Disability and Rehabilitation
An international, multidisciplinary journal

http://informahealthcare.com/dre
ISSN 0963-8288 print/ISSN 1464-5165 online

Disabil Rehabil, 2014; 36(16): 1350–1359
 DOI: 10.3109/09638288.2014.913710

informa
healthcare

RESEARCH PAPER

DeafSpace and the principles of universal design

Claire Edwards[1] and Gill Harold[2]

[1]School of Applied Social Studies, University College Cork, Cork, Ireland and [2]Faculty of Law, Centre for Criminal Justice and Human Rights, University College Cork, Cork, Ireland

Abstract

Purpose: Recent debates about the epistemological origins of Universal Design (UD) have questioned how far universalist design approaches can address the particularities and diversities of the human form through a series of standardised, technical responses. This article contributes to these debates by discussing an emergent architectural paradigm known as DeafSpace, which articulates a set of design principles originating from the d/Deaf community in the US. *Method*: Commentary. *Results*: DeafSpace has emerged as a design paradigm rooted in an expression of d/Deaf cultural identity based around sign language, rather than as a response designed to compensate for, or minimise, impairment. It distinguishes itself from UD by articulating a more user-centred design process, but its principles are arguably rooted in notions of d/Deaf identity based around consensus and homogeneity, with less attention paid to the socio-political contexts which shape diverse experiences of d/Deafness and the exclusion(s) of d/Deaf people from the built environment. *Conclusions*: While proponents of DeafSpace argue that UD and DeafSpace are not mutually exclusive, nor DeafSpace principles applicable only to d/Deaf people, questions remain about the type of spaces DeafSpace creates, most notably whether they lead to the creation of particularist spaces of and for the d/Deaf community, or reflect a set of design principles which can be embedded across a range of different environments.

➤ Implications for Rehabilitation

- UD as a basis for rehabilitation has been critiqued on the basis that creates ''standardised'', or universal solutions, thus negating the particularities of the human form.
- DeafSpace is an architectural paradigm rooted in socio-linguistic understandings of Deafness and the cultural identity of the Deaf community. It challenges UD's technocratic emphasis on minimising impairment and asserts design which is rooted in a more qualitative understanding of individuals' relationship with their environment.
- DeafSpace seeks to place the user more centrally in the design process and draw on the experiential knowledge of (Deaf) users. However, it has less to say about the often exclusionary socio-political relations which underlie the built environment and shape the diverse experience of deafness.
- DeafSpace raises questions about how the needs of particular groups can be met through UD principles and in turn whether DeafSpace principles lead to the creation of separate spaces for the D/deaf community.

Keywords

Architecture, cultural identity, deafness, DeafSpace, universalism

History

Received 25 October 2013
Revised 26 March 2014
Accepted 31 March 2014
Published online 30 April 2014

Introduction

As a set of principles and practices, universal design (UD) has become increasingly popular as a framework for good design in nations and institutions across the world. It embodies the supposedly egalitarian notion that designing products and spaces for the greatest number of people possible will contribute to a situation in which everyone, no matter how diverse their abilities, will be able to access and participate in barrier-free environments [1,2]. For disabled people in particular, UD is seen to present a solution to the multiple barriers in the built environment which create the experience of disability; by minimising the use of specialist and/or rehabilitative technology, UD has the potential to draw attention away from the individual experience of impairment and any sense of physical and/or mental deficit.

There would appear to be little argument with a concept which seeks to promote access and usability in design for the most people possible. Yet while UD is often accepted as a good thing, we would concur with Imrie [3] that the concept conceals some inherent contradictions and dilemmas (see also [4–6]). Chief of these is how the notion of ''design for all'' – which in effect seeks to disregard people's ''age, size and ability'' [7] can take account

Address for correspondence: Claire Edwards, School of Applied Social Studies, University College Cork, William Thompson House, Donovan's Road, Cork, Ireland. Tel: 00353 (0)21 4902313. E-mail: claire.edwards@ucc.ie

of the multiple particularities and specificities of human beings and the way in which they interact with their environments. In other words, does UD mean ignoring particular types of bodies and spaces, and how, if at all, can universalism capture the full range of human corporeal experience?

It is such a dilemma which provides the focus for this article. In particular, we are concerned with exploring how the design needs of a specific group, in this case the d/Deaf community, illuminate some of the concerns about, and criticisms of, UD. The d/Deaf community has often been seen as a culturally separate minority with its own linguistic heritage, and its members frequently reject any association of d/Deafness with disability or deficit [8–10]. In the past 8 years, notions of a d/Deaf cultural identity have formed the basis for an emergent design and architectural paradigm known as DeafSpace [11,12]. DeafSpace is a set of design principles which emerged from a collaborative effort between students at Gallaudet University in the US (the only university in the world which was designed specifically to accommodate deaf and hard-of-hearing students) and hearing architect Hansel Bauman. While the concept is in the process of evolution and the translation of these principles into architectural examples has been relatively limited beyond the Gallaudet campus, DeafSpace raises significant questions about notions of ''design for all''. In an exposition of the key principles of DeafSpace, for example, Bauman suggests that UD has failed to take account of many of the needs of d/Deaf people and the d/Deaf community by providing merely technical fixes, a criticism which echoes that of other commentators on UD. That said, proponents of DeafSpace also argue that its principles can inform UD, not least in creating environments that are closer to the end user: as Bauman states, ''by making environments in a collectivist way – with a deep sensitivity and awareness of the needs of others, the specific physical and cultural forces of a place and the process of making, deaf people offer a new way to design environments attuned to the full range of physical and sensory abilities'' ([11], p. 29). The question remains however as to the type of spaces DeafSpace principles create: are they exclusive, segregated, spaces only readable to members of the d/Deaf community or do they have the potential to facilitate a broader range of users?

Our aim in this article is to use DeafSpace as a lens to explore debates about particularism and universalism in the design process and more broadly, to reflect on some of the conceptual dilemmas that have been raised about the notion of ''design for all''. Taking cognisance of some of the critiques that have been made about the UD agenda – not least its apparent focus on technocratic fixes and the minimisation of user involvement in the design process [3,13] – we interrogate the conceptual underpinnings of DeafSpace principles, and ask what these can tell us about some of the insufficiencies, as well as the potential of UD. The article therefore seeks an epistemological location of both DeafSpace and UD, but more significantly, considers the relationship between the two design orthodoxies. In particular, we ask what, if anything, DeafSpace can illuminate about the potential of UD to be a design approach which is inclusive of multiple human forms, behaviours and ways of being.

Opening up universal design

UD is an orthodoxy which can be seen as part of the broader assertion of disabled people's rights to gain equitable access to the built environment and society more generally. It emerged as part of the civil rights movements in the US in the 1960s, in which there was a growing consciousness that disabled people faced multiple barriers in accessing and moving around different environments, and that policy solutions, which had tended to operate through codes or standards of building practice, had by and large been ineffectual [2–4]. Whereas the history of provision for disabled people had been focused on finding special solutions to the ''problem'' created by impairment, the UD movement proposed that good, accessible design should not draw attention to bodily and/or cognitive difference or impairment, but rather that it should facilitate as many users as possible, thereby limiting the potential for discrimination and stigmatisation of specific groups [1,14].

The seven principles that make up the concept of UD have been well-rehearsed and discussed in other papers, and it is not our intention to repeat them here [3]. However, suffice it to say that UD is a concept that has gained widespread appeal particularly across the Western world, and has been incorporated in disability policy and legislation in a range of countries. In Ireland, for example, the introduction of the Disability Act 2005 brought with it a requirement to establish a Centre for Excellence in Universal Design (CEUD) as part of the State's National Disability Authority. Typically for such organisations, CEUD describes itself as being ''dedicated to the principle of universal access, enabling people in Ireland to participate in a society that takes account of human difference and to interact with their environment to the best of their ability'' [15], and defines its role in terms of developing standards for UD, contributing to professional education, and raising public and professional awareness of the benefits of UD.

UD has been lauded for offering the potential to create more equitable and user-friendly environments, and by extension more inclusive societies which minimise the stigmatisation that can arise from bodily difference. However, as Imrie and others have noted [3,4,16], the growing popularity of UD has taken place with little discussion of the concept's theoretical underpinnings. In a wide-ranging critique of the concept, Imrie ([3, p. 880] argues that while UD may ''contribute, potentially, to a progressive politics of disability'', the epistemological basis of the concept requires greater investigation and discussion. In so doing, he points to a number of issues which may serve to undermine UD's seemingly progressive principles. One of these is what he characterises as a largely technocratic approach to knowledge production within UD. As he suggests, UD works on the basis of problem-solving, in which ''the design problem is posited as an objective entity that, through the development of applications and standards, will result in the correct outcomes'' [3, p. 876]. It is an approach which he argues represents an unstinting enlightenment belief in progress through technology, whereby technological (design) solutions have the potential to address the challenges of human experience (see also [5]). The problem with such an approach however, is its negation of the social and political relations of design processes and ultimately, disabled people's lives: indeed, as Imrie highlights in his research on accessible housing, building developers and others in the house building industry have frequently been reluctant to address issues of accessible design, not least on the basis of economic concerns [17]. Thus, technical fixes to access cannot be divorced from the social and cultural relations within which they are situated.

Another issue revolves around whose voices have come to dominate UD discourse and practices. It can be argued that UD had its roots in a social movement and the experiential knowledge of users, but Imrie suggests that UD has become institutionalised around a number of groups and organisations in which professional or credentialised voices (designers, architects, academics, government policy officials) dominate [3]. This raises questions about the extent to which the experiential knowledge of users has a place within the development of UD. Despite the fact that the seven principles of UD constantly mention the user (e.g. ''Principle four: perceptible information: the design

communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities''), it has been suggested that there is often a disconnect in the design process between the designer or architect and the end user. As Heylighen [13, p. 536] notes in the case of architecture, for example, ''users tend to be held at arm's length and are only allowed in as abstractions (through functional concerns) or as ideals (through notions of authentic living)''. This is problematic insofar as architects may fail to appreciate the multiplicities of human form and experience. Disabled people, she argues, are uniquely placed to be able to identify particular anomalies or problems in the design of buildings, and therefore ought to be key participants in the design process.

A final issue for Imrie [3] goes to the core of what UD itself stands for: that is, the notion that it is possible, or even desirable, to design environments and products in such a way that the particularity of human form and experience is in effect rendered invisible, or at least minimised. The debate about singularism versus universalism is an enduring one in disability policy, with a move towards ''mainstreaming'' services for disabled people in many Western countries reflecting a recognition that impairment should not be seen as something different or anomalous, but rather an inescapable part of the human condition [18]. That said, there remains a challenge or tension in seeking to create universal environments in the face of the specific needs of different groups. In the context of this article, for example, this is particularly evident in the case of the Deaf community, where the propagation of a positive cultural identity associated with Deaf ways of being has sometimes led to calls for separate facilities and services which might appear segregationist to others outside the community [19,20]. It is unclear then, whether UD has the potential to facilitate the needs of different groups, or whether instead calls for universalism will create a dominant orthodoxy in which difference becomes subsumed (and ultimately marginalised) within a process of standardisation.

The critiques of UD outlined above are neither exhaustive, nor meant to be read as an attack on the potential usefulness of UD. However, they do raise important issues about some of the insufficiencies or epistemological silences of the concept, and for the purposes of this article, offer a helpful way into an examination of the relationship between a design concept seemingly aimed at the particularities of a specific group and the principles and practices of universalism. It would be fair to say that much of the original impetus for UD – and for notions of accessible environments – came from those with mobility impairments; access particularly has often been framed around barriers to physical mobility. The d/Deaf experience offers a rather different perspective on accessibility, one which is based around visual ways of being in the world [21]. In much the same way then that Heylighen [13, p. 536] notes that ''certain user groups, such as people with specific impairments or disabilities, are able to detect misfits that most architects are not even aware of'', we suggest that d/Deaf people's encounters with their environment, and the notion of DeafSpace, can detect and facilitate an interrogation of some of the potential difficulties with UD as it currently stands as a design concept.

Understanding deafness and the principles of DeafSpace

Many commentators across diverse disciplines, including Deaf Studies, geography, anthropology and architecture, have been interested in how d/Deaf people relate to their environment [8,9,22–26]. A number of these commentators refer specifically to the creation of, and meanings assigned, to ''d/Deaf spaces'' in different national and international contexts (see e.g. Solvang and Haualand's [8] work on transnational Deaf spaces or Gulliver's [27] historical discussion of what he refers to as ''DEAF space'' in the context of eighteenth and nineteenth century France). In this article, our concern is with the architectural design paradigm known as DeafSpace which has emanated from the US and has its own particular set of meanings.

DeafSpace as a set of design principles and an aesthetic architectural paradigm can be closely related to broader developments in d/Deaf cultural theorising. Over the past few decades, there has been a growing politicisation of d/Deafness, as the Deaf community has consciously worked to reframe and subvert discourse which delimits d/Deafness to pathological understandings associated with impairment, and deficiency and loss of the hearing sense. Such a reframing is evident in the convention of using a capital letter ''D'' to describe ''the cultural practices of a group within a group'' [28, p. 1], and to signify the differences between culturally Deaf people (who tend to be predominantly sign language users) and those in the broader category of deaf, hearing impaired and hard-of-hearing (indicated by the use of a small ''d''). The distinction between ''deaf'' and ''Deaf'' is however far from clear cut, as Lane [20, p. 291] acknowledges in stating that ''there is a gray area between the two; for example, some hard-of-hearing people are active in the American Deaf-World; others are not''. In this article, we use ''d/Deaf'' as a way of reflecting the complexity and continuum of d/Deaf identities.

Scholars within Deaf cultural theorising have commented on the reframing of d/Deafness as the point ''where sensory lack becomes phenomenological plenitude, where the peripheral becomes central, where Deaf becomes desirable'' [29, p. 4]. Central to this is the notion of a visuo-gestural ontology as a different way of being in, and experiencing, the world. Bahan [21, p. 83], for example, suggests that d/Deaf people ''inhabit a highly visual world. They use a visual language to communicate and have developed a visual system of adaptation to orient them in the world that defines their way of being''. This way of being is not just a physical or biological response but also a cultural one [28]. The Deaf community's use of sign language has led to their desire for Deaf people to be seen as a linguistic minority, and a community which exists with its own culture. Indeed, many Deaf scholars stress the significance of the collectivist nature of Deaf culture which is based on a conscious rejection of medical definitions of deafness-as-impairment and which draws on community narratives, poetry and popular community folklore based around the significance of sign language [28,30]. It is worth remarking on the ambiguity presented by the term ''impairment'' which is laden with socio-political and cultural interpretations. The medically-oriented inclination to perceive an inability to hear as a personal loss or tragedy within the framework of the medical model is the account of deafness-as-impairment that has been repeatedly refuted by Deaf cultural theory which prompts us to look at issues such as the visual inaccessibility or lack of Sign Language environments as contributing factors to the disabling of Deaf communities. This does not, however, mean that the corporeal reality of deafness is completely insignificant and as we will see later in the article, the relevance of acoustics in the DeafSpace paradigm are testament to the important relationship d/Deaf people enjoy with sound.

The visuality implicit in Deaf culture and communication challenges the notion of a homogenous hearing public, thus highlighting the need for an increased awareness of the implications of both visual and acoustic environments in architectural practice, and the cultural knowledge that is implicated by the visuo gestural ontology of the Deaf community is a key reference point in DeafSpace design. The DeafSpace Project emerged in 2005 in the US, in conjunction with the American Sign Language Deaf Studies Department at Gallaudet University [12]. Led by

Hansel Bauman, whose brother Dirksen Bauman is a Deaf Studies academic and faculty member at Gallaudet University, DeafSpace has facilitated the emergence of an architectural philosophy which has been articulated in the development of specific design guidelines aimed at creating Deaf-friendly environments. Please note that hereafter in this article, in referencing the work of ''Bauman'', we mean Hansel Bauman, DeafSpace architect. In an instance where the work of Dirksen Bauman is being referenced, this is made explicit. Articulating a definition of DeafSpace, Bauman [12, p. 3] states that

> Our built environment, largely constructed by and for hearing individuals, presents a variety of surprising challenges to which deaf people have responded with a particular way of altering their surroundings to fit their unique ways-of-being. This approach is often referred to as DeafSpace.

The responses which Bauman mentions are long-standing features of Deaf culture and communication. Anyone familiar with d/Deaf gatherings will understand the importance of the environment to enable communication; commonplace logistical considerations include the influence of background contrast on the visibility of the signing frame and minimising glare from sunlight in order to facilitate signed conversations. Crucially, Bauman views architecture as a conduit for cultural (and, centrally, linguistic) expression, and in drawing attention to the significance of sign language to the Deaf community, makes a linkage between the visuality of sign language – as he describes it ''the spatial kinaesthetic of sign language, the desire of deaf people for the visual access that open space affords'' (cited in Byrd, [31]) and architecture itself. The notion of a d/Deaf design aesthetic is also articulated by Byrd [31] who associates d/Deaf culture and language with ''space that comprises free flowing, circular movements . . . associated with the anthropological term ''maluma'', which conjures up images of soft, flowing aesthetic''.

The DeafSpace project has seen the formulation of architectural guidelines which have been framed around five sets of principles described as space and proximity, sensory reach, mobility and proximity, light and colour, and acoustics [12]. These principles are in turn comprised of over 150 DeafSpace architectural design elements [ibid]. The principles were developed in consultation with students at Gallaudet to take account of d/Deaf experiences and encounters with the built environment. For example, in relation to sensory reach, the principles seek to address how d/Deaf people read their environment by sensing movement and touch which may not be readily apparent to hearing people. Similarly the principle of space and proximity recognises the importance of sign language users being able to locate themselves at an appropriate distance from one another in order to communicate; it signifies the relevance of seating arrangements, the achievement of spaces which will accommodate privacy, as well as the visual connections between floors and spaces. Avoiding glare and including lighting arrangements which act as a facilitative backdrop to sign language use is also significant, while DeafSpace design often seeks to remove sharp corners or barriers in buildings/spaces which may disrupt a sign language conversation as d/Deaf people walk together. DeafSpace design also utilises building materials, including flooring, to minimise reverberation and electromagnetic interference which can be disorienting for a person using a hearing aid. To date, the DeafSpace Design Guidelines have been articulated in the construction of two buildings on the Gallaudet campus, namely the Sorensen Language and Communication Centre (completed 2008) and the Living and Learning Residence Hall 6 (completed 2012), and DeafVillage Ireland, located in Cabra, Dublin. The relatively limited and recent implementation of the guidelines means that there has been little evaluation so far of how well these buildings respond to the needs of their end users. In the next section of the article, however, we turn our attention to situating DeafSpace as a design paradigm by assessing some of its epistmological underpinnings.

DeafSpace and its epistemological relationship with UD

The emergence of DeafSpace can be understood as an architectural manifesto which has seen long-standing cultural repertoires of the Deaf community become a conduit for the formalised technical DeafSpace guidelines. However, its epistemological basis has yet to be spelled out clearly, as has its relationship with UD. Proponents of DeafSpace have been critical of the nature of UD for many of the reasons that Imrie [3] highlights. For example, Bauman [11, p. 29] writes that ''Both the ADA Design Guide and mainstream UD discourse have predominantly overlooked the sensory and socio-spatial needs of deaf people much beyond technology and buildings systems related to communication access''. At the same time however, Bauman suggests that DeafSpace might be able to build upon UD and does not view it as an exclusive form of design. In certain ways, DeafSpace may have the potential to offer an alternative to the trajectory of UD: in particular, it appears concerned with finding collectivist ways of building which reflect the experiences of d/Deaf communities and are grounded in local knowledges, rather than finding technocratic or standardised solutions. However, there are questions to be asked about how DeafSpace conceptualises d/Deaf communities in the first place, and how it positions itself in relation to broader architectural traditions (in particular, by adopting American architect Christopher Alexander's notion of a ''pattern language'', which has been subject to its own critique).

In the sections that follow, then, we assess DeafSpace along two, interlinked trajectories. In the first, we explore the type of knowledges that have been premised and utilised in DeafSpace design, given debates about the role of user versus expert or credentialised knowledges in modern design processes and aesthetics, and about the apparent technocracy which it has been argued characterises elements of UD. We then go on to explore DeafSpace in the context of debates about particularism and universalism in design, and ask how we are to interpret DeafSpace in terms of the type of spaces it seeks to create. Our analysis is based on our reading of what limited literature exists around DeafSpace as a design orthodoxy: chiefly, Hansel Bauman's exposition of the concept in a forthcoming edited collection and various guideline documents setting out the DeafSpace principles, also published through Bauman's architectural practice, hbhm architecture. Indeed, one of the limits of analysing DeafSpace at the current time is its emergent nature, and the need for a more sustained investigation of how DeafSpace design is experienced by those who use such spaces.

DeafSpace: whose knowledge, which knowledge?

One of the key issues which has exercised critics of UD relates to the types of knowledges and epistemic communities which inform and surround the creation of the built environment. A range of authors have noted how the ''knowing-in-action'' of users [13, p. 536] has often been sidelined in building design, rendering experiential knowledge marginal in architectural practices. Heylighen [13] suggests that there is often a disconnect between architects' ways of doing, academic research on inclusive and sustainable design practices and the knowledge of end users; Imrie and Hall [32] similarly highlight how architects and designers are embedded in a system where the logic of capital accumulation and meeting client deadlines frequently mitigates against user involvement in the design process, while architects

often work with design theories built upon certain assumptions about corporeal norms and functionality. For Imrie [3], there is a danger that UD does little to challenge such socio-institutional processes and that user knowledges remain sidelined in the design and construction industry – this despite the apparent origins of UD principles in the disabled people's movement.

In assessing DeafSpace as an architectural paradigm and set of practices, the experiential knowledge of the Deaf community itself appears to have been central to the development of the concept. DeafSpace has emerged as, if not a political movement, then a group of users made up of Deaf academics and students at Gallaudet University, facilitated by Bauman who describes himself as a ''hearing architect'' [11] (but one who has a strong familiarity and knowledge of American Sign Language and the Deaf community). To date, the relatively few spaces that have been built following DeafSpace principles have resulted from consultative processes, and can be understood as designs which are heavily user-led. The origins of the 150 patterns themselves can be traced back to a 2-d event in which participants gathered at a workshop to develop aesthetic principles for a new language and communication centre on the Gallaudet campus: drawing on Deaf people's life stories and experiences was a key part of this event and formed the basis for the articulation of a set of values to underpin the design [33].

What becomes apparent from reading documents that have emerged from such events is the way in which DeafSpace can be seen as a response by members of the Deaf community to the exclusions and marginalisation they have experienced in spaces designed and authored by the hearing majority. Historically, spaces designed specifically for d/Deaf people (Deaf schools being a notable example) were associated with deficit and often social control. The discomfort felt by many d/Deaf people at inhabiting spaces which failed to facilitate the visuo-gestural way of being, or acknowledge a culture connected with sign language has led Deaf people to search for ways to re-orientate or customise the hearing spaces they find themselves in. Indeed, Bauman [11, p. 2] suggests that finding ''a place of our own'' is a prominent narrative of the Deaf community and a key tenet of the DeafSpace concept. DeafSpace then, as it is presented, is about more than technical solutions, but also about individuals' well-being and sense of place in the world.

Aesthetically, DeafSpace captures a set of premises about the nature of the Deaf community and Deaf culture. A central premise is that of collectivity, which is often said to be a defining feature of Deaf people in terms of their mode of communication and cultural identity [11]. In practical terms, for example, Bauman refers to the ''conversation circle''; in a group setting, Deaf people frequently arrange themselves in a circle to facilitate clear lines of sight and constantly adjust the arrangement of seats as others leave and join the group. Similarly, he refers to the need for individuals to look out for others when a number of people are signing and walking together, to alert them of upcoming hazards. Yet, this notion of collectivity also appears to become imbued with wider meanings in DeafSpace design. For example, in developing aesthetic principles for the Sorenson Language and Communication Centre at Galludet, the document produced on the basis of the event, *A Case for SLCC Aesthetic Principles* [33, p. 1] notes that:

''Participants envisioned a place where the building would reveal the sense of connection Deaf people feel

- between one another – a strong sense of community.
- to openness and light – a space of well-being.
- to nature as constant reminder of the *natural* condition of deafness.
- and of the physical image of a *place* that expresses Deaf history and culture''.

Clearly, there are some questions that can be raised about such understandings of d/Deafness and assumptions of collectivity. Communities by their very nature suggest not just inclusion and connectivity but boundaries and outsiderness: Matthews and Foley-Cave [34, p. 67] provides some indication of this in their assertion that ''The culturally Deaf person's experience of being 'Deaf' is not that of one who cannot hear, but that of one who is 'Deaf Proud'''. This signifies a celebration of deafness, not as a person lacking ability, but as a positive state of being and a marker of *in-group identity* (emphasis added). While the notion of the Deaf Proud person is certainly a positive articulation of diversity, it is less clear how DeafSpace envisages those on the fringes of or outside this notional community. d/Deaf communities are no less subject to or immune from social and political divergences than other groupings, as debates regarding the often unhelpful distinctions between those who are deafened, hard of hearing and those who perceive themselves to be culturally Deaf bear witness to (indeed, from a sociological point of view, there is nothing ''natural'' or ''essential'' about deafness: it too is subject to social forces which raises questions about the suggestion that deafness is a ''natural condition'') [35,36]. What also becomes apparent is how DeafSpace is linked to certain (idealised) ways of being; for example, Bauman [11, p. 17] frequently reiterates that the Deaf community is underpinned by a ''shared responsibility to care for one another'', an assertion which seems to obscure the diversity of human behaviours and relationships. The Deaf community articulated in DeafSpace, then, appears to be one of consensus around shared meanings and symbols.

Whatever debates these principles raise, there is little doubt that what marks DeafSpace out from UD is that it is less focused on minimising or eradicating the experience of impairment through technical means (e.g. compensating for lack of sound) but about promoting design which starts from cultural understandings of Deafness and ways of being in the world: it is a search for a positive expression of a different (visual, tactile) form of embodiment, rather than one focused on countering deficit. Situating DeafSpace within architectural traditions, Bauman [11] claims DeafSpace as a new form of vernacular and in so doing, places himself within a long tradition of architecture which situates itself as outside, and alternative to, modern architectural sensibilities. Bauman [11, p. 27] is highly critical of modernist architecture which he sees as having lost sight of the sensory and bodily experience of dwelling in buildings, perceiving a ''modern paradigm of disconnectedness that grips current design and building practices'', and draws heavily on the work of American architect Christopher Alexander in developing the DeafSpace principles. Alexander is best known for his work on architectural pattern languages, which he set out in two core texts, *The Timeless Way of Building* [37] and *A Pattern Language* [38]. In the latter of these texts, Alexander documented the built environment – from streets, to rooms, to windows – in 253 patterns, each with its own statement, illustration and research. His aim was to refocus architecture on the tacit knowledge of users and offer a critique of, and alternative to, modernist architecture through an emphasis on more traditional forms of design and building [39]. The development of his pattern language was intended as an exercise in user empowerment, as he explains:

> The people can shape buildings for themselves, and have done it for centuries, by using languages which I call pattern languages. A pattern language gives each person who uses it, the power to create an infinite variety of new and unique buildings, just as his ordinary language gives him the power to create an infinite variety of sentences [37, p. 167].

Bauman draws heavily on Alexander's ideas, positing DeafSpace as a pattern language which can be applied in different contexts, and describing it as ''a new vernacular architecture of connection'' [11]. The term ''vernacular'' has come to be predominantly associated with linguistic dialects and, much like dialectical diversity, a vernacular architecture can be understood as a variation in practice which is informed by the environment and culture of the inhabitants. According to Bauman [11, p. 25], ''DeafSpace exemplifies the aspect of vernacular architecture that is about functional relationships between human habitation and place yet, unlike traditional vernacular architecture, its prime motivation – deaf sensibilities – is not locked to a particular place but rather to a people who inhabit all places''. Alexander's assertion that design can contribute to human well-being is also apparent in the exposition of DeafSpace, in which Bauman describes the need for buildings to be more empathetic to human need; for example, he references Gallaudet academics Ben Bahan and Dirksen Bauman who have described the need for architecture and buildings to act as ''the third person'', in reference to the dynamic of conversation in Sign where different participants take turns to watch out for corners, doors or other spatial furniture which may disrupt conversation.

Part of the appeal of Alexander's work for Bauman is that it draws on more localised forms of knowledge rather than universal solutions which he associates with modernism. He suggests that one of the key differences between UD and DeafSpace is the fact that UD seeks to prescribe universal, ''top-down'' standardised solutions at the expense of more localised, cultural responses. It is perhaps ironic then, that Alexander's work has been criticised for its ''determinism and authoritarianism'' ([39, p. 183]; see also [40]). The patterns set down by Alexander – and the way they were published in what some have described as a Bible-like tome [40] – appear to suggest a formulaic and systematic way of building, despite their vernacular origins; Alexander has been criticised for appearing to be wedded to one particular way of building, which is suggested by his statement that ''there is one timeless way of building. It is thousands of years old and the same today as it has always been'' [37, p. 7]. It is interesting to note that it is in the systematic world of computer science, rather than architecture, that the pattern language has found particular appeal, as ''design patterns are widely used to capture and exchange design solutions that have evolved over time'' [13, p. 536]. An issue to be raised about DeafSpace, then, concerns whether the adopted notion of a pattern language will actually lead to a formulaic (and potentially technocratic) mode of building design, rather than one which is attuned to the sensitivities of different local environments and social relations.

Bauman's interest in the pattern language also appears to stem from its radical critique of modern building processes. Alexander's work is highly critical of the modern processes of construction that exist in capitalist societies as well as the role of architect as an expert whose validation lies in the pure aesthetics of a building (how it looks) rather than how well it functions. Bauman draws on this critique by positing DeafSpace not just as an aesthetic but as a design process. Again referencing the metaphor of collectivity, he stresses the need for architecture to disrupt the traditional ''design-bid-build'' formula that characterises most types of building. He exemplifies how such a disruption might be put into practice by discussing the construction of the Living and Learning Residence Hall 6 at Gallaudet, which was completed and opened in Autumn 2012, and which has been described as ''the first fully-fledged experiment in DeafSpace design, a concept developed at Gallaudet through years of research into how buildings and interiors impede communication for people who don't hear'' [41]. In designing the building, Bauman organised a design/build competition inviting four teams of architects to become involved in a consultative process which engaged 20 Gallaudet residents and which used DeafSpace guidelines as its point of reference. Over a 6-week period, a winning team was picked by the d/Deaf people involved, with the competition being won by a collaboration comprised of LTL Architects, Quinn Evans Architects and Sigal Construction (Metropolis Magazine, July–August 2013). Such a model of praxis contrasts with the traditional tendency in the commercial design process to centre on architectural vision, rather than on the desires and preferences of the users of the space being planned.

Bauman offers this example as a way of demonstrating what he envisions to be a more collectivist way of building and a vernacular form of architecture which places the end user if not centre-stage, then as a key participant in the design process. DeafSpace therefore appears to seek to invert or at least subvert some of the ''traditional'' social relations of the design process, not least regarding who the ''knowers'' are in architectural design. There are, however, questions to be asked about which representations of d/Deafness and the Deaf community are articulated by DeafSpace principles, and how this is to happen in a context where the design and construction industry are rooted in particular ways of working. Discussing the idealism in Alexander's work, for example, Dovey [40, p. 5] notes that ''a good portion of the pattern language requires the erosion of capitalism as a prerequisite''. A key challenge for DeafSpace, it seems, is to recognise and seek to work through those socio-institutional relations which hinder a more user-focused process of building.

Universalism and/or particularism in the DeafSpace paradigm

Having considered some of the epistemological origins of DeafSpace, a key issue concerns how we are to interpret the concept in light of debates about particularism and universalism in the design process. In the context of UD, for example, commentators have questioned whether ''singular bodies'' [42] disappear in the search for standards to equalise access, and ask whether universalism, as an overarching principle, can sufficiently address the particularities of the human condition in terms of creating accessible environments and societies. As Imrie [3, p. 879] notes, ''UD rejects design that fails to respond to, and interact with, everyone irrespective of their socio-cultural status and bodily capabilities and capacities''. There is a danger, however, that a ''one size fits all'' response negates a diversity of needs, and worse, creates a new dogma which actively discriminates by creating another set of norms or standards that incorporate, or are supposed to represent, the range of bodily experience. One of the criticisms of modernist architecture and modernism per se was that it introduced the notion of a standard (for that read, able-bodied, male) body as the basis of much design – Le Corbusier's Modular Man was a key example of such an approach [43]. Yet how does UD conceptualise or reinvent the human body in all its diversity and seek to translate this diversity into a set of UD principles?

In the context of UD as it relates to d/Deafness and the Deaf community, what little research exists suggests that the concerns of people with hearing impairments and sign language users have been relatively marginal. Debates about access have tended to be dominated by the experiences of physical mobility, rather than those which relate to other senses. Heylighen et al.'s work [44, p. 283–4] has drawn critical attention to the fact that ''so far [...] studies on inclusive design in architecture have paid little attention to hearing. They tend to focus on physical accessibility of buildings and spaces, but rarely address their acoustic

qualities'' and that, while varying degrees of recognition of acoustic accessibility exist, ''across the board [. . .] little attention is paid to the diversity of people's hearing capacities and needs''. In the Irish context, similarly, while d/Deafness is referenced in Part M of the *Building Regulations 2000, Access for people with Disabilities* [45], and the National Disability Authority's 2002 document *Buildings for Everyone* [46], the detail is overwhelmingly concerned with technological innovation and focuses on compensating for an absence of sound (although it should be noted that the latter document addresses matters relating to the signing frame and proximity). In his exposition of DeafSpace, Bauman is critical of UD for its attention on providing only technical solutions to a lack of sound, which in and of itself represents a narrow interpretation of how d/Deaf people encounter the world. It is important to note that many d/Deaf people, contrary to the popular romantic construction of living silent lives, enjoy an important relationship with sound. The work of Haualand [47, p. 111–2], a Deaf social anthropologist, critically destabilises the idea that hearing and sound are ''natural'' for all. As she states:

> Being an outsider in a hearing world, I am like other Deaf people ''within hearing culture, but not of it''. My relationship to sounds is thus rather abstract. Through the process of listening, a hearing person most often hears things rather than sounds [. . .] Deaf people may hear sounds, but rarely things, which means that we may perceive without making perceptions.

Deafness then is a nuanced and diverse experience, and arguably, one of the benefits of the DeafSpace concept is that it brings into perspective the combination of senses which d/Deaf people use to navigate their world (sensing movement as someone approaches from behind them, using visual and tactile cues to interpret social encounters, as well as reacting to sound in various ways). This in turn raises questions about how universal principles can reflect and respond to such a diversity of human experience. As the discussion above suggests, to date, the UD manifesto appears not to have responded particularly effectively to the needs of d/Deaf people. How then are we to situate DeafSpace in relation to UD?

At first glance, the experience of d/Deaf communities and the articulation of DeafSpace would appear to offer a significant challenge to the notion of universalism, rooted as it is in the specificities of Deaf culture and a particular time and place. Yet in his exposition of DeafSpace, Bauman [11] seems to suggest that DeafSpace is not concerned with the particularities only of the Deaf community but contains learning for practitioners in the arena of UD. Part of his argument in this regard lies in the idea of the architectural patterns DeafSpace develops, which he suggests can be used to ''customise'' any kind of space. In developing this argument further, one could suggest that this customisation provides the potential to transcend the particularities of spaces just for d/Deaf people. That said, there are some apparent tensions contained within these ideas, and it is notable that to date, the few buildings that have been designed using DeafSpace principles have been by and for d/Deaf people.

One way of approaching this question of the relationship between UD and DeafSpace is to ask what sort of spaces DeafSpace creates, and how far the concept might have currency beyond the needs of the d/Deaf community. It is here that we meet a potential tension in the DeafSpace concept: on one hand, the DeafSpace paradigm is conceptualised by Bauman as a set of ways in which d/Deaf people upon entering a space, customise that space to meet their needs. For example, he notes how, when Deaf people buy a house, they frequently knock down walls to provide clearer sight lines to facilitate sign language. There is constant reference in the exposition of DeafSpace to these processes of ''cultural customisation'' [11], which would appear to suggest that Deaf people could dwell in or re-author any space if they customise it in some way. As Bauman [11, p. 8] states ''DeafSpace does not seek universal solutions but creates particular socio-spatial situations that more sensitively connect individuals to others and their surroundings in a meaningful way regardless of where they are''. This notion of being able to exist anywhere – which resonates with a view of Deaf culture as transcendental of regional and national boundaries [48] – also becomes evident in his articulation that the vernacular architecture which DeafSpace seeks to develop comes not from a particular locality or place, but a culture which exists everywhere, or ''a people who inhabit all places'' [11, p. 25].

At the same time however, there is a very strong sense which comes through the DeafSpace principles in which d/Deaf people are seeking physical places of their own, rooted in particular buildings which represent a set of values built around a defined community. To return to the aesthetic guidelines of the SLCC at Gallaudet [33], for example, the expression of the building as a place incorporating Deaf history and culture seems to indicate this desire for a territorial place for Deaf people to call their own. All of the buildings which have been designed around DeafSpace principles to date serve the Deaf community and are places where Deaf people gather: there is no example yet of the principles being applied as part of a wider building project. This inevitably leads to questions about the creation of segregated spaces for d/Deaf people. Part of the discourse surrounding the construction of DeafVillage Ireland in Dublin, for example, concerned such debates [49]. DeafVillage has been built as a hub for national d/Deaf services and organisations in the city, as a redevelopment of a site owned by the Catholic Institute for Deaf People (CIDP) following a compulsory purchase order by the government. The site comprises not just a one-stop shop for d/Deaf services but also a sports complex open to members of the public, and Hansel Bauman was approached to advise on aspects of the €15milion development in terms of incorporating DeafSpace design principles. Yet the politics that surrounded the building of the centre highlight what John Cradden [49], a deaf reporter writing in one of Ireland's broadsheet newspapers, describes as ''the challenges faced by a community trying to keep its identity while pursuing social integration''. Members of the local Deaf community were initially apprehensive of the extent to which the Deaf Village would be a ''place of their own'', concerns which stemmed from a history of hearing control over Deaf spaces, while the chief executive of CIDP himself had to answer concerns from politicians that DeafVillage would become a Deaf ''ghetto''. Even Cradden himself writes in the article ''I'm curious about this place because, while I'm deaf and know a bit of Irish Sign Language (ISL), I didn't grow up in the ''deaf world''. I went to ''hearing'' schools and nearly all my friends are hearing. Will I be welcome here?''

These comments highlight the differential positioning of those who define themselves as d/Deaf and the socio-political contexts which frame the construction of such places. Examples such as these raise questions about whether DeafSpace concerns the generation of alternative or particularist spaces for the Deaf community, or is about embedding Deaf values into a range of environments (including what those in the Deaf community would refer to as hearing environments). It seems that such issues will only be explicated further when more is known about how people with diverse abilities and capacities (and not just d/Deaf people) experience such spaces, as well as how well DeafSpace principles work for a range of different users. Arguably, part of the contribution that Bauman perceives can be made by DeafSpace to

UD practices is a more ''human'' way of building, that is more inclusive of the end user and values access not just as a structural or physical alteration to a space, but acknowledges the emotional connection people feel with the spaces they inhabit. As he states:

> For the architectural profession, it [DeafSpace] provides a practical guide and mindset with which to think about building for deaf people specifically. Broadly speaking, it calls for a more thoughtful approach about process and a deeper awareness of the intimate interplay between our built environment and well-being. A more sensitive approach will give rise to a multitude of architectures with the common theme of connection [11, p. 25].

Thus, in the way that Imrie [17] describes how housing quality for disabled people has been reduced to employing certain minimum standards, DeafSpace represents a call for a type of design which goes beyond the technical application of standards to particular spaces; it is a call which recognises the qualitative aspects of ''dwelling'' and could be argued to mobilise social constructionist understandings of space which highlight the socio-cultural relationships and ways of living which define how people interact with, and shape, different environments. It should be acknowledged, however, that UD and DeafSpace have markedly different starting points in terms of how they conceptualise human difference. UD emerges from a recognition of disability (albeit as something which occurs as much as a consequence of societal barriers as an individual's bodily capacities and functioning), and the need to ''eradicate'' impairment through design. For Bauman, Deafness is not about disability, but about a cultural identity. The DeafSpace ''manifesto'' is about projecting and building on a form of cultural expression: it does not engage in ''rights talk'' or discussions of equalising access to the built environment across different groups in society – although it does acknowledge the marginalisation of d/Deaf people as a consequence of (presumably) discriminatory societal attitudes and design. Some recognition of these different political starting points – but also the potential commonalities in terms of acknowledging structural barriers which can hinder inclusive (rather than universal) design – will arguably be necessary if what is specific about Deaf culture and ways of being is to have a wider currency in terms of designing across human difference.

Conclusions

The practice of DeafSpace as an architectural paradigm is still in an emergent phase. As an orthodoxy which situates itself as alternative to, and outside the conventions of, mainstream architecture, it has yet to intersect with the professional practice of most architects. There has been some limited opportunity for critical reflection on DeafSpace practice, including Bauman's own discussion of the Sorenson Language and Communication Centre at Gallaudet, in which he reflects on the building's ''ambivalent relationship to its site'', something which he attributes to the inherent pressures in contemporary industrial building practice [11, p. 21]. Furthermore, logistical innovations have already resulted within the guiding principles: an example includes the realisation that curved walls, introduced to cut down on collisions of signing groups, did not actually serve the intended purpose as people tended to hug the curve [41]; using glazing at corner intersections has been adopted instead to address this issue, pointing to the significance of engaging end users in the assessment of buildings' usability.

Given the limited nature of the DeafSpace project to date, it will be some time before we can understand how the relationship between DeafSpace and UD might be articulated in the design, construction and ultimate use of spaces. That said, this article has suggested that DeafSpace provides an opportunity to reflect on some of the epistemological lacunae in UD, not least by considering how far design principles which, at first glance, seem to reflect a very particularist way of experiencing the world, might have currency in promoting equal access to the built environment across the human spectrum. The article has also highlighted ways in which DeafSpace encourages architects to move beyond technocratic insistence in design solutions, and towards a more conscious and reflexive design praxis which recognises that not all end users are the same. In this instance, architects are urged to recognise that people enjoy diverse and individual relationships with acoustic environments.

In an article in which she argues for a more strongly developed theoretical basis to UD, Inger Marie Lid [4, p. 205] suggests that the social model underpinnings of UD (which views disability as a product of societal barriers and inaccessible environments) may lead to UD becoming disproportionately concerned with ''technological knowledge about disabling physical barriers and how to avoid them''. Rather, she argues UD needs to take cognisance of the human experience as one shaped by a relationship between environmental and individual factors, and should draw on the situated knowledges of individuals in terms of exploring how people experience accessibility and usability of design solutions. In this context, she notes that particular design elements in public spaces – dropped kerbs, for example – will be variously usable to different people depending on their individual circumstances and the context in which the design element is deployed. This plurality of situated knowledges, she argues, needs to make up UD as much as a focus on broader environmental barriers if UD is not to be ''a new and perhaps slightly more inclusive minimum standard for inclusion'' [4, p. 213].

Lid's exposition can in many ways be read as a call for more research on the embodied experiences of navigating the built environment, and to this end, DeafSpace would seem to articulate a design orthodoxy which places individual user knowledges more centre stage. Moreover, one could argue that DeafSpace has the potential to produce those situated knowledges of usability through its positing of a closer and more qualitative relationship between individuals and their environment. However, if DeafSpace design is not to lead to segregated spaces or be perceived among ''mainstream'' architects and designers as something only aimed at the Deaf community, then it too has to recognise the plurality of experience in using environments. This includes recognising not just the inherent diversity of those who describe themselves as d/Deaf, but also asking how those ''outside'' the Deaf community – with different bodily and mental capabilities – experience DeafSpace design principles in practice.

Arguably, part of the answer to this question lies in the politics that surround DeafSpace, which are perhaps less well-articulated in available accounts to date. UD roots itself in a politics of disability that seeks to challenge the structures in society which lead to discrimination and calls for barriers to unequal access to be dismantled. In contrast, DeafSpace has less to say about inequality and the social structures which influence how d/Deaf communities are positioned in society, and the implications these issues have for DeafSpace becoming embedded in mainstream design practice. While Bauman recognises the challenges created by the traditional building industry, the process of engaging DeafSpace design principles in practice involves addressing and countering significant socio-institutional and attitudinal barriers. A pertinent issue is the role of hearing stakeholders in DeafSpace projects, and the importance of recognising the ways in which mainstream building practice – both historical and contemporary – has not demonstrated any significant recognition of the

attributes articulated in the DeafSpace principles, with the consequence that design has discriminated against visual ways of being for the most part. If, then, DeafSpace is to have the potential to build on and extend the UD agenda as Bauman [11] suggests, we would argue that the underpinning politics of DeafSpace – and indeed UD – will require a clearer exposition, not least in terms of acknowledging commonalities in socio-institutional barriers which prevent usability and connection between individuals and the built environment across the full range of human experience and functioning.

Acknowledgements

This article is a revised version of a presentation made at the 1-d seminar, *Understanding Universal Design* held at King's College London, 19 April 2013. We would like to thank all the seminar organisers and participants for the very helpful discussion of the ideas set out in the article. We would also like to extend our appreciation to Hansel Bauman for his willingness to share and discuss his understanding of the DeafSpace concept with us.

Declaration of interest

The authors report no conflicts of interest.

References

1. Mace R. Universal design: housing for the lifespan of all people. Rockville (MD): Department of Housing and Urban Development; 1988.
2. Ostroff E. Universal design: the new paradigm. In: Preiser W, Ostroff E, eds. Universal design handbook. New York (NY): McGraw-Hill; 2001:1.3–1.12.
3. Imrie R. Universalism, universal design and equitable access to the built environment. Disabil Rehabil 2012;34:873–82.
4. Lid IM. Developing the theoretical content in Universal Design. Scand J Disabil Res 2013;15:203–15.
5. Findelli A. Rethinking design education for the 21st century: theoretical, methodological and ethical discussion. Des Issues 2001; 17:5–17.
6. Tobias J. Universal design: is it really about design? Infor Technol Disabil 2003;9:1–9.
7. Centre for Excellence in Universal Design, 2013. Available from http://www.universaldesign.ie/ [last accessed 20 Mar 2014].
8. Solvang PK, Haualand H. Accessibility and diversity: deaf space in action. Scand J Disabil Res 2013;16:1–13. doi: 10.1080/15017419.2012.761158.
9. Skelton T, Valentine G. 'It feels like being Deaf is normal': an exploration into the complexities of defining D/deafness and young D/deaf people's identities. Can Geographer 2003;47:451–66.
10. Lane H. Do deaf people have a disability? Sign Language Studies 2002;2:356–79.
11. Bauman H. DeafSpace: a new vernacular architecture for a more sustainable and liveable world. In: Murray J, Bauman HD, eds. The new normal: deaf-gain and the future of humanity. Minnesota (MN): University of Minnesota Press; 2014 (in press).
12. Bauman H. DeafSpace design guidelines overview. hbhm architecture; December 2012. Received in personal communication from author. A copy can be requested directly from the author. Contact: (Postal) Hansel Bauman, Gallaudet University, 800 Florida Avenue NE, College Hall Rm 303, Washington, DC 20002, USA. E-mail: hansel.bauman@gallaudet.edu.
13. Heylighen, A. Sustainable and inclusive design: a matter of knowledge? Local Environ 2008;13:531–40.
14. Crews DE, Zavotka S. Aging, disability and frailty: implications for universal design. J Physiol Anthropol 2006;25:113–18.
15. Centre for Excellence in Universal Design, 2013. Available from: http://www.universaldesign.ie/aboutus [last accessed 20 Mar 2014].
16. Lid IM. What can be achieved by universal design? An investigation of various aspects of the concept. FORMakademisk 2009;17: 17–27.
17. Imrie R. Accessible housing: quality, disability and design. London: Routledge; 2006.
18. Bickenbach JE. Disability, human rights, law and policy. In: Albrecht GL, Seelman KD, Bury M, eds. Handbook of disability studies. London: Sage; 2001:565–84.
19. Ladd P. Understanding Deaf culture. Clevedon: Multilingual Matters Ltd; 2003.
20. Lane H. Ethnicity, ethics and the Deaf-world. J Deaf Stud Deaf Educ 2005;10:291–310.
21. Bahan B. Upon the formation of a visual variety of the human race. In: Bauman HDL, ed. Open your eyes: deaf studies talking. Minneapolis (MN): University of Minnesota Press; 2008:83–99.
22. Gulliver M. Places of silence. In: Vanclay F, Higgins M, Blackshaw A, eds. Making sense of place. Canberra: National Museum of Australia Press; 2008:87–93.
23. Kusters A. Deaf on the lifeline of Mumbai. Sign Language Stud 2009;10:36–68.
24. Mathews ES. Place space and identity – using geography in Deaf studies. Deaf Studies Today 2007;2:215–26.
25. Harold G. Reconsidering sound and the city: asserting the right to the Deaf-friendly city. Environ Plan D: Soc Space 2013;31:846–62.
26. Tsymbal K. Deaf space and the visual world – buildings that speak: an elementary school for the deaf. Unpublished Master of Architecture thesis, University of Maryland; 2010.
27. Gulliver MS. DEAF space, a history: the production of DEAF spaces emergent, autonomous, located and disabled in 18th and 19th century France. Unpublished PhD thesis, University of Bristol; 2009.
28. Padden C, Humphries T. Inside deaf culture. Cambridge: Harvard University Press; 2005.
29. Bauman HDL. Introduction: listening to Deaf studies. In: Bauman HDL, ed. Open your eyes: deaf studies talking. Minneapolis (MN): University of Minnesota Press; 2008:1–32.
30. Padden CA. From the cultural to the bicultural: the modern Deaf community. In: Parasnis I, ed. Cultural and language diversity and the Deaf experience. Cambridge: Cambridge University Press; 1996:79–98.
31. Byrd T. Deaf space. Gallaudet Today Magazine. Spring 2007. Available from: http://www.gallaudet.edu/communications_and_public_relations/gallaudet_today_magazine/deaf_space_spring_2007.html [last accessed 20 Mar 2014].
32. Imrie R, Hall P. Inclusive design. London: Routledge; 2001.
33. Bauman H. A case for SLCC aesthetic principles. Hbhm architecture; 2005. Available from: http://www.gallaudet.edu/documents/academic/atlas/2005-may-slcc-deaf-aesthetic-principles.doc.pdf [last accessed 20 Mar 2014].
34. Mathews P, Foley-Cave SM. Village life: deaf culture in contemporary Ireland. In: McDonnell P, ed. Deaf studies in Ireland: an introduction. Douglas McLean: Coleford; 2004:65–84.
35. Monaghan L, Schmaling C, Nakamura K, Turner GH, eds. Many ways to be deaf. Washington (DC): Gallaudet University Press; 2003.
36. Leigh I. A lens on deaf identities. Oxford: Oxford University Press; 2009.
37. Alexander C. The timeless way of building. New York: Oxford University Press; 1979.
38. Alexander C, Ishikawa S, Silverstein M, et al. A pattern language: towns, buildings, construction. New York: Oxford University Press; 1977.
39. Bhatt R. Traditional knowledge for contemporary uses: an analysis of everyday practices of self-help in architecture. In: Bhatt R, ed. Rethinking aesthetics: the role of body in design. London: Routledge; 2013:181–203.
40. Dovey K. The pattern language and its enemies. Des Stud 1990;11: 3–9.
41. Hales L. Clear line of sight. Metropolis Magazine; July–August 2013. Available from: http://www.metropolismag.com/July-August-2013/Clear-Line-of-Sight/ [last accessed 20 Mar 2014].
42. Winance M. Has universal design forgotten singular bodies? Some reflections concerning accessibility? Paper presented at one day seminar Understanding universal design; 2013 Apr 19; King's College London.
43. Imrie R. Disability and the city. London: Paul Chapman; 1996.
44. Heylighen A, Rychtáriková M, Vermeir G. Designing spaces for every listener. Univ Access Inf Soc 2010; 9:283–92.
45. Department of the Environment, Heritage and Local Government. Building Regulations 2000: Technical Guidance Document M

Access for People with Disabilities. 2000. Government Publications: Dublin. Available from: http://www.environ.ie/en/Publications/DevelopmentandHousing/BuildingStandards/FileDownLoad,1655,en.pdf [last accessed 20 Mar 2014].
46. National Disability Authority. Building for everyone: inclusion, access and use. NDA: Dublin. Available from: http://www.nda.ie/cntmgmtnew.nsf/0/EBD4FB92816E8BB480256C830060F761/$File/Building_for_Everyone.pdf [last accessed 20 Mar 2014].
47. Haualand H. Sound and belonging: what is a community? In: Bauman HDL, ed. Open your eyes: deaf studies talking. Minneapolis (MN): University of Minnesota Press; 2008:111–23.
48. Lane H, Hoffmeister R, Bahan B. A journey into the deaf-world. San Diego: Dawn Sign Press; 1996.
49. Cradden J. The village for everyone. Irish Examiner. Available from: http://www.irishexaminer.com/lifestyle/features/humaninterest/the-village-for-everyone-224130.html [last accessed 1 Mar 2013].