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RESONANCE ACROSS CRITICAL USERS:
AN INVITATION TO APPROACH DIVERSITY
IN ARCHITECTURAL DESIGN *QUALITATIVELY*

ABSTRACT: The demand for an inclusive society responding to diverse needs and ways of being poses a major challenge for designers. Approaches such as Universal Design, Inclusive Design, or Design for All intend to respond to this challenge. However, the uptake of these approaches has been limited in architectural practice; they are often critiqued for being prescriptive, disregarding individual differences, or lacking adequate formats to inform designers about the latter. Inspired by these critiques, we see potential in focusing not on what sets people apart (their particularities), but rather on similarities or overlaps, i.e. resonances, across them, and how these can help designers address the challenge in inclusive designing. Considering resonances through a critical user lens aims to foster awareness not just of *that* design can enable or disable aspects of everyday life, or of *how many* people are affected—thus approaching diversity in quantitative terms—but also of *how important* these aspects are. In other words, it highlights the extent to which design affects people’s vital activities, thereby approaching diversity qualitatively. Moreover, we see possibilities in making resonances explicit as a way to increase the capacity of designers to empathize with experiences of the disabled community, and further abandon the idea that disability is something that affects “others.”

KEYWORDS: resonance, architecture, universal design, inclusive design, design for all

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INTRODUCTION

Despite growing awareness that society is inherently diverse, responding to and accommodating this diversity in architectural design remains a challenge.¹ How architects can design for imaginary users, particularly disabled ones, seems to be especially testing. In the past decade, debates around Universal Design (UD), Inclusive Design (ID), and Design for All (DfA)² have questioned how far these approaches can address particularities of a diverse population.³ Launched in the second half of the 20th century, UD/ID/DfA were initially considered conceptually strong and easy-to-understand approaches striving to respect and include human diversity. Their advocates point out that they make good business sense, and have compelling social and legal drivers.⁴ The uptake of UD/ID/DfA in architectural practice has been limited.⁵ They are critiqued on at least four levels: (1) they are associated with “top-down” prescriptive and standardized formulas outlining concrete specifications, and thus felt to be ineffectual.⁶ They fail to increase designers’ knowledge of, or empathy for, users, or an awareness of people’s diverse experiences in relation to their socio-material environments. Also, a certain difficulty in measuring, or assessing, when UD/ID/DfA is achieved, or for whom it is relevant, adds to these approaches’ limited appeal in architecture. (2) Promoting an egalitarian notion of “design for all” *regardless* of people’s abilities or

¹ P. Meuser, *Accessible Architecture*, DOM Publishers, Berlin, 2012; K. Mulligan, A. Calder, H. Mulligan, “Inclusive Design in Architectural Practice: Experiential Learning of Disability in Architectural Education,” *Disability and Health Journal*, 11, 2, 2018, pp. 237–242.

² Despite their different place of origin and some semantic distinctions, these three approaches share a similar purpose. In this paper we therefore refer to them collectively as UD/ID/DfA.

³ See for example: C. Edwards, G. Harold, “DeafSpace and the Principles of Universal Design,” *Disability and Rehabilitation*, 36, 16, 2014, pp. 1350–1359; or M. Winance, “Universal Design and the Challenge of Diversity: Reflections on the Principles of UD, Based on Empirical Research of People’s Mobility,” *Disability and Rehabilitation*, 36, 16, 2014, pp. 1334–1343.

⁴ Centre for Excellence in Universal Design, “The 7 Principles of UD,” <http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/>, (accessed 9 February 2021); M. Story, J. Mueller, R. Mace, *The Universal Design File: Designing for People of All Ages and Abilities*, NC State University, Center for UD, Raleigh NC, 1998.

⁵ V. Van der Linden, H. Dong, A. Heylighen, “From Accessibility to Experience: Opportunities for Inclusive Design in Architectural Practice,” *Nordic Journal of Architectural Research*, 2, 2016, pp. 33–58; H. Wauters, P.-W. Vermeersch, A. Heylighen, “Reality Check: Notions of Accessibility in Today’s Architectural Design Practice,” in Y.-K. Lim *et al* (eds.), *Design’s Big Debates. The Design Research Society’s 2014 conference*, Design Research Society & Umeå Institute of Design, 2014, pp. 1482–1491.

⁶ C. Edwards, G. Harold, “DeafSpace and the Principles of Universal Design”; K. H. Smith, W. F. E Preiser, *Universal Design Handbook*, McGraw-Hill, 2011.

characteristics, as worded in the UD principles, is found to be confusing and contradicting.⁷ The idea of “one size fits all” was initially aimed to circumvent specialist design for minority segments of the population, yet, in doing so, these principles leave little room for particularities. They are said to *reduce* diversity by universalizing individual differences and their attributed “one size fits all” character.⁸ Scholars argue for replacing the expression “regardless of” (people’s abilities or characteristics) in UD formulations by “taking into account” or “with consideration for.”⁹ (3) Studies show that architects often reason that it is unrealistic and unmanageable to “design for all” and give up prematurely.¹⁰ Being unequipped is often used as an argument resulting in *ignoring* much of the range of human diversity. Designers are likely to encounter limitations in designing for human diversity in its entirety, yet these limitations have not been articulated, studied, or fully exploited. (4) UD/ID/DfA also find their uptake in architectural practice notably hampered by the lack of adequate information formats illustrating aspects of human diversity needed in architectural design.¹¹

Critiques on UD/ID/DfA are giving way to particularistic approaches, sometimes referred to as “design for one,”¹² which aim to

⁷ See, for example: M. Bianchin, A. Heylighen, “Fair by Design. Addressing the Paradox of Inclusive Design Approaches,” *The Design Journal*, 20 (sup1), 2017, pp. S3162–S3170; M. Winance, “Universal Design and the Challenge of Diversity.”

⁸ A. Hamraie, “Universal Design Research as a New Materialist Practice,” *Disability Studies Quarterly*, 32, 4, 2012; A. Hamraie, “Universal Design and the Problem of ‘Post-Disability’ Ideology,” *Design and Culture*, 8, 3, 2016, pp. 285–309; A. Hamraie, *Building Access: Universal Design and the Politics of Disability*, University of Minnesota Press, Minneapolis, 2017; B. Ingstad, S. Reynolds Whyte, *Disability and Culture*, University of California Press, Berkeley, 1995.

⁹ C. Edwards, G. Harold, “DeafSpace and the Principles of Universal Design”; M. Winance, “Universal Design and the Challenge of Diversity”; R. Imrie, R. Luck, “Designing Inclusive Environments: Rehabilitating the Body and the Relevance of Universal Design,” *Disability and Rehabilitation*, 36, 16, 2014, pp. 1315–1319.

¹⁰ A. Hamraie, “Universal Design and the Problem of ‘Post-Disability’ Ideology”; A. Heylighen, V. Van der Linden, I. Van Steenwinkel, “Ten Questions Concerning Inclusive Design of the Built Environment,” *Building and Environment*, 114, 2017, pp. 507–517.

¹¹ E. Guffey, *Designing Disability: Symbols, Space, and Society*. Bloomsbury Publishing, London, 2018; A. Heylighen, J. Schijlen, V. Van der Linden, D. Meulenijzer, P.-W. Vermeersch, “Socially Innovating Architectural Design Practice by Mobilising Disability Experience. An Exploratory Study,” *Architectural Engineering and Design Management*, 12, 4, 2016, pp. 253–265.

¹² See for example: M. Kimmelman, “How Design for One Turns Into Design for All,” *The New York Times*, January 24, 2018, <https://www.nytimes.com/2018/01/24/arts/design/cooper-hewitt-access-ability.html>.

respond to a specific demographic¹³ or reflect an individual's needs or desires.¹⁴ One of their strengths is that they are rooted in a nuanced understanding of individuals' experiences and relationships with their environments that is said to be missing in UD/ID/DfA. However, they have led some critics to propose that their application may result in the creation of separate societies; a ghettoization of spaces for minority communities (e.g. facilities for disabled people).¹⁵ Furthermore, beyond the difficulties in designing for an infinite number of particularities, particularistic approaches are likely to exclude *someone* and thus create the very problem they set out to solve. Hence, it remains a challenge to effectively design built environments responding to the needs and/or ways of being of a diverse population.

This paper starts from the observation that considering human diversity is a fundamental condition of good design. Still, an effective approach—tailored to architecture and explicitly considering the varied abilities and ways of being of users from the outset—has been understudied and underdeveloped. Several scholars argue that UD/ID/DfA require greater investigation and discussion and underline the need to further explore tensions between universalist and particularistic approaches.¹⁶ Motivated by these challenges in present-day architectural practice and inspired by the main critiques on UD/ID/DfA, we propose not to find a compromise between universal and particularistic approaches, but to tackle the problem from a different angle: rather than considering differences between users, or their uniqueness, we see potential in focusing on similarities or overlaps, i.e. resonances, across critical users (explained henceforth), and how designers can deliberately integrate these. By exploring the concept of *resonance* across critical users, we substantiate what has been a core aspect of UD/ID/DfA but has hardly received scholarly attention so far.¹⁷

¹³ H. Bauman, "DeafSpace," in D. Bauman, J. Murray (eds.), *DeafGain*, University of Minnesota Press, Minneapolis, 2014, pp. 375–401; C. Edwards, G. Harold, "DeafSpace and the Principles of Universal Design"; M. Winance, "Universal Design and the Challenge of Diversity."

¹⁴ E. Guffey, *After Universal Design. The Disability Design Revolution*, Bloomsbury Publishing, London, 2023.

¹⁵ H. Bauman, "DeafSpace"; C. Edwards, G. Harold, "DeafSpace and the Principles of Universal Design"; M. Kimmelman, "How Design for One Turns Into Design for All."

¹⁶ C. Edwards, G. Harold, "DeafSpace and the Principles of Universal Design"; A. Hamraie, "Universal Design and the Problem of 'Post-Disability' Ideology"; M. Winance, "Universal Design and the Challenge of Diversity."

¹⁷ Even though often considered as vague and overly homogenizing (e.g., E. Erdtman, K. Rassmus-Gröhn, P.-O. Hedvall, "Let Us Move beyond Word Battles and Separatism:

Revisiting resonance allows us to start addressing two interrelated questions: why, and to whom, inclusive designing matters (motivation and relevance) and how to make information on human diversity accessible for designers (empathy and understanding). It can be argued that an imbalance between motivation, relevance, and understanding often leads to designers encountering difficulties, or not seeing the point, in implementing readily available information on human diversity. Heylighen *et al.*, for instance, point out that the application of inclusive design in architecture is notably hampered by its (perceived) prescriptive character, resulting in a lack of motivation¹⁸ and understanding of the reasons behind certain requirements.¹⁹ Architecture, several scholars point out, is often practiced in a self-referential way, i.e., designers refer to their own bodies as a source of knowledge.²⁰ An effective approach to inclusive design thus necessitates, as an entry point, relatable experiences of “others” connecting to and resonating with that of the designer(s). Resonance puts the focus on shared experiences of disablement on the basis of individual embodiment of impairment. Several scholars and companies (e.g., Microsoft²¹) mention the concept of resonance “in passing” but do not elaborate on its mechanisms of transferability, its applicability, and explicit implementation in architectural practice.²²

Strategies and Concerns Regarding Universal Design in Sweden,” *Equality, Diversity and Inclusion: An International Journal*, 41, 9, 2022, pp. 15–29; R. Imrie, “Universalism, Universal Design and Equitable Access to the Built Environment,” *Disability and Rehabilitation*, 34, 10, 2012, pp. 873–882; M. Winance, “Universal Design and the Challenge of Diversity”), UD/ID/DfA were in fact conceived to be lively and evolving, and open to revisions and adjustments from a contemporary lens (e.g., E. Steinfeld, B. Tauke, “Universal Designing,” in J. Christopherson (ed.), *Universal Design: 17 Ways of Thinking and Teaching*, Husbanken, Oslo, 2002; M. Story, J. Mueller, R. Mace, *The Universal Design File: Designing for People of All Ages and Abilities*, NC State University, Center for UD, Raleigh, 1998).

¹⁸ In a survey among Flemish architects, accessibility legislation was listed among the 10 most irritating aspects of their profession. See: NAV, *Ons vak in vorm: het eerste architectencongres* [Our professional in shape: the first architects congress], 2012.

¹⁹ A. Heylighen *et al.*, “Ten Questions Concerning Inclusive Design of the Built Environment.”

²⁰ R. Imrie, “Architects’ Conceptions of the Human Body,” *Environment and Planning D: Society and Space* 21, 1, 2003, pp. 47–65. See also D. Gissen, *The Architecture of Disability. Buildings, Cities, and Landscapes beyond Access*, University of Minnesota Press, Minneapolis, 2022.

²¹ See: A. Shum, K. Holmes, K. Woolery, et al., “Inclusive Microsoft Design,” 2016, <https://www.microsoft.com/design/inclusive/>, (accessed 5 July 2026).

²² See, for example: H. Froyen, E. Verdonck, D. De Meester, A. Heylighen, “Universal Design Patterns for Stoma Care Away-from-Home,” *Australasian Medical Journal*, 1, 13, 2009, pp. 213–215; N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, “Designing for a Future Self: How the Architect Stéphane Beel Empathises with Wheelchair Users,”

Focusing on resonance thus enables us to tackle a known challenge, i.e. inclusive designing, from a new lens. Our objective is to draw attention to a way of approaching design that builds on the strengths of UD/ID/DfA, circumventing their past and current critiques and limitations.

In the remainder of this paper, we zoom in on the concept of resonance in (architectural) design, and outline lessons learned from a series of empirical studies conducted on design practices of architects with personal disability experience. We then discuss the potential of a critical user approach and further address the integration of other key concepts—such as affordance and empathy and their relevance in inclusive designing. Ultimately, we outline key challenges and conclude with final thoughts.

RESONANCE EXPLAINED

The term resonance finds its origin in acoustics. It is defined as an overlap of frequency by which energy adds to the energy that is already there, i.e. it is amplified. Collins Dictionary refers to resonance as “sound produced by a body vibrating in sympathy with a neighbouring source of sound.”²³ In literature and semantics, resonance is frequently used in a figurative sense: resonance implies an emotional effect produced by something that strongly reminds you of something related to your own experiences and feelings. If something resonates with you, you have a connection to it with your character, and it makes sense to you at a deep level. The effect of such connection is typically an increase in one’s motivation around the event, person, or object that resonates with us.

In considering human diversity in design, few references to the concept of resonance exist. Graham Pullin and Alan Newell describe it as situations “where the needs of the people who have a particular disability coincide with particular able-bodied users in particular contexts.”²⁴ Contextual factors and activity restrictions often affect people not classified as disabled yet overlap with the experiences of those who are:

The Journal of Architecture, 26, 6, 2021, pp. 912–937; G. Pullin, *Design Meets Disability*, MIT Press, Cambridge, Mass., 2009.

²³ Collins English Dictionary, “RESONANCE Definition and Meaning,” 2025 https://www.collinsdictionary.com/dictionary/english/resonance#resonance__1, (accessed 5 July 2026).

²⁴ G. Pullin, A. Newell, “Focussing on Extra-Ordinary Users,” in C. Stephanidis (ed.), *Universal Access in Human Computer Interaction. Coping with Diversity*. UAHCI 2007. Lecture Notes in Computer Science, vol. 4554, Springer, Berlin, 2007, p. 256.

If we have our hands full, our ability to carry out a task demanding dexterity is affected; if we are preoccupied by one thing, our ability to see something else may be compromised; if we are tired, distracted, upset, or unable to speak a local language, we may acquire at least symptoms of a reduced cognitive ability.²⁵

This view, Pullin further stresses, seeds the idea that different people, disabled and non-disabled, may have shared needs in particular circumstances, despite their differing needs, experiences, abilities, and identities at other times. In its core, we understand resonance in design as a dynamic concept where designers identify and capitalize on shared human needs and/or ways of being, i.e., consciously utilize common grounds across diverse and selected (i.e. critical) user groups. It can be argued that considering resonance in (architectural) design has the potential to motivate designers to connect, and empathize, with an array of diverse (e.g. disability) experiences based on overlaps they recognize as familiar to their own, and move them into “inclusive action.”

INCIDENTAL EXAMPLES OF RESONANCE IN DESIGN

To our knowledge, few examples exist where designers have considered resonance from the outset. Rather, some designs’ intended stakeholders have “incidentally” resonated with those of a broad population after their launch. Most examples of resonance can be found in product and interaction design. For example, the OXO potato peeler was initially designed for a person with arthritis, yet was found to be useful and comfortable by a broader population.²⁶ In the same vein, text messaging (originally TTY) was aimed to facilitate communication between non-hearing people;²⁷ and predictive text was developed for those with dexterity impairments.²⁸

²⁵ G. Pullin, *Design Meets Disability*, pp. 91–92.

²⁶ V. Lanston, “Behind the Design: OXO’s Iconic Good Grips Handles,” 31 January 2017, <https://www.oxo.com/blog/behind-the-scenes/behind-design-oxos-iconic-good-grips-handles>, (accessed 5 July 2026); G. Pullin, A. Newell, “Focussing on Extra-Ordinary Users.”

²⁷ Gallaudet University Archives, “How TTYs Made Telephones Accessible to the Deaf—Awareness, Access and Change,” Gallaudet University, <https://gallaudet.edu/museum/exhibits/history-through-deaf-eyes/awareness-access-and-change/how-ttys-made-telephones-accessible-to-the-deaf/>, (accessed 5 July 2026).

²⁸ J. L. Arnott, M. Y. Javed, “Small Text Corpora in Character Disambiguation for Reduced Typing Keyboards,” *Proceedings of RESNA 13* (Washington DC), 1990; Microsoft, “What Predictive Text Teaches about Writing,” Microsoft, 6 October 2023, <https://www.microsoft.com/en-us/microsoft-365-life-hacks/writing/>

Initially, these designs occupied a specific market niche, and were designed specifically for/by a distinct group of individuals, yet became popular and marketable for a broader population as quotidian products. In spatial design, likewise few examples of resonance can be found; a step-free passage between train/metro/bus and platform/street, initially aimed to increase accessibility for those with limited mobility, has been found to offer easy boarding/alighting to an extensive array of passengers. What is more, it has been concluded that the installation of level thresholds decreases boarding time, in turn increasing the frequency of vehicles and generating more profit. So-called “special design,” critical for a few, delivers a long-term societal and economic return following an initially costly accessibility investment.²⁹ Another example is that of loggias: Carlos Pereira *et al.* explore the (sensory) qualities of loggias for people with and without visual impairments. For some people with visual impairments, they explain, building façades provide multisensory clues essential for orientation and/or finding a building entrance: “the sound of voids in the building façade, such as the sound of a loggia or an open door is recognizable.”³⁰ Moreover, they argue that loggias have the visual advantage in light regulation for sighted people, providing time and space for ocular adaptation; they protect from glare and allow for efficient shelter to sun, wind, and rain exposure. A last example is that of tactile pavements, initially aimed at providing people with visual impairments a distinctive surface detectable with their feet or cane and alerting them to changes or dangers. Nowadays, these surfaces oftentimes assist those using mobile phones or those who are otherwise distracted.³¹

what-predictive-text-can-teach-us-about-writing-style, (accessed 5 July, 2026); A. Newell, “The Future of ICT,” in P. J. Clarkson, S. Keates, R. Coleman, C. Lebbon (eds.), *Inclusive Design: Design for the Whole Population*, Springer, Berlin, 2003.

²⁹ O. Herwig, *Universal Design: Solutions for a Barrier-Free Living*, Birkhäuser, Berlin, 2008; X. Karekla, N. Tyler, “Reduced Dwell Times Resulting from Train-Platform Improvements: The Costs and Benefits of Improving Passenger Accessibility to Metro Trains,” *Transportation Planning and Technology*, 35, 5, 2012, pp. 525–543; M. Bordas Eddy, *Universal Accessibility: On the Need of an Empathy-Based Architecture*, PhD Thesis, Tampere University of Technology, 2017.

³⁰ C. Pereira, T. Heitor, A. Heylighen, “Exploring Multisensory Qualities of Loggia Spaces for Urban Resilience to Climate Change,” *Modular Journal*, 2, 2, 2019, p. 13.

³¹ W. Feuerman, “Consciousness and Distraction in the Digital Age,” *Conscious Cities Antology 2018: Human-Centered Design, Science, and Technology*, 2018. <https://www.ccities.org/consciousness-and-distraction-in-the-digital-age>, (accessed 5 July 2026).

EMPIRICAL BACKGROUND

Our path towards considering resonances and exploring their potential in (architectural) design draws to a large extent from a series of empirical studies we conducted within the framework of an overarching study on the design practices and outcomes of architects with personal disability experience.³²

The overarching study was built up around four case studies. Each case study focused on a triad of one architect with personal disability experience, at least one person from their surroundings, and at least one of their materialized designs. Data were collected by conducting several semi-structured interviews, visiting the materialized designs under study guided by the respective architect, observing them, and inventorying design media. Permission to conduct the study was obtained from the KU Leuven Social and Societal Ethics Committee. Before the interviews, consent was obtained in written form. The option was given to remain anonymous throughout the study or in any publications, yet was not chosen.³³

During fieldwork, we observed how Natalia's (the first author's) own embodied experiences as a wheelchair user partially overlapped with some experiences of the mobility and sensory impaired architects of the study, and how their experiences, in turn, overlapped with that of yet other people they considered in their designs.

For instance, in the context of the case study on the design practice of American architect George Balsley,³⁴ we visited the Sorenson Language and Communication Center (SLCC) in Washington DC. During the visit, Natalia could benefit from seeing through transparent banisters initially designed to extend visual reach for Deaf people to be able to see and communicate across space, even from a seated position. Likewise, Natalia could detect significant resonances both between Deaf people using their hands to communicate while being in motion and her own use of hands to propel her wheelchair; and between the subsequent challenges

³² N. Pérez Liebergesell, *The Difference Disability Makes: Learning about Interactions with Architectural Design from Four Architects Experiencing Disability*, PhD Thesis, KU Leuven, 2020.

³³ More details on how this research was carried out, including approach, methods and ethical considerations, can be consulted in N. Pérez Liebergesell, *The Difference Disability Makes*.

³⁴ N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, "Through the Eyes of a Deaf Architect: Reconsidering Conventional Critiques of Vision-Centered Architecture," *The Senses and Society*, 14, 1, 2019, pp. 46–62.

Deaf people and wheelchair users face in juggling any other simultaneously occurring activities involving hands. Beyond, struggles regarding the use of hands while being in motion and needing to perform other activities (such as opening doors) may also resonate with someone with a limb-amputation, pushing a suitcase, using a cane or walker, holding a child, operating a phone, carrying a beverage, etc. Hence, many of the design considerations initially aimed to support Deaf people's actions and/or ways of being, such as transparent banisters, automatic doors, mobile furniture arrangements, broad hallways, or rounded and see-through corners, also benefitted Natalia as a wheelchair user—and potentially an even wider spectrum of people and circumstances—albeit for different reasons. Stéphane Beel, a Belgian architect whose design practice we studied in tandem with one of his designs, the *Koninklijk Museum voor Midden-Africa* (KMMA)³⁵ in Tervuren (Belgium),³⁶ stressed that architects should address the various possibilities offered by one design challenge. For instance, a ramp should not be built specifically for wheelchair users to use but serve a broader spectrum of people, and for more than one purpose. Otherwise, designers tap into “specialized design” (often perceived as stigmatizing and/or accentuating differences among people by separating them) and thus compromise the quality of the overall design. Moreover, the case study on Beel's design practice, as well as a case study conducted on the design practice of Sydney-based architect William Feuerman,³⁷ concluded that both architects had developed an ability to relate to other people's situations; the empathy they showed stemmed from a partial bodily overlap between their experiences and that of people with similar conditions as their own (e.g. regarding mobility, balance, or other sensory issues they experienced). These overlaps, in turn, produced a disposition to understand other people's situation, and beyond, allowed for inclusion-oriented effects in their design approaches and outcomes analogous to resonance.

Lastly, during our case study, Barcelona-based architect Marta Bordas Eddy expressed that architects should design from the worst-off

³⁵ After completion of research fieldwork, the museum's name was changed to *AfricaMuseum*.

³⁶ N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, “Designing for a Future Self: How the Architect Stéphane Beel Empathises with Wheelchair Users,” *The Journal of Architecture*, 26, 6, 2021, pp. 912–937.

³⁷ N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, “Urban Chandelier: How Experiences of Being Vision Impaired Inform Designing for Attentiveness,” *Journal of Interior Design*, 46, 1, 2021, pp. 73–92.

situation, as it is likely to also benefit others and resonate with a broader population, while the other way around does not always work.³⁸ When Marta's partner Joel was asked how he, as a person who walks, experienced the house designed by and primarily for her, he stressed: "that the house was designed for her doesn't mean anything bad for me; I believe it's actually the contrary [...] at the level of the design it's a very nice house, very convenient, very practical and comfortable."³⁹ Hence, conclusions drawn from these four case studies have drawn our attention to considering the potential of resonance in architectural design.

CRITICAL USERS

Studying and applying overlaps across the entire population may prove unrealistic and unworkable in architectural terms. Hence, if resonance is to be applied in architectural design, architects need to consider which resonances between whose experiences are taken into account in the first place. How is a target population selected, and which aspects of their experiences and/or ways of being are to be taken into account?

Rather than considering user-diversity to the fullest, we propose to start by considering only a fraction by exploring the notion of critical user.⁴⁰ Critical users—also called lead or extreme users—are users who do not feel indifferent towards certain designs; they are at the limit of needing something to be *one* way. In other words, critical users are those who find it difficult to, or cannot, attain their vital needs and/or ways of being to what the (built) environment affords. For them, the presence or absence of certain design elements or qualities is of vital importance and thus considered in absolutes—activities and/or ways of being are either

³⁸ N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, "Designing from a Disabled Body: The Case of Architect Marta Bordas Eddy," *Multimodal Technologies and Interaction*, 2, 1, 2018, pp. 1–17; see also: M. Bordas Eddy, *Universal Accessibility*.

³⁹ N. Pérez Liebergesell *et al.*, "Designing from a Disabled Body," p. 11.

⁴⁰ J. Cassim, H. Dong, "Critical Users in Design Innovation," in P. J. Clarkson, S. Keates, R. Coleman, C. Lebbon (eds.), *Inclusive Design: Design for the Whole Population*, Springer, London, 2003; P. Hannukainen, K. Hölttä-Otto, "Identifying Customer Needs: Disabled Persons as Lead Users," *Proceedings of the ASME 2006 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Volume 4a, 2006, pp. 243–251; G. Pullin, A. Newell, "Focussing on Extra-Ordinary Users"; S. Raviselvam, K. L. Wood, K. Hölttä-Otto, K. Nagarajan, "A Lead User Approach to Universal Design – Involving Older Adults in the Design Process," *Studies in Health Technology and Informatics*, 229, 2016, pp. 131–140; E. Von Hippel, "Lead Users: A Source of Novel Product Concepts," *Management Science*, 32, 7, 1986, pp. 791–805.

enabled or disabled by design. “Non-critical” user groups might experience some (built) environments as (un)pleasant or (un)comfortable, yet vital activities are not significantly compromised. To some extent, a critical user approach matches several voices in literature arguing the necessity to “design from the worst-off,”⁴¹ to consider “man at his weakest,”⁴² or to “solve one, extend to many.”⁴³ The notion of the critical user approaches diversity qualitatively by foregrounding “how important” rather than quantitatively “how many” (i.e., the number of people affected). This would bring to the fore not only *that* socio-material environments dis- or enable people, but also to what extent designs influence people’s vital activities essential for life—hence the qualitative aspect of the critical user approach. The idea is thus to reach as many people as possible—but starting from a critical few.

In a similar vein, Pullin and Newell put forward the idea of considering, and involving, older people in design, for they often have varied impairments at once, e.g. reduced mobility, strength, memory, and cognitive abilities.⁴⁴ While impairment may not by itself be considered an inclusion criterion for critical users, being disabled—e.g., by the built environment—is likelier to occur in the presence of impairment (or rather, in the *interaction* between some people and some designs). Moreover, several scholars argue, and our previous studies corroborate, that many people with impairments possess an attentiveness towards aspects of the (built) environment which designers frequently ignore but which can be relevant for architectural design.⁴⁵ Besides the level of people’s adaptability (how they can adapt their wants and needs to different options), the level of attentiveness (awareness of how their bodies and (built) environments

⁴¹ M. Bianchin, A. Heylighen, “Just Design,” *Design Studies*, 54, 2018, pp. 7; M. Bordas Eddy, *Universal Accessibility*, p. 42.

⁴² A. Aalto, *Rationalism and Man*, Lecture at Swedish Craft Society, Stockholm, 1935, in A. Aalto, “Rationalism and Man,” in G. Schildt (ed.), *Alvar Aalto in His Own Words*, Otava, Helsinki, 1997, p. 103.

⁴³ A. Shum *et al.*, “Inclusive Microsoft Design.”

⁴⁴ G. Pullin, A. Newell, “Focussing on Extra-Ordinary Users.”

⁴⁵ See, for example: H. Bauman, “DeafSpace”; J. Boys, *Doing Disability Differently*, Routledge, Abingdon, 2014; R. Butler, S. Bowlby, “Bodies and Spaces,” *Environment and Planning D: Society and Space*, 15, 4, 1997, pp. 411–433; M. Dischinger, “The Non-Careful Sight,” in P. Devlieger *et al.* (eds.), *Blindness and the Multi-Sensorial City*, Garant, Antwerp, 2006; G. Pullin, *Design Meets Disability*; P.-W. Vermeersch, A. Heylighen, “Rendering the Tacit Observable in the Learning Process of a Changing Body,” in N. Nimkulrat, K. Niedderer, M. Evans (eds.), *Proceedings of EKSIG 2013: Knowing Inside Out – Experiential Knowledge, Expertise and Connoisseurship*, Loughborough University, Loughborough, 2013.

interact) may also be a relevant inclusion factor in the way critical users are considered. It should be emphasized that starting from critical users does not aim to select people *representing* larger groups (which is neither desirable nor realistic), but to consider overlapping consensus—resonances—between people who have “the most” extraordinary/radical requirements for ordinary aspects of life and “the rest” of the population.

Product designers often consider critical users when mapping out interactions between users and products.⁴⁶ So far, however, critical users have rarely been considered in architectural design. During the product design process, Pullin and Newell argue, involvement of extreme users shows potential in acting as an effective source of inspiring “provocation”—rather than an often-assumed constraint or nuisance.⁴⁷ Considering critical users from the outset makes managing, understanding, and relating to the needs and ways of being of a relatively small group of people easier than attempting to design for all the particularities of an inherently diverse population. In fact, Eric von Hippel stresses that one need not identify critical users illuminating an entire design but select them purposefully with respect to as few—or as many—attributes as considered relevant.⁴⁸ Additionally, we argue that critical users may not be critical in all aspects of life, but rather on a small number, or even one, and that they may be highly dependent on the environment they are in. Involving critical or lead users on the extreme of environmental awareness is useful to unearth unarticulated behaviors, desires, and needs that may be (or become in the future) relevant to the rest of the population.⁴⁹ Pullin and Newell encourage a certain directionality in inclusive designing, i.e., to start by considering the margins/extremes (design for a few critical) and subsequently move to the centre (design for many). The aim is, then, to embed such “radical” design within the mainstream—not the other way around. Bordas Eddy articulates this idea in a similar way: if one were to design for the average, as often happens, entire segments of the population are being left out.⁵⁰ If one were to design for the extremes, a broader

⁴⁶ J. Cassim, H. Dong, “Critical Users in Design Innovation”; H. Dong, P. J. Clarkson, J. Cassim, S. Keates, “Critical User Forums – An Effective User Research Method for Inclusive Design,” *The Design Journal*, 8, 2, 2005, pp. 49–59; Von Hippel, “Lead Users: A Source of Novel Product Concepts.”

⁴⁷ G. Pullin, A. Newell, “Focussing on Extra-Ordinary Users.”

⁴⁸ Von Hippel, “Lead Users: A Source of Novel Product Concepts.”

⁴⁹ A. D. Peacock *et al.*, “Co-Designing the Next Generation of Home Energy Management Systems with Lead-Users,” *Applied Ergonomics*, 60 (April), 2017, pp. 194–206.

⁵⁰ M. Bordas Eddy, *Universal Accessibility*.

part of the population could benefit—or, at the very least, their vital needs and/or ways of being would unlikely be compromised.⁵¹

In considering critical users, the questions remaining are: what is the bare minimum that human beings require to function (capability), and what role does (architectural) design play?

The capability approach, developed by Amartya Sen⁵² and introduced in the United Nations Development Program since 1990, holds promise in defining those “vital activities and ways of being.” Capabilities are described as what people are effectively able to do, or be, based on what they value. These beings and doings are called “functionings.” Examples of the latter could be being healthy, resting, being part of a community, or being mobile.

While many scholars have re-examined and further developed Sen’s ideas,⁵³ it is worth mentioning that Ilse Oosterlaken analyzed relationships between Sen’s theory and its relevance in design.⁵⁴ Capabilities, she explains, are highly dependent on one’s characteristics, what one values in life, but also on the *context* one is in, whether it be spatial, social, cultural, etc. Capabilities are not something people *have*; they are *produced* by material and institutional support. The context can be considered a conversion factor in the sense that it holds the potential to contribute to enable human action and functioning. For example, a bicycle affords transportation to a person who has the bodily fitness and skill to use it, but there are also other things involved that transcend the artifact, like a proper infrastructure to ride it, policies put in place, or the cultural meaning and acceptance of riding a bicycle. The bike’s intrinsic value

⁵¹ In their analysis and promotion of the economic impulse for accessible tourism, Peter Neumann and Werner Allemeyer combine quantitative and qualitative layers: barrier-free environments, they stress, are absolutely essential for around 10% of the population, while they are considered necessary/important for between 30 and 40% of people, and comfort-enhancing for 100% of the population. P. Neumann, W. Allemeyer, *Ökonomische Impulse eines barrierefreien Tourismus für alle: Langfassung einer Studie im Auftrag des Bundesministeriums für Wirtschaft und Arbeit*, Münstersche geographische Arbeiten 47, Inst. für Geographie der Westfälischen Wilhelms-Univ., Münster, 2004.

⁵² A. Sen, “Rights and Capabilities,” in *Resources, Values, and Development*, Blackwell and Harvard University Press, Oxford / Cambridge MA, 1984.

⁵³ See, for example: M. C. Nussbaum, *Women and Human Development: The Capabilities Approach*, Cambridge University Press, Cambridge, 2000; I. Robeyns, *Wellbeing, Freedom and Social Justice: The Capability Approach Re-Examined*, Open Book Publishers, Cambridge, 2017.

⁵⁴ I. Oosterlaken, “Human Capabilities in Design for Values,” in J. van den Hoven, P. Vermaas, I. van de Poel (eds.), *Handbook of Ethics, Values and Technological Design*, Springer, Dordrecht, 2013.

includes to move freely and at will, and this, in turn, contributes to the instrumental value, including reaching one's workplace. Architectural design could indeed be considered a conversion factor dis/allowing certain capabilities necessary for functioning.

Another theory that lends itself well for the purposes of defining vital aspects of life is that of Abraham Maslow's hierarchy of needs⁵⁵ (also widely revised and developed by scholars such as Pieter Desmet and Steven Fokkinga, or Belal Dahiam Saif Ghaleb).⁵⁶ Maslow's theory suggests that people are motivated to fulfil basic needs before they move on to more advanced needs. Other scholars often display Maslow's five basic needs as a pyramid,⁵⁷ organised from bottom to top as follows: physiological, security and safety, social belonging, esteem, and self-actualization. The ones at the bottom of the pyramid are considered deficiency needs to be fulfilled to avoid unpleasant consequences, and thus basic for a person's wellbeing, while the ones at the top are called growth needs and stem from a desire to evolve as a person. Maslow's theory has been criticized for being based on a Western ideology, without accounting for cultural differences in (ordering) human needs.⁵⁸ More recently, it has been expanded to include also other needs, and some have argued that human needs do not follow any hierarchical logic, rather, needs are individual (i.e., differing from person to person), interrelated, additive, and can change over time.⁵⁹

⁵⁵ A.H. Maslow, "A Theory of Human Motivation," *Psychological Review*, 50, 4, 1943, pp. 370–396.

⁵⁶ P. Desmet, S. Fokkinga, "Beyond Maslow's Pyramid: Introducing a Typology of Thirteen Fundamental Needs for Human-Centered Design," *Multimodal Technologies and Interaction*, 4, 3, 2020, 38; B. D. S. Ghaleb, "Towards A Dynamic Model of Human Needs: A Critical Analysis of Maslow's Hierarchy," *International Journal of Multidisciplinary Approach Research and Science*, 2, 3, 2024, pp. 1028–1046.

⁵⁷ S. King-Hill, "Critical Analysis of Maslow's Hierarchy of Need," *The STeP Journal*, 2, 4, 2015, pp. 54–57.

⁵⁸ G. Hofstede, "The Cultural Relativity of the Quality of Life Concept," *Academy of Management Review*, 9, 3, 1984, pp. 389–398.

⁵⁹ See, for example: B. D. S. Ghaleb, "Towards A Dynamic Model of Human Needs"; A. J. Hale *et al.*, "Adapting Maslow's Hierarchy of Needs as a Framework for Resident Well-being," *Teaching and Learning in Medicine*, 31, 1, 2019, pp. 109–118; D. Kenrick *et al.*, "Renovating the Pyramid of Needs: Contemporary Extensions Built Upon Ancient Foundations," *Perspectives on Psychological Science*, 5, 3, 2010, pp. 292–314. Insights from the empirical studies mentioned above, as well as Natalia's first-hand experience of being a wheelchair user, suggest that basic needs could be expanded to also consider e.g. privacy/anonymity needs, or the need of 'being alone together'; see: A. Heylighen, M. Annemans, K. Coomans, *et al.* 2020. "Room for Being Apart Together: How Spatial Organization

In any event, all design practices are articulations of human needs, and the design outcome thus affects the need fulfilment of every single person.⁶⁰ By way of example, we consider physiological needs, and one of their architectural counterparts, i.e. bathrooms. We do so for two reasons: (1) bathrooms are widely known and used, and easy to understand in architectural terms, and (2) to this day, basic physiological needs for diverse users are still ordinary exclusions referenced in scientific and opinion articles around the globe; having access to bathrooms recurrently becomes a “make-or-break” reason for social gatherings, finding and/or maintaining a job, selecting a holiday destination, etc.⁶¹ Regarding the use of bathrooms, people depending on (wheeled) mobility devices, or people requiring assistance are considered critical, as they are unlikely able to adapt to different (e.g. smaller) options (Figure 1). No matter what skills they learn, if a bathroom stall does not allow for the mobility device (e.g. wheelchairs) to pass and/or turn, or for people’s assistance to support them, these are situations that negate the use of a toilet for what one may consider a vital aspect of life. Other user groups may benefit from big stalls just as well, but they are likelier able to adapt to different options. A conflict across critical users regarding bathrooms could be the conflicting toilet height between that needed by some wheelchair users (often higher than usual), and some people of short stature (often lower than usual). Likewise, a conflict could occur between left-transferring and right-transferring (wheelchair) users. How conflicts like these could be dealt with is discussed below. Whereas considering bathroom design from a critical user lens would indeed tackle a basic need, one shall not overlook experiences of—and meanings attached to—bathrooms beyond considering purely functional aspects. That is, how their presence, designation, and design can have ramifications on other needs such as safety, social belonging, or even self-actualization (e.g., by how accessible bathrooms make private, employment, or socio-cultural life im-/possible). Moreover, further angles on human diversity could be offered by acknowledging the cultural specificity of bathroom use.

Affords Social Interactions across Different Contexts,” presented at the *Sensing Spaces, Perceiving Place – ANFA 2020 Conference* (on-Line), 14 September 2020.

⁶⁰ P. Desmet, S. Fokkinga, “Beyond Maslow’s Pyramid.”

⁶¹ J. Brookes, “To Pee or Not to Pee? That Is the Question ... for Disabled Tourists and Islanders,” *OnTheWight*, 13 April 2021, <https://onthewight.com/to-pee-or-not-to-pee-that-is-the-question-for-disabled-tourists-and-islanders/>, (accessed 5 July 2026); A. F. Nielsen, “The Role of Toilets in Public Spaces: An Interview Study with Individuals Experiencing Gastrointestinal Issues,” *Social Science & Medicine*, 362, 2024, 117408.

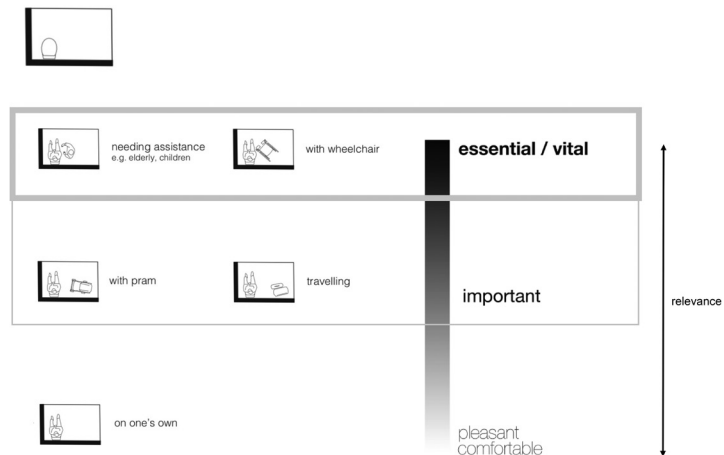


Figure 1. Representation of a Western bathroom stall and classification in order of relevance. The stall affords transfer space on the right side for several critical users. Illustration by the authors, 2026.

RESONANT AFFORDANCE AMONG CRITICAL USERS

Previously mentioned empirical research has aided identifying at least two types of resonances relevant in (architectural) design: (1) bodily resonance, referring to overlaps of needs and/or ways of being across different people; and (2) design resonance, i.e. design elements or qualities that serve for more than one purpose at once. For instance, a bodily resonance could be that of a wheelchair user and a Deaf person using sign language both needing their hands as they move (and communicate) through space. A design resonance would be automatically opening doors benefitting both of them, albeit for different reasons.

The concept of affordance, a term coined to describe people's possibility to act according to their abilities and what the environment offers,⁶² lends itself to connect both types of resonances. Affordances allow establishing relationships between properties of an object and characteristics of a person encountering that object, and what actions they identify as possible. For example, an automatically opening door affords for people needing their hands while being mobile their passing. A "resonant affordance" may thus be considered that which links several critical users' vital functionings to (architectural) artefacts.

The application of resonance in design could be modulated so as to respond to particulars of groups of individuals depending on what the design sets out to do. How the resulting architecture responds to particularities beyond critical users remains open for the designer(s) to expand as the context demands. An example could be the abovementioned SLCC in Washington DC;⁶³ that this building was designed particularly for, and with, Deaf people, and considered besides functional features also socio-cultural ones, does not make it e.g. wheelchair-inaccessible—rather the contrary, as was argued above. Architects can initially design (built) environments based on resonances—so that they cover critical users' needs and/or ways of being—and particularize them for specific user groups.

PERSPECTIVES ON DISABILITY AND EMPATHY

We started from the question how architects can design for imaginary users, particularly disabled ones, as their perspectives have been considered

⁶² J. J. Gibson, *The Senses Considered as Perceptual Systems*, Houghton Mifflin, Boston, 1966; D. Norman, *The Design of Everyday Things*, Basic Books, New York, 2013.

⁶³ See N. Pérez Liebergesell *et al.*, "Through the Eyes of a Deaf Architect."

especially hard to grasp in relation to architecture. We turn to the field of cognitive science and philosophy as we build on the concept of empathy. Foregrounding resonances across critical users may be a promising route to (1) recognize and use design's potential to respond to manifold human needs and ways of being without falling back on specialized design (perceived as) benefitting only a few; and (2) provide designers comparable experiences of disablement relatable to their own to assist them to empathize with whom they design for, and thereby overcome the impression that disability happens to "others."

The idea that the material context holds the power to dis- or enable a person recalls the social model of disability.⁶⁴ The social model contrasts with the medical model, which focuses on the disabling effects of an individual's impairment, and has often been critiqued for offering little insight into some disabled people's identity and experiential universe.⁶⁵ While it remains relevant to explore and revise meanings and experiences of disability from ever-changing contemporary lenses, the social model of disability holds the potential to make designers aware of their share of responsibility in enabling or disabling the people they design for. *Every* design decision has the potential to include or exclude someone. Designers may be insufficiently informed about the perpetuation of spatial injustice and derived accountability.⁶⁶ The inclusion of contextual factors—such as architecture—in the very definition of disability, Pullin points out, "speaks volumes of blurring boundaries between disabled and able-bodied, not just in terms of a grey scale or continuum between the two, but also because changing environmental factors and social contexts make disability contextual, even dynamic, for each individual."⁶⁷ In these terms, disability may be considered universal, from Latin *universalis*, i.e. belonging to all, or occurring everywhere.

⁶⁴ M. Oliver, *Social Work with Disabled People*, MacMillan, London, 1983.

⁶⁵ D. Goodley, "Learning Difficulties', the Social Model of Disability and Impairment: Challenging Epistemologies," *Disability & Society*, 16, 2, 2001, pp. 207–231; M. Oliver, "The Social Model of Disability: Thirty Years On," *Disability & Society*, 28, 7, 2013, p. 7; T. Shakespeare, N. Watson, "The Social Model of Disability: An Outdated Ideology?," in *Research in Social Science and Disability*, vol. 2., 2001, pp. 9–28; R. Thorneycroft, "Screwing the Social Model of Disability," *Scandinavian Journal of Disability Research*, 26, 1, 2024, pp. 286–299.

⁶⁶ L. Stafford, L. Vanik, L.K. Bates, "Disability Justice and Urban Planning," *Planning Theory & Practice*, 23, 1, 2022, pp. 101–142; A. Ulahannan, S. Birrell, P. Herriotts, "Inclusive Streetscapes: Embedding Disabled People's Lived Experience into Street Accessibility," *Wellbeing, Space and Society*, 8, June 2025, 100261.

⁶⁷ G. Pullin, *Design Meets Disability*, p. 91.

Nonetheless, the (perceived) difference between able-bodied and disabled people is often accentuated by architecture, e.g. by “special,” accessible entrances through side-doors. It has been argued that people’s identity and sense of place is shaped not only by social interactions, but also by interactions with the material world of objects and buildings that surround them.⁶⁸ Besides their material properties, the messages objects and buildings convey thus deserve careful attention, specifically, how they depict disabled people. In relating common associations of disability with architecture, we turn once more to Bordas Eddy by way of example. In her view, architects should communicate through affordances (Figure 2), rather than through entitlement:

If you have a bigger bathroom, and a smaller one, instead of saying “this is for the disabled” and “this is for whoever,” maybe you should say “this is big” and “this is small.” We should communicate the architectural space without necessarily referring to the users; that is, describe the facilities and whatever is inside and not so much the people.⁶⁹

The same goes for bathroom stalls that afford extra space for e.g. transfers; an alternative to entitling solely wheelchair users to use such stalls (even though they might be used by, or usable to, a broader set of individuals than just wheelchair users), could be communicating that a bathroom stall offers space on one or both sides. In this way, architectural design shows great potential to reduce possibilities for (disability-related) othering.

Several voices bring forth the need for information on human diversity in architectural design to be descriptive, rather than prescriptive, and inspirational and consisting of possibilities, rather than composed by strict rules one must adhere to.⁷⁰ Design guidelines and legislation often fall short in explaining the reasons behind certain requirements,

⁶⁸ D. Littlefield, “Milky Voids – The Reinterpretation of a Mining Building,” in D. Littlefield, S. Lewis (eds.), *Architectural Voices: Listening to Old Buildings*, Wiley-Academy, London, 2007; N. Pérez Liebergesell, P.-W. Vermeersch, A. Heylighen, “The Hidden Unwelcome: How Buildings Speak and Act,” *Journal of Interior Design*, 46, 3, 2021, pp. 3–10; S. Steets, “Taking Berger and Luckmann to the Realm of Materiality: Architecture as a Social Construction,” *Cultural Sociology*, 10, 1, 2016, pp. 93–108.

⁶⁹ M. Bordas Eddy in N. Pérez Liebergesell *et al.*, “Designing from a Disabled Body,” p. 6.

⁷⁰ See, for instance: E. Verdonck, H. Froyen, “Universal Design Patterns: Designing a Web-Based Tool with Architects,” in P. Leclercq, A. Heylighen, G. Martin (eds.), *CAAD Futures 2011: Proceedings of the 14th International Conference on Computer-Aided Architectural Design*, Les éditions de l’Université de Liège, Liège, 2011.



Figure 2. Examples of communication through entitlement (left: commonly used) and communication through affordance (right: proposal) in Western bathroom stalls. Illustration by the authors, 2026.

presumably because information is presented in a highly technical way, at the expense of a deeper human understanding, and perceived as narrowing down design freedom. The information contained in these documents, and the formats in which they are presented, pose a major challenge to putting empathy in motion, i.e. it hampers designers' capacity to put themselves in the shoes of those they design for. Consequently, people whose situations are radically different from a designer's own are often kept at a distance and/or categorized as "not-like-me."

The case study conducted on Beel's design practice⁷¹ assisted in recognizing the potential of resonance with regard to empathy in design processes; it allowed corroborating several scholars' conclusions insofar empathizing presupposes a bodily commonality or overlap in order to be successful.⁷² Beel's design and mindset showed that some designers may be affected by experiences of feeling disabled without having an impairment—or only having partial/temporary impairment. Empathy, we argue, requires a certain degree of identification and incorporation of the other into self, in order to trigger an affective response (i.e., being moved into action). One cannot empathize with no-body, with figures or technical information, rather, *some-body* is needed to empathize with.⁷³ Unearthing resonances between selves and others, even if only partially, is expected to allow transforming abstract information into concrete and enactable narratives, which scholars mention to be necessary to feel motivated to connect with "the other."⁷⁴ Relating resonances across embodied selves may thus be a promising route to overcome limits of empathy in design processes.

CONFLICTS

Conflicts across a diverse population are likely to occur; what is vital for one person can come into conflict with what is vital for another. For

⁷¹ N. Pérez Liebergesell *et al.*, "Designing for a Future Self."

⁷² See, for example: P. Bloom, *Against Empathy*, Ecco, New York, 2016; L. Finlay, "Reflexive Embodied Empathy," *The Humanistic Psychologist* 33, 4, 2005, pp. 271–292; M. Merleau-Ponty, *Phénoménologie de La Perception*, Routledge & Kegan Paul, London, 1962; E. Stein, *On the Problem of Empathy*, 3rd edition, ICS Publications, Washington, D.C., 1989.

⁷³ D. Zahavi, *Self and Other*, Oxford University Press, Oxford, 2014.

⁷⁴ A. Heylighen, A. Dong, "To Empathise or Not to Empathise?," *Design Studies*, 65, November 2019, pp. 107–124; M. Kouprie, F. Sleeswijk Visser, "A Framework for Empathy in Design," *Journal of Engineering Design*, 20, 5, 2009, pp. 437–448; N. Pérez Liebergesell *et al.*, "Designing for a Future Self."

instance, a curb can hinder access for someone getting around on wheels but offer a vital clue for a blind person regarding orientation. Hence it is as important to acknowledge when overlaps of critical aspects of life do not occur; these conflicts are a necessary consideration within an inclusive mindset, i.e. being knowledgeable how far inclusive designing can go.

Myriam Winance argues that “instead of envisaging the inclusion of diversity via the universality of a product, a common world should be constructed through the diversification of the resources it contains and the variations in the forms of relationships between the person and the object or environment.”⁷⁵ On the one hand, diversification might be a realistic consideration where limits, or conflicts, among critical users are encountered. If both, ramp and curb, are vital for different critical users, designers may opt to separate (i.e., duplicate) their routes, and avoid overlapping them. Another example that refers to the aforementioned height of toilets: if one toilet positioned at a certain height does not sufficiently respond to a variety of statures and abilities, it is advisable to offer a variety of toilets positioned at different heights. Conflicts, or incompatibilities, of vital needs across critical users can thus give way to multiple designs. Universality in architectural terms has often been interpreted as “sameness,” either regarding the design outcome, or regarding people’s experiences of the latter. Sometimes, however, it is not feasible to have just one design addressing everyone’s needs and/or ways of being; rather, a series of particular options are needed.

Nevertheless, it shall also be acknowledged that diversification of resources might not always be the most sustainable option, and oftentimes deemed redundant in architectural terms. For instance, multiple doors/door types for diverse building users might not only imply discrimination, but may involve a great degree of resource consumption. There is thus an evaluative component whereby designers need to consider when conflicts across critical users present, and how best to address them.

CONCLUDING REMARKS: FROM SPECIAL TO UNIVERSAL, TO RESONANT

Universal Design emerged in the US in the mid-1980s as a reflex to the implementation of accessibility standards required by law. Rather than integrating accessible features in architectural design to prevent

⁷⁵ M. Winance, “Universal Design and the Challenge of Diversity”, p. 1335.

discrimination, it became apparent that strictly following standards primarily aimed at “solving problems” resulted in special, separate, expensive, and usually ugly features⁷⁶—thus essentially creating a different kind of discrimination. Hence, Universal Design was born as a critical reaction to disability-specific design.

Since then, critiques on both, accessibility standards and Universal Design (and subsequently ID and DfA) have continued; the former for its high specificity (e.g. “for wheelchair users”) and for compromising so-called design freedom; and the latter for its low specificity (e.g. “for all”) and for presupposing a process of reduction of diversity. Some critiques on UD/ID/DfA and accessibility standards found in literature point towards dissonances between experience, practice, terminology, and theoretical ideals.⁷⁷ Even though relevant, the latter are oftentimes non-operational, unrealistic, and/or not fully capturing the realities of architectural practice.⁷⁸

Exploring the potential of resonances is presented as a reaction to these critiques. Resonances do not get rid of particulars; they do not strip the user of their unique features, rather, allow addressing a manageable selection of them. Ultimately, resonances correct the expression “regardless” that has triggered discussion and substitute it with the idea of “inclusive of / with attention for” design supporting vital aspects of life. Resonances are specific to a number of particulars, making these manageable and actionable in architectural practice. How much designers want to add to a critical minimum remains open for them to consider.

A significant collection of legislation documents, guidelines, books, and articles exist around accessibility and UD/ID/DfA. Having access to this oftentimes considered unappealing information, however, guarantees for neither an accessible nor inclusive outcome. While readily available, narratives on experiences of being disabled by built environments often seem to be “meaningless” to architects, i.e. difficult to relate to or grasp. Information cannot become meaningful on its own, but depends

⁷⁶ M. Story *et al.*, *The Universal Design File*.

⁷⁷ E. Erdtman *et al.*, “Let Us Move beyond Word Battles and Separatism”; R. Imrie, R. Luck, “Designing Inclusive Environments”; E. Steinfeld, B. Tauke, “Universal Designing.”

⁷⁸ Y. Afacan, C. Erbug, “An Interdisciplinary Heuristic Evaluation Method for Universal Building Design,” *Applied Ergonomics*, 40, 4, 2009, pp. 731–744; M. Lamirande, “Aspects of Designing Inclusively from Practitioner Perspectives,” *Architecture*, 2, 3, 2022, pp. 497–517; M. Zallio, P. J. Clarkson, “Inclusion, Diversity, Equity and Accessibility in the Built Environment: A Study of Architectural Design Practice,” *Building and Environment*, 206, 2021, 108352.

on the structures attributing meaning to it (e.g., design processes, and the people involved therein) and the medium making it tangible (e.g., architecture).

Resonances allow to conceptually tackle this issue by re-negotiating familiarity and strangeness/meaninglessness. Bringing forward similarity-in-difference may support designers to relate to critical users' experiences by recognizing some/parts of them as resonating with their own. In its core, this is what empathizing is, i.e. the ability of temporarily putting oneself in the place of the other, and making sense of other people's situations and/or ways of being. The act of empathizing is said to be more likely successful when parts of the self are recognizable in the other, i.e., when an embodied relationship between self and the other is established.⁷⁹ Moreover, empathy is linked to affective resonance; it is characterized as the *sharing* of an affect.⁸⁰ Spelling out resonances between temporary and permanent disabling situations created by design may help "humanizing" technical information, and making it relatable. The resulting resonant design could aid blurring the boundaries between adapted, assistive, or specialized design (often experienced as stigmatizing) and mainstream design—what has been a core aspect of Universal Design since its inception.

Rather than attempting to "design for all" from the outset, we see potential in limiting the users to be considered in design to only a few, i.e. the most critical ones, and invite designers to take notice how they resonate with the rest of the population. Resonances aim to "achieve the ordinary," i.e. work out conventional and vital demands of extraordinary users. Beyond asking "what counts as difference," an equally relevant question may be "what counts as similarity," and how designers can work around it deliberately.

Ultimately, considering UD/ID/DfA from the perspective of resonances opens up new lines of discussion among the scientific community by conceptually providing insight into how to reconcile universality and particularity. Future research could benefit from identifying resonances in architectural practice, and analysing what effects their application produce. Likewise, we have taken a relatively narrow approach towards capabilities, i.e. the fulfilment of pre-defined capabilities and the

⁷⁹ P. Bloom, *Against Empathy*; E. Stein, *On the Problem of Empathy*.

⁸⁰ K. Stueber, "Empathy," in E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, Metaphysics Research Lab, Stanford University, Stanford, 2019.

role of architecture therein, in order to define critical users. Future research could benefit from considering architecture in itself as a contributor to re-defining, and expanding, such capabilities.

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