A new network direction in housing studies: the case of actor-network theory

Introduction

This paper explores the network as an increasingly popular theoretical paradigm in institutional and sociological readings of market, governance and housing research and seeks to build upon the recent special edition of *Housing, Policy and Society* (2007, Vol. 24, No.1) by positioning actor-network theory as a new theoretical direction for housing research. Although the special edition provided a comprehensive and timely discussion of "the most relevant strands of network theory" (Mullins & Rhodes, 2007:10) in housing studies (social housing in particular), the absence of a detailed discussion of actor-network theory is remiss given its growing recognition in the post-structural social sciences more broadly. The paper provides an overview of actor-network theory and highlights potential areas where it can contribute to housing studies.

In traditional readings, network forms of organisation have been defined as any collection of (human) actors that pursue repeated, enduring exchange relations with one another and, at the same time, lack an organisational authority to resolve disputes that may arise during the exchange (Podolny & Page, 1998). As a result, the network has become an alternative to market or hierarchical exchange (Mullins & Rhodes, 2007), as network modes of resource allocation and transaction are seen to occur neither through direct exchange nor administrative fiat but through networks of individuals and organisations engaged in reciprocal, preferential, and mutually supportive actions (Cooke & Morgan, 1993). In these readings an emphasis is placed on institutional stability, which is dependent upon continuing consensus and coalition building (Lowndes, 2001).

Although actor-network theory has a relative short history within geography, urban policy analysis and housing studies, it is increasingly positioned at the forefront of research into both economic functioning and the spatial and temporal expression of (sub)urban existences (Amin & Thrift, 2002; Whatmore, 1997; Murdoch & Abram, 2002). In contrast to more structural and institutionally stable network readings, actor-network theory offers a means through which the silent, absent, and 'invisible' actors and interactions can be identified and articulated in a more comprehensive analysis of urban life.

After a brief overview of network theorisations, the paper positions actor-network theory as an approach capable of capturing human actors and non-human actors functioning in more detail. As a theoretical premise, actor-network theory recognises the role of non-human actors within the construction of housing and offers a topological reading of the world where actors, rather than being on different scales, are more or less connected (Latour, 1993; Murdoch, 1997a).

Network Theorisations

The basic assumption of networks is that human actors are mutually dependant upon resources controlled by others and that this gives rise to the pooling of resources. Even the simplest networks are inherently complex, as they involve neither the explicit criteria of the market nor the well-organised routines of hierarchies (Cooke and Morgan, 1993). While, as an organisational structure the network is positioned as a hybrid of markets and hierarchy elements, it is nevertheless positioned as expressing a separate and different mode of exchange, one with its own logic (Dicken et al., 2001). Network theorists have come to conceptualise enterprise and exchange as governed by social interactions that are motivated by desires for power, access to information, personal attitudes, and social support, to name a few (O'Neill & Gibson-Graham, 1999). The perceived advantage of networks of associations is that they depend not only on who is involved but also on the extent to which contacts foster greater trust and consensus among those who interact (Schneider et al., 2003). Thus repeat interaction within networks is seen to create an environment conducive to learning as these interactions preserve a greater variety of search routines than in hierarchies and also convey richer, more complex information than the market.

Nevertheless, critics have argued that network analyses treat the network as given and attempt to determine simply how an individual's position within the network affects the degree of influence that can be exerted within it (Leitner et al., 2002). Structuralists argue that while creative and innovative interaction may be possible, it is heavily circumscribed by the (fixed) systems of power and domination that frame certain social situations and that give rise to the most important social outcomes (Murdoch, 1997b). Even those theories that attempt to focus on institutional ensembles and interrelations, such as regulation theory, tend to lean towards structuralism, as institutional assemblages become explained principally by their structural coupling to the mode of production and mode of regulation (Murdoch, 1997b).

An alternative to more structural understandings of networks sees them not as organisational structures, but as essentially *relational processes*, which when realised empirically within distinct time- and space-specific contexts (Dicken et al., 2001). Relational processes need not indicate in any way, a priori, local clustering or properties of place, as relational proximity can potentially occur at a distance. In this sense, following Giddens' structuration arguments (1981; 1984), networks become condensates of both social agency *and* social structure: social agents act in the context of network relations and these same relations reflect structural forces (Peck, 2005).

This tradition has a long history in housing research, drawing heavily on the work of Patsy Healey (1991a; 1991b; 1992; 1994; Healey & Barrett, 1990). Healey presents an institutional reading of residential property that emphasises the social over the economic, the regional over the national, and agency over structure. Here the production of space, markets and institutions is captured best in the complex articulation between structure and agency, which is consistently in motion (Guy & Henneberry, 2000). As such, residential property is positioned as the product of socially and economically interrelated aspects of a wider process. This institutional approach allows the exploration of the market as constructed by competing

design, development, and investment actors at local, national, and global levels over time (Guy and Henneberry, 2000). Under this premise, an actor's network identity is the result of what has gone before and by current relations with others, rather than the expression of stable positions and structures. As a result, the inherent agency assumed in much network literature is destabilised. Structuration, therefore, argues that while actors live within culturally-bound structures of rules and resource flows, these structures are remade in each instance, while simultaneously, in remaking these structuring forces, actors also change their own configuration and culture. Structures therefore retain only a virtual existence as they persist as "instantiations" as both the medium and outcome of actors' behaviour (Murdoch, 1997a:323). But does this go far enough? Only recently has the question of what lies behind the network paradigm theoretically been explored – a process furthered by actor-network theory.

Actor Network Theory

The notion that networks function through distinctive cross-cutting ethnologies, which are produced in particular spaces and times as a consequence of the way actors relate to one another is vital in developing more conceptual network analyses (Amin & Thrift, 2002). Murdoch (1998) argues that networks draw together materials that have their own space-time, into new and different associations. Therefore, each network traces its own unique time-space that reflects not only the myriad of materials linked in the construction of that network, but also the relationships established between the combined elements. Given that, in such a reading, networks are multiple and static, there is an inherent problem with the network metaphor that implies nodes through which things circulate along fixed channels rather than a set of often tenuous fluid-like flows (Amin & Thrift, 2002). As an alternative to these rigid interpretations, it has been proposed that localities should be seen as constituted by various networks operating at different scales and that, through the use of political, economic, and cultural resources, the local is differentially constructed and represented in these networks (Murdoch & Marsden, 1995).

In these alternative readings the idea is not to explore systems, which imply an immanent logic underlying urban life, but rather to explore the numerous systematising networks that give a provisional ordering to urban life (Latour, 1999; Amin & Thrift, 2002). In other words, we are required to recognise that housing is the product of unique relations manifest in its creation and difficult to identify or transplant elsewhere. Latour (1999) has argued that from its very conception actor-network theory has been a method to learn from the actors themselves, while Law (2004) suggests that actor-network theory presents a methodology where we are required to follow the actors, to trace influences and recognise those with authority outside our bounded conceptions. In the case of housing studies, we are required to trace all those associations and actors that facilitate housing development, its experience, its meaning and its identity – no matter which spatial scale they originate, no matter whether they are human or non-human, no matter whether they are specifically identified as housing related.

Actor-network theory is a research agenda based on no stable theory of the actor (Callon, 1999:181). Yeung (2002) notes that much of the work that draws on actor-network theory

places its analytical focus on unearthing the complex web of relations between humans and non-humans, and attempts to accord non-humans their due place in the construction of the world. It is important to note that the tendency of non-human actors to interact in certain ways (such as the tendencies and qualities of building materials) has significant impacts on the apparent structure of the social (Law, 1992). If these non-human actors disappear or change then the social would also change. Thus, the role of non-human entities must be developed along with the more traditionally conceived human actors as they are equally important to the network. This recognition of non-human actors is especially pertinent in the field of housing studies given that housing is after all an inanimate object, yet it flows through our identities and is, in turn, composed of a multiplicity of non-human components. Actor-network theory proposes that there are many possible modes of ordering, not just one (Law, 2000c) – there is no single translation of residential development/housing. This argument draws parallels to Ball's (1981; 1983; 1985; 1986a; 1986b) notion of *Structure of (Building) Provision* that suggests that housing development is the product of a unique set of relations. However, while Ball argues that each tenure has its own structure of provision in an actor-network theory reading, each dwelling is the product of unique actor interactions. According to Latour (1996) the world's complexity cannot be divided into discrete levels of bounded space that fit neatly together (cited in Herod & Wright, 2002) and as housing researchers we must explore those actors that influence housing, no matter where they originate.

Actor-network theory claims that modern societies cannot be analysed without recognising them as "having a fibrous, threadlike, wiry, stringy, ropy, capillary character that is never captured by the notions of levels, layers, territories, spheres, categories, structure, systems" (Latour, 1997, cited in Dicken et al., 2001:104), where (apparent) social structures are built and maintained through complex and heterogeneous assemblages (Latham, 2002). In this reading housing is the expression of a complex array of divergent, temporarily stable actors. According to actor-network theory, all phenomena are the products of heterogeneous networks, where the complexity of interaction and agency is inevitably beyond the vision of actors themselves as neither planners nor developers understand the extent of their reach nor the multiplicity of actors (building materials, site topography, planning policy) and arrangements (institutional, political, market, social) that facilitate/mediate their operation/identity. Rather, the networks that constitute actors and all other phenomena become represented as a single block: they are replaced by an action (Law, 1992). For example a house is a product of a series of actors that facilitate its identity, a builder is the amalgam of a series of human and non-human actors, while housing policy is the expression of a multiplicity of interested (and uninterested) actors.

Thus, for actor-network theory, the network acts not as a noun but as a verb. Networks are not free-standing entities, but the sites of struggle, relational effects that "recursively generate and reproduce" themselves (Law, 1992:4). The notion of the network, as used in actor-network theory, provides a description of the complex webs of actor relations effectively serving to de-centre the economic and to overcome the binary between subjects and objects (Yeung, 2002) as both builders and bricks have roles vital to housing, as does policies of social housing, state fiscal management and urban planning. In a relational approach none of these bodies and bits

is privileged. This highlights the fact that any or all of them are necessary in the production of a local ordering (Yeung, 2002). Thus, it is not a stretch for housing researchers to position social housing provision (at least in the Australian case) as the result of shifts in state funding, residential housing markets, increased social polarisation, poor dwelling quality and maintenance, inter alia. In housing studies we should not ignore human actors outside the existing institutional frames or non-human actors; rather, we should recognise their role and trace their influence. The study of actor networks is, therefore, the study of associations between different materials and relations through which orders and hierarchies are made (and unmade) and through which society is held together and made durable (Latour, 1986; Latham, 2002).

Actor-network theory is semiotic in nature as the significance and meaning of something depends on its relations, especially those relations between it and its neighbours (Law, 1994; 2000c). Actor-network theory suggests that all entities achieve their significance through their relations with other entities (Law, 2000a). In the case of housing studies, an actor, say a developer, policy officer or household, is the product of those relations in which it is embedded, as the relations with other actors shift, so too does the identity/influence of that actor. For example, and rather simplistically, developers mobilise differential institutional (formal/legal) arrangements depending on who they are engaging, while endangered species (as defined by State and Federal conservation policies) are only powerful in a housing market experiencing demand for housing at particular sites. In addition to the realisation that actors exist as the consequence of the relations in which they are located, they are also *performed* in, by, and through these relations (a process of translation) (Law, 1999).

The remainder of the paper explores in detail the components of an actor-network theory approach, highlighting the role of heterogeneous associations and hybrid collectifs, the process of translation and power, immutable mobiles and topology in turn and how these insights can be used to provide a more theoretical network approach in housing research.

Heterogeneous Associations and Hybrid Collectifs

Actor-network theory argues that social relationships count for little unless they are held together by durable and resilient materials (Murdoch, 1998). Actor-network theory, therefore, calls for the interpretation of the hybrid network that places emphasis on the multiple agency of hybridity – the mobilisation of the animate, mechanical, and discursive modalities of being within and between differently-configured possibilities of individuality (Whatmore, 1997). Agency is, therefore, the collective capacity of heterogeneous networks, in which the activities of non-humans may count for as much, or more, as the activities of humans (Murdoch et al., 2000). The strength of actor-network theory is this underlying premise that the world is made up of complex 'imbroglios' of human and non-human actors (Latham, 2002:116). We as housing researchers need to recognise that, for example, the builder in not just a man, but an imbroglio of building equipment and materials, building design, relations with council staff, consultants, suppliers, unions and industry associations. Thus, actors do not exist in and of themselves. Rather, they are constituted in networks of which they form a part, where actors are sets of relations or sets of relations between relations (Law & Mol, 1995). Therefore,

machines, people, social institutions, the natural world are all effects or products (Law & Mol, 1995). For example new housing is the end product of, inter alia, housing market operations, land availability, centralised planning, society perceptions of ownership and dwelling types, builders and developers, survey equipment, expert consultants, site topography. Clearly, it is not a stretch to theorise housing as the outcome of complex and multiple interactions of human and non-humans, as well as institutional and discursive constructs. Here there is no distinction between humans and non-humans; rather, it acknowledges that housing is an effect of distributed heterogeneous arrangements of materials rather than the intentional activity of humans alone (Hetherington & Law, 2000).

While this approach may seem radical to some, Murdoch (1995) positions the heterogeneity of actor networks as a somewhat middle ground between economics' recognition of *things* that draw actors into a relationship, and sociology where actors define themselves through *interaction*. Putting these together leads to the idea that actors define one another through interaction – via the intermediaries that they put into circulation (Murdoch, 1995). According to Callon (1991:134) an intermediary is "anything passing between actors which define the relationship between them". Importantly, Callon (1991) identifies four primary types of intermediaries: literary inscriptions (books, articles, patents, etc.); technical artefacts (machines and other non-humans); human beings (in particular their skills and knowledge) and money (as an institutional means of exchange). The scope to explore the role and influence of intermediaries in housing studies is vast given the influence of, inter alia, building designs, tools, consultants, housing subsidies, survey equipment, bricks, pipes, labour unions as intermediaries in the construction of housing is enormous. The difference between actors and intermediaries is the capacity to act as an author, "an [actor] is an intermediary that puts other intermediaries into circulation" (Callon, 1991:141). Thus, an actor mobilises intermediaries to create new arrangements. Further, the capacity to define an actor is inherently empirical, as we must identify and follow those with the capacity to mobilise others for the purpose of securing an appropriate network outcome In other words, we as housing researchers must trace those that mobilise others for the purpose of creating housing while recognising that these relations are temporarily fixed. Importantly, Callon (1991) also suggests that the definition of actor and intermediary is far from static, given that at any time one may enrol others for the purpose of securing a network translation, while at other times one may also be enrolled by others and expected to circulate through networks in support of another's translation: thus, a consultant is an intermediary if it is mobilised by a builder to aid the development of housing; however, the consultant is also an actor who enrols and mobilises, for example, survey equipment to generate this translation. Enrolling is the process by which actors constitute other network actors in their own identity or agency. In this sense human agents are never located in bodies alone, but rather each actor is a patterned network of relations, or an effect produced by such a network – hence the term actor network. All actors (human and non-human), therefore, draw things together, albeit in particular ways and styles (Law, 2000b).

Thus agency is the expression of constant and stable heterogeneous configuration. An object is an object, or an actor an actor, only if everything stays in place; that is, if the relationships between it and its neighbouring entities hold steady (Law, 2000c). However, it should be

noted that nearly all networks look tighter than they actually are, and are held together by the activities of intermediaries, which can potentially break down in spectacular ways (Amin & Thrift, 2002), after all legislation can change, scientific equipment fail, endangered species be found, interest rates can rise. While an actor retains its agency only through its relation with others, they need not be present, at least in the immediate spatial context. Thus, actor-network theory presents an alternative conception of spatiality (Law, 2000c). In this light, the legitimacy of an actor may be facilitated through a non-spatially present entity. For example we must recognise that a planning document is legitimised in part by the accepted accuracy of surveying equipment. Murdoch (1995) suggests that for any social order to be effective and stable it must spread across space and time; however, quoting Law (1994), he notes that, left to our own devices, our human actions and words would not spread very far at all. It is instead the materials, such as texts and technologies (i.e. intermediaries), which form a crucial part of this ordering (Murdoch & Marsden, 1995), such as a planning policy developed away from the site housing development. Therefore, any consideration of the length and breadth of heterogeneous associations entails shifting to the exploration of the past, the far-away, and the non-human.

Translation and Power

One of the central components of actor-network theory is the process of translation. Translation is used to describe the ways that agency is ascribed and negotiated through a network (O'Neill & Whatmore, 2000). Translation is an attempt to dissolve the classic dualism of natural and social, as the properties of all enrolled entities are derived from their relative position within a network (Murdoch, 1997a). Therefore, no actor has essential qualities or representations. Rather the object of translation is to explore how the ordering of actors generates the possibility that one thing (an actor) may stand for another (a network) (Law, 1992). As researcher we should then understand that: a house translates the processes/actors/intermediaries responsible for its construction; a builder translates on behalf of the development site (including non-human intermediaries/actors, such as endangered species and topography), the objectives/price constraints of potential purchasers, the 'housing market', the desire for profit, the state based planning and building control; and the list could go on.

Translation involves a complex series of negotiations where expressed identities are fought over, roles are ascribed, and power relations fixed. However, initial actor identities are challenged and redefined by the network builders as new sets of relations are established (Murdoch, 1997a). These network builders become the translators or spokespersons for the entities that constitute them (Callon, 1986a; 1986b) as they come to express their desires, thoughts, interests, and mechanisms of operation. For example, local government is seen to translate on behalf of local residents, environmental constraints, development pressures; industry representatives are seen to translate builders, developers, consultants, and, at times, housing affordability and households.

Thus, O'Neill & Whatmore (2000) contend that the focus of housing research should be the performance of key figures: their talk, their relations, and their practices. Housing research

should then explore the actions of developers, builders, planners, residents, politicians, but of course we already do this, rather, it is the detail and linkages that we follow that would change under an actor-network theory framework. However, this reading may imply an apparent simplicity – that actors simply speak and act on behalf of others. Rather there is, what Callon & Law (1995: 4) term, 'chains of translations', often of varying length and kinds. These chains represent the repeated translations of actors as an actor network grows in size. It is, therefore, virtually impossible for an actor to express the desires and goals of all those actors that grant it agency – local government does not translate on behalf of all its constituents, the question is then, who does it translate for? What have these constituents mobilised to be enrolled in the translation (e.g. political lobbying)? Which actors are outside the translation/actor-network? What intermediaries does it put in to circulation to facilitate this translation (e.g. local media or formal policy instruments)? The power of the translator is that it speaks on behalf of these actors, yet does not necessarily need to speak in a fashion, or pursue goals, of its constituents. Therefore, building on the previous example, it is likely that while local government may translate on behalf of some of its constituents, the translation would not be the same if it came from the actors themselves.

While the process of translation is typically contingent and variable, Law (1992) suggests four general features that aid in successful translation. First, it should be recognised that some materials are more durable than others and, thus, maintain their relational properties for longer: a formal policy directing housing is more stable than a newspaper article by a local NIMBY group or informal associations with policy actors may be more durable than formal policy. Therefore, for translation with a higher level of permanency these materials should be enrolled in the performance of the network's objectives. Second, translation is increased through the enrolment of actors, which are relatively mobile, and which attempt to order network construction through space: the enrolment of statistics of population growth or housing market performance is difficult to challenge yet can be easily mobilised across a variety of sites of development. These actors have the ability to act at a distance, potentially becoming the immutable mobiles that transverse topologies to maintain order (Latour 1988). Further examples of such durable materials in residential development are statutory and strategic planning documents. Third, the process of translation is significantly more successful if it anticipates the responses and reactions of the materials to be translated: builders are aware that development may cause issues with the local community and, thus, need to have strategies to confront any challenge. Finally, an understanding of ordering is needed. Thus, the process of translation must recognise that expressions (and their interpretation and influence) may alter given the environment (institutional, political, emotional) in which they are expressed (Law, 1992).

The notion of the translator places the issue of power firmly at the centre of the research agenda. Thus, power is not a matter of inevitable strength, nor are those who are powerful those who hold power. Rather, in an actor-network theory framework, the powerful are those who enrol, convince, and enlist others into networks on terms that allow the enrolling actor to represent others; the stronger the network the stronger the translating actor (Murdoch, 1995). In this sense power is not something endowed by nature, but rather something that is achieved

(Callon et al., 1986a) as an actor is given the authority to speak or act on behalf of others (Callon and Latour, 1981; Allen, 2003). Housing examples may include: the capacity of local government to translate on behalf of local residents and the policy directions of higher tiers of government; the capacity of expert consultants to translate on behalf of site specific considerations; the capacity of housing and urban development industry organisations to translate on behalf of their members and/or the housing market more broadly; the capacity of homeowners to translate feelings of home; parents to translate feelings of safety or security on behalf of their children. Thus, according to Latour (1988), an actor is powerful only if it speaks for others, if it can make those it silenced speak when called upon to demonstrate its strength, and if it can get those who challenge it to confess that it is speaking truthfully on behalf of its constituents. For example, when developments are challenged on environmental grounds, can builders get expert consultants to translate the impact of the development? Can these consultants, in turn, mobilise appropriate scientific studies? In instances where the translation process is weakly executed, the enrolling actors are continually subject to questions of their status and find it hard to mobilise other parts of the network (Murdoch, 1995). Thus, the lack of methodological rigor by consultants can destabilise translations of development or anti-development politicians are unable to get community support through electoral means.

In an actor-network theory conception, power is something that is not held *in potentia*, it is something that is exerted *in actu* as others perform the actions, not the actor itself (Latour, 1988; Murdoch & Marsden, 1995). In this conception, power is a composition made up of many actors, but attributed to one of them, with the amount of power exercised the product of the number of actors involved, rather than how much power someone holds. Therefore we should position developers are powerful because they enrol relations with councils, housing market statistics, scientific methodologies/studies, etc. The importance of individual actors rests, therefore, with the particular ways through which they enter into and engage with the complex webs of relational networks (Yeung, 2002). Further, actor-network theory focuses on the ability of actors to act at a distance by entraining/enrolling other actors and the necessary material objects, codes, institutions, discourses, rhetoric and procedural frameworks to effect the activation of power (Dicken et al., 2001; Latour, 1993; Murdoch & Marsden, 1995). According to Allen (2003:132):

> The mobilisation of artefacts, the gathering of information, and the recoding and charting of absent words becomes the means through which administrators, scientists, and politicians [builders, developers, planners, Social Housing Authorities, Urban Development Corporations] 'back home' impose not just their understanding on distant others, but their sense of order too.

Under an actor-network theory conceptualisation these resources (e.g. policy documents, legal devices, professional experience, discourses of affordability or ownership, designs of houses, planning approaches [such as new urbanism]) are important elements in enrolling actors and giving durability to network interactions and their long-term objectives and outcomes (McGuirk, 2000). The focus is therefore, the means by which certain actors actively consolidate the position of others and how spaces are connected in ways that permit certain actors to determine the shape of others from a distance (Murdoch, 1998). For example central planning policy is powerful enough to influence development at distant sites, while new building technologies can transform all new dwellings. Power is, thus, associated with the

length at which influence can be maintained, where power equals length of network reach (Murdoch et al., 2000). Therefore, power comes to represent the extent to which network actors and translations are enrolled and transmitted through other networks.

The notion of 'at a distance' control or power should, however, not suggest that there is a coherent and stable core that seeks to influence and direct some distance periphery (Whatmore & Thorne, 1997). Further, the act of network translation, or acting at distance through a series of statements, does not in itself ensure the transmission of that power, rather the translator needs to be aware of the path its statement will follow, a path that ultimately depends on what successive listeners do with the statement (Latour, 1991). Housing centred research must recognise therefore that policy will be interpreted differently at each site of development, that issues of urban design will be challenged in local contexts, and that notions of community development will be mediated by local population profiles. Therefore, actors need to ensure that their translations are understood and interpreted in analogous ways to the objectives of the translating actor-network. The ideal power translation is, therefore, to dissolve the notions of 'here' and 'there' through the establishment of near instantaneous reach (Allen, 2003).

While some actors have the ability to enrol others into powerful networks for which they translate, this is not to say that any actor is so powerful that its decisions and associations as a whole will be finally and definitively considered a technical reality (Callon & Latour, 1981). Here the unpredictable nature of networks becomes paramount as each new enrolment is potentially different from the last, perhaps opening up a small space for forms of resistance (Murdoch, 1997a). For example each interaction between developer and council is different due to different site characteristics and enrolments to translate these characteristics. Similarly Allen (2003) argues that while there are many different avenues of interaction that bridge the distance between here and there, these interactions also create the possibility for political interventions, for negotiation, appropriation, accommodation, and resistance, for instance different interpretations of housing policy leads to challenge. Amin and Thrift (2002) suggest that networks appear much tighter than they actually are, as the plethora of intermediaries that roam networks may and do often shatter and breakdown. For example survey equipment can break, interest rates can rise, elections can be won and lost, etc, changing the network and its power construct.

While the process of translation effectively positions certain actors at the centre of a network system, this is not to say that translation is an inevitable process. The order or desire of the translator moves through the series of actor networks where the translation is inevitably changed through the interpretations of other actors. We can see, for instance, that policy texts may be interpreted differently by different actors (e.g. developers or local conservation groups) for the purpose of their own objectives. Translation is, therefore, a process of continual translation (one that is contingent of relations with other networks), not a process of simple transmission (the straight expression of one actor network) (Latour, 1991). We as housing researchers must therefore explore how builders/local governments change their translation in the face of challenge? What new actors/intermediaries do they enrol to strengthen their network? Translation, thus, cannot be taken for granted as the strategies used

and the interpretations expressed depend upon the particular circumstances in which they develop (Callon, 1986a; 1986b). We can see this when builders mobilise different networks to secure development approval in different local government areas.

Immutable Mobiles

Although the heterogeneous associations of a network can extend across space, the extent to which actor networks can influence other spaces is vital. The proposition forwarded by Latour (1993; 1999) is that of the 'immutable mobile'. Immutable mobiles are those actors within a network that facilitate its expansion. Examples in housing include statistics of demand and population growth, formal policy that remains constant across development sites, and discourses of affordability. They act as are objects that erode or stabilise particular capacities and sustain patterns of connections allowing actor networks to pass with continuity from the local to the global, and from the human to the non-human (Whatmore & Thorne, 1997). In this sense, Smith (2003:36) contends that networks and actors "are made by that which passes through them". We see that local councils are partially constructed by the flow of development and social service legislation, metropolitan plans from higher tiers of government and housing market pressures – each of which remain constant as they control the actions of the council. Thus, networks are not viewed as empty infrastructures through which immutable mobiles move, but rather are constructed through the interaction of the actors themselves (Smith, 2003). Further, their mobility across Euclidean space becomes possible because of this network (or actor) immutability (or fixity), as an actor displaces itself from one location to another (Mol & Law, 1994; Law, 2000c). In this sense, everything that flows is not a fluid, as immutable mobiles retain their shape in network space even as they move in Euclidean space (Law, 2000c).

Immutable mobiles are important because they weave together to form networks, actors, houses, cities, and so on. In effect, immutable mobiles become the method and material of long-distance control (Smith, 2003). One of the most important, and indeed most discussed applications of immutable mobiles, is that of knowledge creation and texts. While early research highlighted how texts are vital to the long distance control of science originating in a few laboratories (Callon et al., 1986b), immutable mobiles (in this case, texts) have become increasingly important as the objects that allow knowledge to be used well beyond its place of origin (Latour, 1988a; Latham, 2002). Housing studies abounds with texts that flow through space: urban policy, advertisement material and NIMBY newsletters, statistics, building regulations, to name a few. In addition to providing the foundations of power and actor representation and expression, immutable mobiles form the central actor-network theory premise on spatial conceptions of topology.

Topology

While immutable mobiles may play significant roles in the expansion and stabilisation of a network across space, it is important to note the actor-network theory provides a significantly

different analysis of space. Actor-network theory suggests that Euclidean representations of space that appear natural are in fact created and performed through a different kind of spatiality (Law, 1999). Opposed to a structuralist approach of the bounded region, the topological presupposition of the network addresses the intertwining of networks and is based on pragmatist, constructionist, and ethnographic approaches.

Topology is a branch of geometry that is concerned not with distance and exact location, but rather with the ways in which relations are stretched and folded while simultaneously maintaining certain essential properties as a space (Latham, 2002). In this interpretation, objects are not located in terms of given coordinates. That is, actor-network theory is concerned with a spatial imagination that traces points of connection and the lines of flow, rather than reiterating fixed surfaces and boundaries (Whatmore & Thorne, 1997). Thus, proximity and position are not metric; there is no inside or outside boundaries, rather 'proximity' is semiotic in nature.

This alternative spatiality, a network topology, is the expression of network associations that are produced through the space of the network (Mol & Law, 1994). Thus, an actor-network theory topology argues that there is no difference between macro and micro or global and local, but rather that longer networks can simply reach further than others (Latour, 1993; Murdoch, 1997a; Latham, 2002) In housing research we need to recognise that local and national policy are equally influential in the creation of property: neither should be seen as more important/authoritative.

In this reading, the metaphor of scale is replaced by a metaphor of connection (Dicken et al., 2001). The objective in such a reading of space and place is not to play down their significance and the phenomena that are expressed therein, but rather to see localities as part of a larger network environment, one that is not separate from global, transnational, national, or local influences (Amin & Thrift, 1994a). In this interpretation research should recognise all of those actors that flow through housing no matter what scale they originate. The network (as envisaged in actor-network theory) is, therefore, an inherently topological entity, as it (following its semiotic nature) retains both its network identity and its spatial expression by virtue of its position in a set of links or relations (Law, 1999) as relations/actors/intermediaries that shape housing originate at a variety of spatial and temporal locations, all of which can shift. The acknowledgment of a network topology allows for the deconstruction of place, which facilitates the crossing and breaking down of apparently place-based and institutional barriers, simultaneously removing the hierarchical division of micro and macro (Law, 1999). We therefore need to recognise that housing is not the outcome placed based phenomenon, but the place based expression of topological relations that spread well beyond the site of development itself. In this sense, scale and size are not positioned as inherent spatial representations, but are (also) considered to be relational effects (Law, 2000d); Euclidean space (like actors and networks) is therefore, a performance (Law, 2000c).

Conclusion

The special edition of *Housing, Policy and Society* (2007, Vol. 24, No.1) provided a thorough analysis of network theorisations centred on human, organisational networks charged with managing social housing. Nevertheless, this review failed to recognise the increasingly popular and powerful actor-network theory as a paradigm that can inform housing studies. As a theoretical premise, an actor-network theory approach to housing should highlighted the fact that the relations and interactions that create property are not spatially confined to a site of development, nor are those actors responsible for property and planning construction consistent across spatially defined translations.

An actor-network theory centred analysis proposes that a single, comprehensive theory of residential property, planning and housing is extremely difficult to achieve, and, in fact, is undesirable, given the multiplicity of topological actors that differentially interact in each policy translation and development application. Thus, given that each network represents a different set of actors, processes, enrolments, and translations, an actor-network theory approach that facilitates the entering and following of each of these networks has the ability to explore the key intricacies and nuances of planning, development and housing, be they human or non-human, present of absent.

References

Allen, J. (2003) *Lost Geographies of Power* (Malden: Blackwell).

Amin, A. & Thrift, N. (1994) Living in the Global, in A. Amin & N. Thrift (Eds), *Globalisation, Institutions, and Regional development in Europe* (Oxford: Oxford University Press).

Amin, A. & Thrift, N. (2002) *Cities: Reimagining the Urban* (Cambridge: Polity Press).

Ball, M. (1981) The development of capitalism in housing provision, *International Journal of Urban and Regional Research*, 5, pp. 145-177.

Ball, M. (1983) *Housing Policy and Economic Power: The Political Economy of Owner Occupation* (London: Methuen).

Ball, M. (1985) Coming to terms with owner occupation, *Capital and Class*, 24, pp. 15-44.

Ball, M. (1986a) Housing Analysis: Time for a Theoretical Refocus? *Housing Studies,* 1(3), pp147-165.

Ball, M. (1986b) The built environment and the urban question, *Environment and Planning D: Society and Space,* 4, pp. 447-464.

Callon, M. (1986a) The Sociology of an Actor-Network: The Case of the Electric Vehicle, in M. Callon, J. Law & A. Rip (Eds), *Mapping the Dynamics of Science and Technology: Sociology of Science in the real world* (Basingstoke: MacMillan).

Callon, M. (1986b) Some elements of a sociology of translation: domestication of the scallops and fishermen of St Brieuc Bay, in J. Law (Ed.), *Power, Action and Belief: A New Sociology of Knowledge*? (London: Routledge and Kegan Paul).

Callon, M. (1991) Techno-economic networks and irreversibility, in J. Law (Ed.), *A Sociology of Monsters: Essays on Power, Technology and Domination* (London: Routledge).

Callon, M. (1999) Actor-network theory - the market test, in J. Law & J. Hassard (Eds), *Actor Network Theory and After* (Oxford: Blackwell).

Callon, M. & Latour, B. (1981) Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so, in K. Knorr-Cetina & A.V. Civourel (Eds*), Advances in Social Theory and Methodology: Towards an integration of micro- macro-sociologies* (Boston: Routledge and Kegan Paul).

Callon, M & Law, J (1995) Agency and the Hybrid Collectif, *South Atlantic Quarterly*, 94(2), pp 481-507.

Callon, M., Law, J. & Rip, A. (1986a) How to study the force of science, in M. Callon, J. Law, & A. Rip (Eds), *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (Basingstoke : MacMillan).

Callon, M., Law, J. & Rip, A. (1986b) Putting texts in their place, in M. Callon, J. Law & A. Rip (Eds) *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (Basingstoke: MacMillan).

Cooke, P. & Morgan, K. (1993) The network paradigm: new departures in corporate and regional development, *Environment and Planning D: Society and Space*, 11, pp. 543-564.

Dicken, P., Kelly, P.F., Olds, K. & Yeung, H. (2001) Chains and networks, territories and scales: towards a relational framework for analysing the global economy, *Global Networks*, 1(2), pp. 89-112.

Giddens, A. (1981) Agency, institution, and time-space analysis, in K. Knorr-Cetina & A.V. Cicourel (Eds), *Advances in Social Theory and Methodology: Towards an integration of micro- macro-sociologies* (Boston: Routledge and Kegan Paul).

Giddens, A. (1984) *The Constitution of Society: Outline of the Theory of Structuration* (Cambridge: Polity Press).

Giddens, A. (1990) *Consequences of Modernity* (Cambridge: Polity Press).

Granovetter, M. (1985) Economic action and social structure: The problem of embeddedness, *American Journal of Sociology*, 91(3), pp. 481-510.

Guy, S. & Henneberry, J. (2000) Understanding Urban Development Processes: Integrating the Economic and the Social in property Research. *Urban Studies*, 37(13), pp. 2399-2416.

Hodgson, G. M. (1993) Institutional Economics: Surveying the 'Old' and the 'New'. *Metroeconomica*, 44 (1), pp. 1-28.

Hodgson, G. M. (2001) *How economics Forgot History: The problem of historical specificity in social science*, (London: Routledge).

Healey, P. (1991a) Models of the development process: a review, *Journal of Property Research*, 8, pp. 219-238.

Healey, P. (1991b) Debates in planning thought, in H. Thomas & P. Healey (Eds), *Dilemmas of Planning Practice* (Aldershot: Avebury Technical).

Healey, P. (1992) An institutional model of the development process, *Journal of Property Research*, 9, pp. 33-44.

Healey, P. (1994) Urban policy and property development: the institutional relations of real-estate development in an old industrial region, *Environment and Planning A*, 26, pp. 177-198.
Healey, P. (1997) *Collaborative Planning* (London: MacMillan).

Healey, P. & Barrett, S. M. (1990) Strategies and Agency in Land and Property Development Process: Some Ideas for Research, *Urban Studies*, 27(1), pp. 89-104.

Herod, A. & Wright, M. W. (2002) Placing Scale: An Introduction, in A. Herod & M. W. Wright (Eds), *Geographies of Power: Placing Scale* (Malden: Blackwell).

Hetherington, K. & Law, J. (2000) Guest Editorial: After Networks, *Environment and Planning D: Society and Space*, 18, pp. 127-132.

Latham, A. (2002) Retheorising the Scale of Globalisation: Topologies, Actor-networks, and Cosmopolitanism, in A. Herod & M.W. Wright (Eds), *Geographies of Power: Placing Scale* (Malden: Blackwell).

Latour, B. (1986) The powers of association, in J. Law (Ed.) *Power, Action and Belief: A New Sociology of Knowledge?* (London: Routledge and Kegan Paul).

Latour, B. (1988) *The Pasteurization of France* (Cambridge: Harvard University Press).

Latour, B. (1991) Technology is society made durable, in J. Law (Ed.) *A Sociology of Monsters: Essays on Power, Technology and Domination* (London: Routledge).

Latour, B. (1993) *We Have Never Been Modern* (Cambridge: Harvard University Press).

Latour, B. (1999) On recalling ANT, in J. Law & J. Hassard (Eds), *Actor Network Theory and After* (Oxford: Blackwell).

Law, J. (1992) *Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity* (Lancaster: Centre for Science Studies and the Department of Sociology, Lancaster University).

Law, J. (1994) *Organizing Modernity* (Oxford: Basil Blackwell).

Law, J. (1997) *The Manager and His Powers* (Lancaster: Centre for Science Studies and the Department of Sociology, Lancaster University).

Law, J. (1999) After ANT: Complexity, naming and topology, in J. Law & J. Hassard (Eds), *Actor Network Theory and After* (Oxford: Blackwell).

Law, J. (2000a) *Networks, Relations, Cyborgs: on the Social Study of Technology* (Lancaster: Centre for Science Studies and the Department of Sociology, Lancaster University).

Law, J. (2000b) *Economics as Interference (Draft)* (Lancaster: Centre for Science Studies and the Department of Sociology, Lancaster University).
Law, J. (2000c) *Objects, Spaces, Others (Draft)* (Lancaster: Centre for Science Studies and the Department of Sociology, Lancaster University).

Law, J. (2000d) Transitivities, *Environment and Planning D: Society and Space*, 18, pp133-148.

Law, J. (2004) And if the global were small and noncoherent? Method, complexity, and the baroque, *Environment and Planning D: Society and Space*, 22, pp. 13-26.

Law, J. & Callon, M. (1988) Engineering and Sociology in a Military Aircraft Project: A Network Analysis of Technical Change, *Social Problems*, 35(3), pp. 284-297.

Law, J. & Mol, A. (1995) Notes on materiality and sociality, *The Sociological Review*, 43, pp. 274-294.

Leitner, H., Pavlik, C. & Sheppard, E. (2002) Networks, Governance, and the Politics of Scale: Inter-urban Networks and the European Union, in A. Herod & M. W. Wright (Eds), *Geographies of Power: Placing Scale* (Malden: Blackwell).

Lowndes, V. (2001) Rescuing Aunt Sally: Taking Institutional Theory Seriously in Urban Politics, *Urban Studies*, 38(11), pp. 1953-1971.

McGuirk, P. M. (2000) Power and Policy Networks in Urban Governance: Local Government and Property-led Regeneration in Dublin, *Urban Studies*, 37(4), pp. 651-672.

Mol, A. & Law, J. (1994) Regions, Networks and Fluids: Anaemia and Social Topology, *Social Studies of Science*, 24(4), pp. 641-671.

Mullins, D. & Rhodes, M. L. (2007) Special Issue on Network Theory and Social Housing, *Housing, Theory and Society*, 24(1), pp. 1-13.

Murdoch, J. (1995) Actor-networks and the evolution of economic forms: combining description and explanation in theories of regulation, flexible specialisation, and networks, *Environment and Planning A*, 27(5), pp. 731-757.

Murdoch, J. (1997a) Inhuman/nonhuman/human: actor-network theory and the prospects for a nondualistic and symmetrical perspective on nature and society, *Environment and Planning D: Society and Space*, 15(6), pp. 731-756.

Murdoch, J. (1997b) Towards a geography of heterogeneous associations, *Progress in Human Geography*, 27(3), pp. 321-337.

Murdoch, J. (1998) The Spaces of Actor-Network Theory, *Geoforum*, 29(4), pp. 357-374.

Murdoch, J. & Abram, S. (2002) *Rationalities of Planning: development versus environment in planning for housing* (London: Ashgate).

Murdoch, J. & Marsden, T. (1995) The spatialization of politics: local and national actor-spaces in environmental conflict, *The Transactions of the Institute of British Geographers*, 20(3), pp. 368-380.

Murdoch, J., Marsden, T. & Bank, J. (2000) Quality, Nature, and Embeddedness: Some Theoretical Considerations in the Context of the Food Sector, *Economic Geography*, 76(2), pp. 107-123.

O'Neill, P. & Gibson-Graham, J. K. (1999) Enterprise discourse and executive talk: stories that destabilize the company, Transactions of the Institutes of British Geographers, 24, pp. 11-22.

O'Neill, P. & Whatmore, S. (2000) The business of place: networks of property, partnership and produce, *Geoforum*, 31(2), pp. 121-136.

Peck, J. (2005) Economic sociologies in space, *Economic Geography*, 81, pp. 129–176.

Podolny, J. M. & Page, K. L. (1998) Network Forms of Organisation, *Annual Review of Sociology,* 24(1), pp. 57-76.

Powell, W. W. (1990) Neither Market nor Hierarchy: Network Forms of Organisation, *Research in Organizational Behaviour,* 12, pp. 295-336.

Powell, W. W. & Smith-Doerr, L. (1994) Networks and Economic Life, in N. J. Smelser & R. Swedberg (Eds), *The Handbook of Economic Sociology* (New Jersey: Princeton University Press).

Schneider, M., Scholz, J., Lubell, M., Mindruta, D. & Edwardsen, M. (2003) Building Consensual Institutions: Networks and the National Estuary Program, *American Journal of Political Science*, 47(1), pp. 143-158.

Smith, R. G. (2003) World city actor-networks, *Progress in Human Geography*, 27(1), pp.25-44.

Thrift, N. & Olds, K. (1996) Refiguring the economic in economic geography, *Progress in Human Geography*, 20(3), pp. 311-337.

Whatmore, S. (1997) Dissecting the autonomous self: hybrid cartographies for a relational ethics, *Environment and Planning D: Society and Space*, 15(1), pp. 37-53.

Whatmore, S. (1999) Hybrid Geographies: rethinking the 'Human' in Human Geography, in D. Massey, J. Allen & P. Sarre (Eds), *Human Geography Today*, (Cambridge: Polity Press).

Whatmore, S. & Thorne, L. (1997) Nourishing Networks: Alternative geographies of food, in D. Goodman & M. Watt (Eds), *Globalising Food: Agrarian questions and global restructuring* (London: Routledge).

Yeung, H. W. (2002) *Towards a Relational Economic Geography: Old Wine in New Bottles?,* Paper presented to the 98th Annual Meeting of the Association of American Geographers, Los Angeles, USA.