Authors' post-print (final draft post-refereeing)

To be published as:

Bianchin, M., Heylighen, A., Just design. *Design Studies*.

Please refer to the publisher's final version.

Just design

Matteo Bianchin, Università di Milano-Bicocca, Dipartimento di Scienze Umane, 20126 Milano, Italy

Ann Heylighen, KU Leuven, Department of Architecture, Research[x]Design, BE-3001 Leuven, Belgium

Abstract: Inclusive design prescribes addressing the needs of the widest possible audience in order to consider human differences. Taking differences seriously, however, may imply severely restricting "the widest possible audience". In confronting this paradox, we investigate to what extent Rawls' theory of justice as fairness applies to design. By converting the paradox into the question of how design can be fair, we show that the demand for equitability shifts from the design output to the design process. We conclude that the two main questions about justice find application in design: the question about the standards of justice and the question about its metrics. We endorse a Rawlsian approach to the former, while some revision may be due regarding the latter.

Keywords: decision making; design theory; epistemology; user participation; universal design

Several design approaches aim at inclusivity. Depending on the continent or region, they are called Universal Design (Mace, 1985; Preiser and Ostroff, 2001), Inclusive Design (Coleman, 1994; Imrie and Hall, 2001) or Design for All (EIDD 2004).[1] While differences exist in how these approaches have evolved, the similarities are more apparent (Ostroff, 2011). In particular, all three approaches share the purpose to "ensure that […] products and services address the needs of the widest possible audience, irrespective of age or ability" (Design Council 2009). This purpose derives from two premises (Clarkson and Coleman, 2015: 235):

> "there is such considerable diversity in mental and physical capability both across the population and over the length of the life-course that the association of 'normality' with 'able-bodiedness' is neither accurate nor acceptable";

> "disability arises from interactions with the surrounding environment that are amenable to design and structural interventions, and not inherently from capability levels, health status, or associated degrees of impairment".

Characteristic of inclusive design approaches is their utopian character (Steinfeld and Tauke, 2002). The crux is that really designing "for all" seems impossible. Human differences are too wide to be

taken into account in all their varieties. Furthermore, it is reasonable to expect that trade-offs are the usual case. Designing to address the needs connected with a specific capacity likely entails some cost as to satisfying other needs – what is good for someone who is blind may differ from what is good for someone in a wheelchair. Moreover, given that a moderate scarcity of resources is common in human societies, choices are likely to be made among concurrent demands. Thus, rather than reconciling with the diversity of human needs, adopting an inclusive design stance seems to highlight the conflict that arises from such diversity. It will always turn out that somebody's perspective has been overlooked or harmed.

This feature of inclusive design approaches is not only acknowledged, as the term "possible" in the abovementioned definition suggests, but even advanced as a determinative characteristic (Duncan, 2007). Some authors write about ''Universal Design*ing*'' (Steinfeld and Tauke, 2002), or ''Design for *More*'' (Herssens, 2011) to express the unceasing endeavour. Other authors prefer the term "Inclusive Design" because, in their view, "Universal Design" or "Design for All" are often interpreted literally and incorrectly to advocate the design of one product that meets the needs of the entire population (Keates and Clarkson, 2003). Unlike these "more aspirational" approaches", their approach assumes that no design will work perfectly for everyone (Clarkson and Coleman, 2013) and that meeting everyone's needs may require combining mainstream products with specialist solutions (Hosking et al., 2010).

Because of this utopian character, critics tend to consider inclusive design approaches – and Universal Design in particular – unrealistic, and use this as an argument not to adopt or teach them (De Cauwer et al., 2009). Whether this is the case, however, relates to the differences in human needs and the moderate scarcity of resources that characterises the human condition (Heylighen, 2014; Winance, 2014). The real point thus seems to be a question of justice: to what extent is it possible to design something that, at the same time, allows for equitable use by everyone and respects the diversity in people's capacities?

In this respect, inclusive design approaches seem to face a paradoxical condition. On the one hand, they prescribe to address the needs of the widest possible audience in order to take into account human differences. On the other hand, taking human differences seriously seems to imply that nothing can be designed that meets the needs of everyone, so that "the widest possible audience" may turn out to be severely restricted.

This article addresses this paradox by questioning what the alleged utopian character of inclusive design approaches implies for design practice. For if their purpose, taken literally, is unattainable, the

question arises how designers can be fair to users. In order to answer this question we explore the conceptual tools provided by contemporary theories of justice and in particular the theory of justice as fairness advanced by moral and political philosopher John Rawls (1999; 1986; 1993).

The working hypothesis is that design theory may recruit some of the conceptual tools Rawls provides in order to confront the issue at stake. By investigating to what extent this hypothesis holds, the article aims to contribute to a theory of just design that provides a way out of the paradox of inclusive design approaches and, in doing so, strengthens their theoretical basis.

1. General frame

Critics have indicated the lack of academic attention for and critical scrutiny of the overarching principles of inclusive design approaches in general and Universal Design in particular, their understanding, and their placement into practice (e.g., Imrie, 2012). Exceptions to this rule include studies which confront Universal Design with a critical theory paradigm (D'Souza, 2004), prevailing perceptions in current design practice (Van der Linden et al., 2016), or informational and market issues (Tobias, 2003). Yet other studies analyse how inclusivity relates to quality in design, and suggest that a deliberative approach to inclusive design can both help to understand their connection and confront the questions raised about the relationship between designers and users (e.g., Heylighen and Bianchin, 2013).

In this respect, researchers have recently stressed the relevance of ethics and social issues to design and inclusive design in particular. It has been claimed that, to address ethical and social issues arising within design, focusing on democracy and justice is of paramount importance (Pols and Spahn, 2015: 366). On the one hand, inclusive design approaches seem connected with a democratic attitude according to which design processes should include all who are affected by their output, which is consistent with a deliberative approach (Heylighen and Bianchin, 2013). On the other hand, as pointed out above, these approaches seem faced with a paradox that is naturally connected with a question of justice. However, while design methods tend to refer at least implicitly to the *values* of democracy and justice, they do not refer to a specific *theory* of democracy and justice (Pols and Spahn, 2015).

We address the demand for a theoretical approach by investigating to what extent Rawls' theory of justice as fairness can be applied to confront the paradox of inclusive design. The point is that this paradox can be seen as raising a question of justice, as it results from the need to answer different and potentially conflicting needs. More specifically the very purpose of designing for the widest

possible audience faces two connected problems, insofar as a moderate scarcity of resources can be taken to be common in human affairs.[2]

(a) "many users with severe functional impairments require solutions that would hamper other users" (Keates, 2015: 392);

(b) "[i]t is often hard to prioritize which issues are the most important to fix and, occasionally, which ones may actually harm the overall usability and accessibility of the product" (Keates, 2015: 398).

While this is difficult enough where users are homogeneous, in the case of inclusive design, they are often very heterogeneous. Keates therefore concludes that organizations and designers need assistance to help prioritize issues (ibid.). This acknowledges that issues do not order themselves according to a naturally shared system of priorities. Individuals can be expected to disagree about the priority to be accorded to different issues as they diverge in their interests and needs, and in the conceptions of the good under which these are weighed. This condition is what political philosophers commonly take to be characteristic of modern, pluralistic society. Although different readings are possible of what pluralism amounts to, the common view is that people in a democratic society tend to be committed to different and conflicting ethical beliefs, values, and conceptions of what it is to lead a good life (Rawls, 1993; Habermas, 1996; Gutman and Thompson, 2004).

A moderate scarcity of resources and the fact of pluralism prototypically design the conditions under which a conflict of interest raises questions of justice: they require fixing some principles for distributing goods in situations where conflicting claims arise about the priority to be accorded to satisfying specific needs and interests. In what follows we investigate to what extent Rawls' theory of justice as fairness allows addressing these issues and therefore helps confronting the paradox of inclusive design. First, we define justice in general according to Rawls' theory. Second, we apply some conceptual tools it provides to design. This leads us to suggest a way out of the paradox by considering usability's overall distribution, instead of usability of single artefacts, as the domain of application for fairness in design. We conclude by identifying and confronting several problems and limitations that arise when trying to address the paradox in this way.

2. Towards a theory of just design

2.1 Justice defined

By way of a first step towards a theory of just design, we define justice in general according to Rawls' theory of justice as fairness. A good reason to look at this theory is that it explicitly aims at justifying the principles of justice that govern the distribution of benefits resulting from social cooperation

among agents differing in their natural talents and capacities, social position and conceptions of the good.

In this context, society is conceived as a cooperative venture for mutual advantage marked by both an identity and a conflict of interest: an identity of interest, since social cooperation "makes possible a better life for all than any would have if each were to live solely with his own effort"; a conflict of interest, since "persons are not indifferent as to how the greater benefits produced by their collaboration are distributed, for in order to pursue their ends they each prefer a larger to a lesser share" (Rawls, 1999:4). Choosing among different social arrangements thus requires a set of principles that determines how the burdens and benefits of cooperation are distributed. These are the principles of social justice, as they "provide a way of assigning rights and duties in the basic institutions of society and they define the appropriate distribution of the benefits and burdens of social cooperation" (Rawls, 1999: 4).

The conceptual tools to confront the task are provided by the idea of the original position, conceived along the lines of social contract theory as the hypothetical initial situation in which agents collectively choose the principles for arranging basic social institutions. The assumption here is that social institutions crucially rest on acceptance, as no system of cooperation that is supported by mere enforcement or "persuasion" can be stable over time (Rawls, 1999: 295, 1993: 142; Freeman, 2007, chap 3; see also Searle, 1995, 2010). In order for a system of cooperation to be stable over time, the principles that regulate the relevant social arrangements must turn out to be justified to those who are bound by them.

Besides defining the circumstances of justice as those of moderate scarcity and pluralism, as outlined above, Rawls builds on three elements. First, he defines justice as the first virtue of social institutions and selects society's basic structure as the proper subject of justice. Second, he introduces the idea of a well-ordered society according to which the principles of justice are publicly known. Third, he advances a purely proceduralist approach to justice that converts the question of justifying the standards of justice into a deliberative problem: which principles of justice would rational agents choose under conditions that constrain their choice to the effect of conveying a fair and impartial point of view?

As for the first element, Rawls' theory of justice is designed to address social institutions. The principles of social justice, that is, are domain specific: they are not intended to be general moral principles that apply equally to individual actions, constitutional essentials, international relations, life-boat situations etc. Rather, they are specific to the design of the social institutions that make for society's basic structure, which is therefore the primary subject of justice. The term "basic structure"

here refers to "the way in which the major social institutions fit together into one system, and how they assign fundamental rights and duties and shape the division of advantages that arise through social cooperation" (Rawls, 1993: 258). In this sense the basic structure encompasses political constitutions, legally recognized systems of property as well as family and how the economy is organized (see Freeman, 2014).

Second, the theory of justice is supposed to apply to a society designed to advance its members' good and effectively regulated by a public conception of justice; i.e., a society "in which everyone accepts and knows that the others accept the same principles of justice, and the basic social institutions satisfy and are known to satisfy these principles" (Rawls, 1999: 297). In such a society, individuals are expected to develop an effective desire to act on the principles of justice and these principles can be expected to be stable over time.

Third, justice is defined in purely procedural terms: the principles of social justice are generated by a procedure that is constitutive of the correct output, rather than merely conductive to discover it. The standards of justice, that is, are not independent from the procedure designed to tackle the problem of justification (Elgin, 1996).

The procedure Rawls advances envisages that rational agents choose the principles of social justice under a veil of ignorance. This veil blinds the knowledge agents possess of their own natural assets and abilities, social position, and conception of the good, amongst others. Agents are supposed to know general facts about psychology, society, and human life. Moreover, agents are taken to be rational in that they are endowed with a conception of the good and the capacity for instrumental reasoning. Finally, they are assumed to be motivated to agree on fair terms of cooperation and to comply with them once they are in place. The veil of ignorance screens out the contingent information that would lead to arbitrarily favouring a specific party – since "we cannot reasonably expect our views to fall into line when they are affected by the contingencies of our different circumstances" (Rawls, 1999: 517).

Rawls thus understands the original position – the initial situation of a hypothetical social contract – as a "device of representation" designed to convert a question of justification into a deliberative problem. The original position models the conditions under which agents that regard themselves as free and equal are supposed to reach an agreement, and therefore constrains what can be put forward as a good reason in deliberating the principles of social justice. It constrains deliberation insofar as it conveys an impartial and fair point of view that expresses agents' self-conception as free and equal rational beings (Rawls, 1999, 1985; Freeman, 2007; Barry, 1995). In other words, it

conveys the idea that we cannot expect others to accept principles that favour those in our position with respect to natural or social advantages and to a specific conception of the good (Rawls, 1993: 24).

The expected result of the procedure Rawls advances is that, under this condition, rational agents will choose principles that maximize the position of the worst off while protecting individual freedom and a fair equality of opportunity:

> FIRST PRINCIPLE
>
> Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all.
>
> SECOND PRINCIPLE
>
> Social and economic inequalities are to be arranged so that they are both:
>
> (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and
>
> (b) attached to offices and positions open to all under conditions of fair equality of opportunity.
>
> (Rawls, 1999: 266, see for comments Freeman, 2007, Part 1)

2.2 Justice in design

Now we have sketched the general features of Rawls' approach to defining justice as fairness, the next step towards a theory of just design is to analyse how this approach may fare in design.

To achieve the purpose of inclusive design, i.e., to address the needs of the widest possible audience, several design strategies have been advanced. One strategy is to seek resonance between the needs of particular groups and those of the entire population (Pullin and Newell, 2007). Navigating sidewalks with a trolley or pram resonates with navigating them with a wheelchair – both benefit from curb cuts, i.e., sidewalks flattening into the street. Another strategy is to design for flexibility in use, e.g., by providing choice in methods of use (Connell et al., 1997), or to design for customization (Benyon et al., 2000), which allows accommodating for a wider range of interactions than a fixed design would. Think of the possibility in cars to alter the seat and steering wheel position within certain limits. While these strategies may help designers in broadening the potential audience their design can accommodate, they offer little assistance in prioritizing issues. When designing for

flexibility, for instance, how to decide which methods of use to afford and which not? Or when designing for customization, how to determine the limits within which interactions are allowed?

An exception to this rule is the use of exclusion calculations, a technique advanced in product design as particularly helpful "not just to identify usability issues, but also to prioritize them so that redesign efforts can be allocated appropriately" (Goodman-Deane et al., 2014, p. 892). This technique enables designers to specify the capability demands placed on users by each stage of interaction with a product, and to display how many people cannot meet those demands and thus would be excluded (Keates, 2015). Exclusion calculations are considered helpful in prioritizing issues for two reasons: they help identifying where improvements may fail to have the expected impact because other aspects of the design are still problematic;[3] moreover, they allow ranking product aspects by how many people they affect, e.g., how many people cannot see a label (Keates, 2015). This seems to suggest that the criterion to decide where to allocate design efforts is the number of people affected: "The population exclusion figures […] are useful for assessing the numbers of people affected by design issues and determining if changes are worthwhile" (Goodman-Deane et al., 2014, 893).

If designers adopted a broadly Rawlsian approach to the issue, however, they would not need to calculate how many people cannot meet the capability demands a product places on users. Moreover, rather than on the aggregate output in terms of the exclusion calculation, designers would be asked to focus on the position of the worst off as the relevant target. The former seems to align with an output-oriented utilitarian approach in that the number of people whose needs are addressed sets the standard against which inclusivity is assessed. In a Rawlsian framework, instead, a procedure is suggested from which justice in design can be derived according to the general structure of justice as fairness (Barry, 1995; D'Agostino et al., 2012).[4] This means that issues would be prioritized according to the position of the worst off in terms of the capability demands placed on users – not just by the number of people affected.

If we proceed to apply this view to inclusive design approaches, the upshot is shifting the way "universal" is understood. For a designed artefact to be universal would not mean that everyone should be enabled to use it in an equitable way. As pointed out above, this is in fact impossible, given human differences. Yet its design can be taken to be universal if it accords with what would be chosen by everyone under the condition sketched, i.e., under a veil of ignorance about their natural talents and capacities, social position, and respective conception of the good. This shifts the demand for equitability from the *output* to the *process* of design, i.e., from considering universal usability in

terms of the concrete use one can make of an artefact to considering it in terms of a constraint imposed on how artefacts must be designed to the effect that all possible users is paid equal respect.

Fairness, however, can hardly be applied to design issues for single artefacts. Not only do human differences make it virtually impossible to design an artefact that is useable by each according to her own specific capacity; designing an artefact so that usability for the worst off is maximized may severely restrict the usability for users with different capacities or with a different level of capacity of the same kind.

A classic example are the abovementioned curb cuts: while addressing the needs of people in a wheelchair and making life more comfortable for people with a trolley or pram, they cause problems for pedestrians with a vision impairment who rely on a sharp curb to detect the edge of the sidewalk.

A more specific example concerns the entrance of Museum M in Leuven (Belgium). When designing this entrance, architect Stéphane Beel found it important that different groups of visitors do not have to separate; by integrating a ramp into the staircase, he ensured that someone using a wheelchair can enter the museum together with someone walking (see Fig.1). However, where the ramp crosses the stairs, it interrupts the banister that guides people in descending the stairs. This is necessary for the ramp to continue, but for someone who is vision impaired it is difficult to find the next banister (Heylighen et al., 2013). Thus, while the architect tried to treat people using a wheelchair and people walking in an equitable way, in doing so he severely restricted the usability of the entrance for vision impaired people.
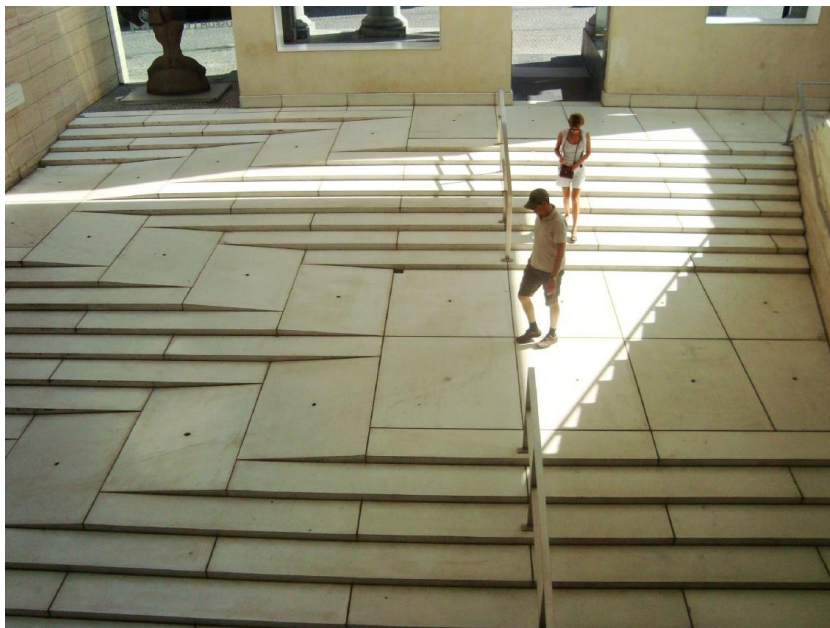

Figure 1. Entrance to museum M in Leuven (Belgium), designed by Stéphane Beel © C. Van Doren.

Besides curbs and ramps, designers may be confronted also by dilemmas about the use of light and colours. For some people with a vision impairment, bright light and strong colour contrasts are crucial to be able to perceive and navigate the built environment. To some extent, this resonates with the preferences of people who are hyposensitive. Some diagnosed on the autism spectrum, for instance, specifically look for sensory stimuli such as bright light and bright colours (Bogdashina, 2003). However, within the same autism spectrum hypersensitive people may experience major difficulties in processing even modest levels of light and colours, causing considerable stress (ibid.). Designers who seek to accommodate the needs of vision impaired and hyposensitive people, thus may severely restrict the usability for hypersensitive people, and vice versa.

Yet another example relates to the design of furniture for disabled children. While strictly speaking this can be considered as design for special needs, also here designers aspire to address the needs of as many children as possible. Pullin (2009: 75-76) refers in this respect to the award-winning product range of James Leckey, which seeks to accommodate children with cerebral palsy of different ages, different sizes, and with a diversity of different conditions, while catering for different uses and contexts – at home, in school and beyond. "As a result," Pullin (2009: 76) points out, "there is enormous pressure to produce adjustable, versatile, universal solutions that can accommodate the largest number of children and from a manufacturing perspective benefit from an economy of scale". In reality, however, adjustability and modularity may come with considerable disadvantages. The product may become so overburdened with features that compromises need to be made in each. Moreover, because the design becomes visually complex (see Fig.2 left), it can be intimidating to the children and their friends; as such it can stigmatize children among their peers and prevent social inclusion.

If we focus on the design of single artefacts, thus either fairness or universal usability seem to fail. If designers go for fairness, in the sense of maximizing usability for the worst off, the usability for other users may be compromised. In the case of museum M, the architect tried to design an entrance that maximizes usability for wheelchair users; yet, as a result, the entrance became less usable for people with a vision impairment.[5] If, on the other hand, designers go for universal usability, in the sense of addressing the needs of as many people as possible, they might end up with a solution that is not fair. By trying to design furniture that is universal – i.e., suits every child with cerebral palsy, everywhere – designers at Leckey ended up with a product that may not maximize usability for those children who are worst off in that it might hamper the social inclusion it seeks to foster.

The upshot is that we still need to find a way to reconcile universality and equitability.

2.3 A way out of the paradox

A possible way out is considering the overall distribution of usability within a relevant social context, instead of the usability of single artefacts, as the domain of application for fairness in design. What counts as a relevant social context can be any group, institution, or social relationship: a state, a neighbourhood, or a city, but also a transport system, a hospital, or the audience of a movie theatre.[6] Identifying the relevant social context may well be a pragmatic matter: depending on the issue at stake, the relevant target of design justice may be a certain group, association, or institution, as well as the whole society. The point of what we suggest here is that the framework of justice as fairness applies not to the problem of designing a specific artefact in a way that maximizes usability for the worst off, but to a different problem: that of distributing usability within a social context taken as a whole in a way that does so.

In fact, this reasoning resonates with Leckey's decision to resist the pressure for a single product that suits everyone, everywhere and to move away from aspiring to universal solutions (Pullin, 2009: 76): "Leckey recognizes that conflicting demands may be inherent in the product specification itself and cannot always be reconciled in the design." Therefore, the firm has chosen to build a range of relatively focused products. By assembling each chair to order, based on patterns in computer-aided design databases and individually laser-cuts parts, making many different designs to suit different children turned out to be almost as economical as trying to fit all children into a single design (see Fig.2 right). While not every chair in the collection may be fair, in the sense of maximizing usability for the worst off, the collection as a whole can be considered as such.

Considering fairness at the level of the distribution across artefacts may thus involve accepting some difference in usability, provided that the solution maximizes the results for the worst off. Leckey considered this distribution across its own product portfolio, yet depending on the situation, it may be considered instead across all related products available on the market, or at the level of the institutional setting regulating their production. The point is that just design does not rest on whether everyone can use an artefact in the same way. On the contrary, it can manage the fact that some will get more than others by considering a solution just if and only if relative differences go generally to the advantage of the less able or most disadvantaged. This in fact just mirrors in design the role of the second principle in Rawls' theory of justice.

Figure 2. KIT Seating System (left) and Whoosh Chair (right) ©James Leckey Design Ltd.

This seems to provide a solution to what we labelled the paradox of inclusive design approaches. Shifting the understanding of "universal" along the procedural line suggested above, and focusing on the social distribution of usability rather than on the usability of single artefacts, allows for a non-paradoxical understanding of these approaches. According to this understanding, the apparent contradiction between the aim of designing for the widest possible audience and that of taking difference seriously can be treated as raising a question of justice, and confronted by a procedural conception of justice as fairness.

An important implication of this approach is that it helps clarifying the relationship between Universal and Inclusive Design. We can define design as "universal" if it accords with the sketched procedure, and "inclusive" according to the people involved in the relevant decision-making. These redefinitions are not meant to dispense with existing definitions , but rather to refine them in order to make clear the different stages where the problem appears: the general framework of justice as fairness and the deliberative stage where the principles of justice are applied in specific contexts. While the general framework of justice as fairness is utterly universal in claiming that every rational and reasonable agent would choose the relevant principles in the original position, inclusivity concerns the way users participate in deliberating how principles apply in specific contexts. The demand for inclusivity is thus relocated from the condition under which people use the artefact(s) to the condition under which they participate in the decision process about how usability is to be distributed in particular cases in order to meet the requirement for fairness. The point about

inclusivity is not that all should be granted equal use of the artefact(s), but that all should be granted equal right to participate in deliberating how the artefact(s) are to be designed (Heylighen and Bianchin, 2013).

In both cases, the definition shifts from the output to the process. Design can be said to be universal if it accords with the procedure of justice as fairness – that is, if the design process is set up in accord with the claim that just principles are such that they would be agreed upon in the original position, and therefore respects the principle of maximizing usability for the worst off. Further, design can be said to be inclusive according to the degree in which users are allowed to participate in the deliberation – and, of course, according to the quality of the deliberation itself.[7]

3. Problems and limitations

So far, we have presented a first attempt at developing a theory of just design and, based thereon, at solving the paradox of inclusive design. Our strategy has been to try and apply Rawls' theory of justice as fairness to design practice. The upshot is a shift in the definition of Universal and Inclusive Design. At this point, a number of qualifications need to be provided to our use of a Rawlsian framework in confronting the paradox of inclusive design, while several questions remain to be addressed.

3.1 Context of application

To start with, Rawls' theory is intended to deal with assessing justice for a society, while we try to confront a specific problem arising in the restricted field of design. His theory is designed to apply to the basic structure of society, and it is an open question whether and to what extent it needs to be adjusted when applied to a more restricted and/or informal context. In this respect, it should be clear that we do not mean to contribute to the general theory of justice, nor to apply the theory as a whole to design. We rather make use of a specific conceptual tool the theory provides, namely the original position, to deal with the paradox of inclusive design constructed as a problem of justice in design.

3.2 Metrics of justice

Once the principles in justice are in place, the question arises what is to be distributed according to these principles, i.e., the question of the metrics of justice. Rawls' theory focuses on the distribution of primary goods, i.e., goods that can be means for whatever ends and therefore are wanted by rational agents whatever else they want (Rawls, 1999: 79). These include not only income and wealth, but also basic rights and liberties, the powers connected with offices and positions, and the

social basis of self-respect. As to the metrics of justice, Rawls' approach is thus routinely taken to be resource-based: what is (to be) distributed are the means individuals can use to achieve their ends whatever they are.[8]

In design, however, artefacts are individuated by the functional properties agents attribute to them in the context of an action plan in which they instrumentally serve to achieve the intended ends: artefacts in this sense can be defined as "objects embedded in use plans" – a use plan being an action plan that involves manipulating some object in order to achieve the intended goal (Houkes and Vermaas 2010: 137). As long as the functions artefacts are designed for refer to use plans, it seems that actual capacities, knowledge and circumstances of particular persons should be taken into account in their design (Oosterlaken, 2009; 2012). If this is true, artefacts' instrumental features make sense only within the teleological context of action planning. Thus, there may be no purely instrumental features of artefacts that in design theory play the role primary goods play in Rawls' theory because there may be no way to abstract teleology away from usability, i.e., an artefact's instrumental value from the functionings it enables.

Focusing on ends rather than means is what marks off the capability approach to justice and has been indeed proposed as the correct approach to frame normative and moral issues that arise in design theory (Oosterlaken 2009). Capabilities are defined as the real freedom or opportunity to perform actual functionings. The latter are conceived both as beings – being well-nourished, well-educated, housed, healthy etc. – and as doings – performing a specific activity like travelling, voting, caring for a child etc. (Robeyns, 2011). The point is that providing an index of primary goods may not be the best way of judging (dis)advantage and thus of providing a space of equality against which to assess justice, because people differ in converting these goods into actual functionings. Differences are due to internal, personal conditions as well as social or environmental conditions that are external to agents. An often-cited example concerns biking: a bike is a good that enables the functioning of mobility, providing a person with an ability to move she may not possess without it. A person with a physical impairment may be not in the condition to extract the same well-being from a bicycle as an able-bodied person, however. In the language of the capability approach, the latter person is said to have a lower conversion factor. The capability approach is designed to fit with human differences by taking into account such "conversion factors": it refers not simply to personal abilities or powers, but to the opportunity of functioning in a certain way constrained by personal, social, and environmental conversion factors (Sen, 1980; Robeyns, 2005).

The paradox of inclusive design thus seems better framed in terms of capabilities than in terms of primary goods. In this respect, we need to ask whether a broadly Rawlsian approach to justice is at

least compatible with the capability approach, which seems apt to convey the issues arising within design. That the framework of Rawls' theory of justice is incompatible with a capability approach is far from obvious, however. For one thing, Amartya Sen – who first articulated the capability approach – seems to see both approaches as complementary rather than rivals (Sen, 2009: 52 ff.). For another, the two approaches seem to relate to different tasks: that of providing the foundational framework for a theory of justice, and that of addressing questions of justice arising in non-ideal circumstances. One can thus argue that, were a full-blown capability theory of justice developed, the basic structure of society and the distribution of primary goods can reasonably be expected to play a central role (Robeyns, 2009; see also Daniels, 2010).

We take this to suggest that the capability approach preserves the foundational framework of justice as fairness. The standards of justice still can be fixed by the tools a broadly Rawlsian approach provides, while the metrics of justice may need to undergo some revision. This is particularly important for the solution we suggest to the paradox of inclusive design approaches. What must be stressed in this connection is that these approaches focus on usability. The conjecture we advance is that the idea of equitable use, which is crucial to inclusive design, can be cashed out in terms of a fair distribution of usability according to a broadly Rawlsian conception of justice as fairness.

Now, usability is neither a primary good, nor a capability. If we adopt Houkes and Vermaas' definition of artefacts and take seriously the role of conversion factors advanced by the capability approach, we can define usability as measuring the degree in which agents can convert a resource – the artefact – into a functioning.[9] On the one hand, usability relates to ends – artefacts' functions are settled by the ends they are intended to serve in a use plan – and may be aptly defined in terms of capabilities – the usability of a bike, say, can be defined in terms of the capability to move it enables. On the other hand, usability is not itself a capability, but a measure for the instrumental value a resource can be made to have in a use plan constrained by the relevant conversion factors. In this respect, we see no obstacle to apply the general framework of justice as fairness to the distribution of usability as a way to characterize the idea of equitable use that is central to confronting the paradox of inclusive design.

In this context, thus, we are not to choose between resource-based and capability-based metrics for social justice. The approach we suggest, however, is compatible with revising the metrics of justice in the direction suggested by the capability approach. Our aim is to assess in what terms the idea of equitable use can be better conceived and whether a fair distribution of usability can be taken to be the core of just design. Provided that the general framework of justice as fairness applies, we only need to clarify in which sense usability can be subject to the standards it provides.

3.3 Identifying the worst off

A further question is how to characterize and identify the worst off in the context of design. For instance, is having difficulty to get on or off a sidewalk, as people using a wheelchair, pram or trolley may experience, worse than lacking a guideline to navigate that sidewalk for people who are vision impaired, or the other way around? The tools to identify relative positions that qualify the worst off in Rawls' theory are given by an index of primary goods and the knowledge of general facts about psychology, society, economy and human life that are accessible in the original position by virtue of the best theories available about such domains. To what extent does the knowledge available to designers allow identifying the relative positions regarding the usability of what is being designed?

In architecture, knowledge about usability is to some extent codified in accessibility legislation: accessibility standards translate usability into minimum door widths and maximum heights of thresholds that are objectively measurable. Yet, although these standards derive from some kind of human consideration, they offer architects little insight into why a particular building feature may be problematic in terms of usability, leading to erroneous application (Franz et al., 2010).

Other knowledge sources about usability include design guides related to specific user groups. Design guides on autism-friendly architecture, for instance, explain the difficulties autistic people encounter, formulate general goals, and specify these in several design guidelines (Ahrentzen and Steele, 2009; Brand, 2010). Analysis shows, however, that these guidelines can be interpreted in multiple ways; they can reinforce but also counteract each other, thus asking for critical judgment (Kinnaer et al., 2016). Moreover, testimonies by autistic people suggest that the meaning they attribute to the designed environment is not always reducible to guidelines (ibid.).

In product design, knowledge about usability can be obtained also by the abovementioned exclusion calculations. While this technique offers designers insight into how many people would be affected by a product feature, its current version is limited by the underlying dataset: the Disability Follow-up Survey does not identify difficulties for people with no or mild impairments, and is too coarsely grained to pick up fine differences in difficulty (Goodman-Deane et al., 2014, 892). Therefore, Clarkson et al. (2007) recommend combining exclusion calculations with user trials and expert appraisal.

Together these examples suggest that, given the specific capacities and limitations affecting users in the context of design, identifying the worst off will likely require taking into account the first person knowledge to which users have privileged access from their own experience or perspective. A crucial ability for designers in general and for inclusive designers in particular, is being able to empathize

with the people they design for (Dorst, 2006; McGinley and Dong, 2011). Yet, however empathetic designers may be, they may overlook aspects that are important to people who experience the designed environment differently than they do (Crilly et al., 2008). More in general, there is a vast body of evidence that non-disabled people are extraordinarily bad at predicting the experience of disabled people (Barnes, 2016:71). In this respect, it has been argued that crucial to inclusive design is a deliberative component, which allows users to participate in the design process (Heylighen and Bianchin, 2013). This deliberative moment should be fed into our account to deal with the problem of gathering reliable information about the relative position of the addressees. It should be seen as complementary rather than as an alternative to the theory of justice in this sense, as it addresses the question of how the standards of justice are to be implemented, when the veil of ignorance is lifted and the information about specific personal, social, and environmental conditions is provided for them to apply in a specific context.

3.4 Wrapping up

The problems and limitations outlined above are internal to design and amount to questioning whether and how the conceptual tools of Rawls' theory of justice can be applied to a specific problem, i.e., the paradox of inclusive design. As we have seen, the two main questions arising about justice find application in design, namely (i) the question about the standards of justice – finding out according to what standard the principles of justice can be assessed – and (ii) the question about the metrics of justice – what is to be distributed. In light of the abovementioned problems and limitations, we endorse a Rawlsian approach to the first question, while we concede that some revision may be due regarding the second. This revision may be needed in order to cope with (a) the special status disability holds in the context of inclusive design and (b) the fact that resource-based metrics like Rawls' primary goods may turn out either unfit or incomplete, at least in this respect.

4. Conclusion

Inclusive design approaches are facing a paradoxical condition. In this article, we have confronted this paradox by converting it into the question of how design can be fair and, once framed in that way, which meaning Universal and Inclusive Design take. To this end, we have recruited the relevant conceptual tools of a Rawlsian approach to defining justice as fairness, and have applied these to confront the paradox. After having derived the implications for design, we have identified and confronted several questions arising from this application.

Awaiting further analysis of these questions, the approach we advanced highlights the relationship between design practice and the social context, and more generally the relevance of political issues

to design - and vice-versa. It makes explicit the political implications of design theory, which is likely to challenge prevailing understandings in this area. In addition, the approach extends the domain of justice to the realm of design practice, which is likely to promote new research in this domain.

Acknowledgements

Notes

1. In this article we use 'inclusive design approaches' or 'inclusive design' (with lowercase) as an umbrella term to refer to all three approaches together, whereas we use the terms 'Universal Design', 'Inclusive Design' or 'Design for All' (with capital letters) when referring to a specific approach.

2. The idea of moderate scarcity in this context is meant neither to measure the resources agents dispose of in a specific situation, nor to suggest a condition in which resources are subject to especially severe limitations. Instead it is meant to convey the rather uncontroversial view that human agency is constrained by the fact that resources are insufficient to satisfy all possible needs and/or desires. Agents are thus likely to compete and conflict over the distribution of goods. This is paradigmatically the condition under which a demand for justice arises, i.e., a demand for general principles according to which conflicts can be adjudicated in ways justifiable to those affected (Hume, 1738-49; Rawls, 1999).

3. For example, in a study comparing the usability of autoinjectors (medical devices delivering medicine through the skin using a needle), exclusion calculations revealed that changes to the device only reduced exclusion slightly because people were still excluded by the demands of cleaning the injection site (Goodman-Deane et al., 2014).

4. Rawls characteristically contrasts his approach to justice with utilitarian approaches because the solution offered crucially differs from maximizing aggregated utility. The reason is that in the original position individuals are represented as distinct bearers of interest and unanimity is required, so that the rational choice of the principles of social justice is sensible to how goods are distributed among individuals. A utilitarian view of justice, on the contrary, only dictates to maximize happiness for the greatest number, i.e., to "achieve the greatest sum of satisfaction of the rational desires of individuals" where "[…] it does not matter, except indirectly, how this sum of satisfaction is distributed among individuals any more than it matters, except indirectly, how one man distributes his satisfaction over time" (Rawls 1999: 23). Applied to our case, we could say that exclusion calculations do not seem to take into account how usability is distributed among users, while a Rawlsian approach to justice in design does.

5. Whether wheelchair users are to be considered the worst off in this case, will be discussed in more detail below.

6. Rawls conceived society as a system of cooperation consisting in "a social union of social unions", social unions being forms of life characterized by shared ends and common activities (e.g., families, friendships, and larger associations and groups) (Rawls 1999: 460, 462). In adopting the framework of justice as fairness in the context of design, however, we are not committed to a specific conception of society. Although we generally share the view that human social life in any form can hardly be severed from cooperation (Tomasello 2014, 2016), our hypothesis depends neither on that – a possibly controversial issue that cannot be addressed here – nor on considering a whole society as the target of just design. In fact, we make use of (some of) Rawls' conceptual tools in order to frame a problem in design and to confront the issues it raises about fairness – thus, for instance, we make use neither of the first principle, nor of the second part the second principle as defined above.

7. The distinction accords with the intuition that, while universality is a matter of all or nothing, inclusivity may be a matter of degree. Things cannot be more or less universal: either they are universal or they are not. The procedural understanding provides a framework to envisage how design processes can be universal and a standard to assess their universality. By contrast, deliberation can be more or less inclusive according to how users are involved in the design process. The measure and the quality of participation may vary and the standards against which inclusivity is assessed are admittedly nuanced and hard to define (Heylighen and Bianchin, 2013).

8. Note that we chose not to confront the fact that Rawls' theory of justice as fairness rests on the assumption that participants in the hypothetical agreement are full functioning members of a system of cooperation. This raises questions as to how severely disabled people who cannot fully participate in social cooperation are to be taken into account according to social contract theory (Nussbaum, 2006, chap. 2). There have been some attempts to answer this question (Richardson, 2006; Pogge, 2002), but this is not relevant to our problem. Neither do we enter the general issue of how a theory of justice should deal with disability, i.e., the question of disability as a target of justice (Cureton, 2008).

9. The definition of usability is often taken to oscillate between objective and subjective considerations (Pucillo and Cascini, 2014; Crilly, 2013). Houkes and Vermaas' definition aptly conveys the right context to assess the issue in our view.

References

Ahrentzen, S., Steele, K. (2009). *Advancing full spectrum housing*. Phoenix: Arizona Board of Regents.

Barnes , E. (2016). *The minority body. A theory of disability*. Oxford University Press.

Barry, B. (1995). John Rawls and the Search for Stability. *Ethics* 105(4), 874-915.

Benyon, D., Crerar, A., Wilkinson, S. (2000). Individual differences and inclusive design. In C. Stephanidis (Ed.). *User interfaces for all: Concepts, methods and tools* (pp. 21-46). Lawrence Erlbaum.

Bogdashina, O. (2003). *Sensory Perceptual Issues in Autism and Asperger Syndrome*. London: Jessica Kingsley.

Brand, A. (2010). *Living in the community*. London: Helen Hamlyn Centre, Royal College of Art.

Clarkson, J., Cardoso, C., Hosking, I. (2007). Product evaluation: practical approaches. In: Coleman, R., Clarkson, J., Dong, H., Cassim, J. (Eds.), *Design for Inclusivity* (pp. 181-196). Aldershot: Gower. (Referred to in Goodman-Deane et al. 2014).

Clarkson, P.J., Coleman, R. (2015). History of inclusive design in the UK. *Applied Ergonomics* 46 (Part B), 235-247.

Coleman, R. (1994). The case for inclusive design – an overview. *Proceedings of the 12th Triennial Congress of the International Ergonomics Association*. Toronto: International Ergonomics Association.

Connell, B.R., Jones, M., Mace, R., Mueller, J., Mullick, A., Ostroff, E, Sanford, J., Steinfeld, E., Story, M., Vanderheiden, G. (1997). *The Principles of Universal Design, NC State University*. Raleigh (NC): Center for Universal Design, College of Design.

Crilly, N. (2010). The roles that artefacts play: technical, social and aesthetic functions. *Design Studies* 31, 311-344.

Crilly, N., Maier, A., Clarkson P.J. (2008), Representing artefacts as media. *International Journal of Design* 2(3), 15-27.

Cureton, A. (2008). A Rawlsian Perspective on Justice for the Disabled. *Essays in Philosophy* 9(1), article 5: 1-27.

Daniels, N. (2010). Capabilities, Opportunities, and Health. In H. Brighouse, and I. Robeyns (Eds), *Measuring Justice. Primary Goods and Capabilities* (pp. 131-149). Cambridge: Cambridge University Press.

D'Agostino, F., Gaus, G., Thrasher, J. (2012). Contemporary Approaches to Social Contract. In E. Zalta (Ed.), *Stanford Encyclopedia of Philosophy*, from http://plato.stanford.edu/archives/win2012/entries/contractarianism-contemporary/

D'Souza, N. (2004). Is universal design a critical theory? In S. Keates, P.J. Clarkson, P. Langdon, P. Robinson (Eds), *Designing a more inclusive world* (pp.3-10). Berlin: Springer-Verlag.

De Cauwer, P., Clement, M., Buelens, H., Heylighen, A. (2009). Four reasons not to teach inclusive design. In *Proceedings of Include 2009* (art.nr. 46). London: Royal College of Art, Helen Hamlyn Centre.

Design Council. (2009). *Inclusive design education resource*, from http://www.designcouncil.info/inclusivedesignresource/

Dorst, K. (2006). *Understanding Design: 150 reflections on being a designer*. BIS Publishers.

Duncan, R. (2007). *Universal design – clarification and development. A Report for the Ministry of the Environment, Government of Norway*. Raleigh: North Carolina State University, Center for Universal Design.

EIDD Design for All Europe (2004). *Stockholm Declaration*. From http://www.designforalleurope.org/Design-for-All/EIDD-Documents/Stockholm-Declaration/

Elgin, C. (1996). *Considered Judgment*. Princeton: Princeton University Press.

Franz, J.M., Bitner, G., Wright, N., Gillett, C., Hannaford, R. (2010). Inclusive universal design practice and activism: A case study. In M. Narikawa (Ed.), P*roceedings of the 3rd International Conference: Universal Design*. International Association for Universal Design.

Freeman, S. (2007). *Justice and the Social Contract*. Oxford: Oxford University Press.

Freeman, S. (2014). The Basic Structure of Society as the Primary Subject of Justice. In J. Mandle, D. A. Reidy (Eds), *A companion to Rawls* (pp. 88-111). Oxford: Blackwell.

Goodman-Deane, J., Ward, J., Hosking, I., Clarkson, P.J. (2014). A comparison of methods currently used in inclusive design. *Applied Ergonomics* 45, 886-894.

Gutman, A., Thompson M. (1996). *Democracy and Disagreement*. Cambridge (MA): Harvard University Press.

Habermas, J. (1996). *Between Facts and Norms: Contributions to a Discourse Theory of Law and Democracy*. Cambridge (MA): MIT Press.

Herssens, J. (2011). *Designing architecture for more: a framework of haptic design parameters with the experience of people born blind* [PhD dissertation]. Hasselt/Leuven: Hasselt University & KU Leuven.

Heylighen, A. (2014). About the nature of design in universal design. *Disability and Rehabilitation* 36(16), 1360-1368.

Heylighen, A., Bianchin, M. (2013). How does inclusive design relate to good design?. *Design Studies* 34, 93-110.

Heylighen, A., Van Doren, C., Vermeersch, P. (2013). Enriching our understanding of architecture through disability experience. *Open House International* 38(1), 7-19.

Hosking, I., Waller, S., Clarkson, P.J. (2010). It's is normal to be different: Applying inclusive design in industry. *Interacting with Computers* 22, 496–501

Houkes, W., Vermaas, P. E. (2010). *Technical functions; on the use and design of artefacts*. Dordrecht: Springer.

Hume, D. (1738-40). *A Treatise of Human Nature: A Critical Edition*, D. Fate Norton, M. J. Norton (Eds.). Oxford: Clarendon Press, 2007.

Imrie, R. (2012). Universalism, universal design and equitable access to the built environment. *Disability and Rehabilitation* 34, 873-82.

Imrie, R., Hall, P. (2001). *Inclusive Design: Designing and developing accessible environments*. London: Spon Press.

Keates, S. (2015). Design for the Value of Inclusiveness. In J. Van den Hoven, P.E. Vermaas, I. van de Poel (Eds), *Handbook of Ethics, Values and Technological Design* (pp. 383-402), Dordrecht: Springer.

Keates, S., Clarkson, P.J. (2003). *Countering Design Exclusion: An Introduction to Inclusive Design*. Springer, London. Referered to in (Hosking, I. et al.., 2010).

Kinnaer, M., Baumers, S., Heylighen, A. (2016). Autism-friendly architecture from the outside in and the inside out: An explorative study based on autobiographies of autistic people. *Journal of Housing and the Built Environment* 31(2), 179-195.

Mace, R. (1985). Universal design: Barrier free environments for everyone. *Designers West* 33(1), 147-152.

McGinley C., Dong H. (2011). Designing with information and empathy. *The Design Journal* 14(2), 187-206.

Nussbaum, M. (2006). *Frontiers of Justice: Disability, Nationality, Species Membership*. Cambridge: Harvard University Press.

Oosterlaken, I. (2009). Design for Development: A Capability Approach. *Design Issues* 25(4), 91-102.

Oosterlaken, I. (2012). Inappropriate artefacts, unjust design? – Human diversity as a key concern in the capability approach and inclusive design. In I. Oosterlaken, J. van den Hoven (Eds), *The Capability Approach, Technology and Design* (pp. 223-244). Dordrecht: Springer.

Ostroff, E. (2011). Universal Design: an Evolving Paradigm. In *Universal Design Handbook*, 2nd edition (pp. 1.3-1-11). McGraw-Hill.

Pogge, T. (2002). Can the Capability Approach be Justified? *Philosophical Topics* 30(2), 167-228.

Pols, A., Spahn, A. (2015). Design for the Values of Democracy and Justice. In J. Van den Hoven, P.E. Vermaas, I. van de Poel (Eds), *Handbook of Ethics, Values and Technological Design* (pp. 335-363), Dordrecht: Springer.

Preiser, W.F.E., Ostroff, E. (Eds) (2001). *Universal Design Handbook*. New York (NY): McGraw-Hill.

Pullin, G. (2009). *Design meets disability*. Cambridge (MA): The MIT Press.

Pullin, G., Newell, A. (2007). Focusing on extra-ordinary users. *Universal Access in Human Computer Interaction. Lecture Notes in Computer Science* 4554, 253-262.

Puscillo, F., Cascini, G. (2014). A framework for user experience, needs and affordances. *Design Studies* 35, 160-179

Rawls, J. (1985). Justice as Fairness. *Philosophy & Public Affairs* (14)3, 223-251.

Rawls, J. (1993). *Political Liberalism*. New York: Columbia University Press.

Rawls, J. (1999). *A Theory of Justice*. 2nd edition. Cambridge (MA): Harvard University Press.

Richardson, H.S. (2006). Rawlsian Social-Contract Theory and the   Severely Disabled. *The Journal of Ethics* 10(4): 419-462.

Robeyns, I. (2005). The Capability Approach: A Theoretical Survey. *Journal of Human Development* 6(1): 93-114.

Robeyns, I. (2009). Justice as Fairness and the Capaility Approach. In K. Basu, R. Kanbur (Eds), *Arguments for a Better World: Essays in Honor of Amartya Sen* (pp. 397-413). Oxford: Oxford University Press.

Robeyns, I. (2011). The Capability Approach, http://plato.stanford.edu/archives/sum2011/entries/capability-approach/

Searle, J. (1995). *The Construction of Social Reality*. New York: Penguin.

Searle, J. (2010). *Making the Social World*. Oxford: Oxford University Press.

Sen, A. (1980). Equality of What? In S. McMurrin (Ed.), *Tanner Lectures on Human Values*, Volume 1. Cambridge: Cambridge University Press.

Sen, A. (2009). *The Idea of Justice*. Cambridge (MA): Harvard University Press.

Steinfeld, E., Tauke, B. (2002). Universal designing. J. Christophersen (Ed.), Universal design. 17 ways of thinking and teaching (pp. 165-89). Norway: Husbanken.Tobias J. (2003). Universal design: is it really about design? Inform Technol Disabil 9, 1–9.

Tomasello, M. (2014). A Natural History of Human Thinking, Cambridge (MA): Harvard University Press.

Tomasello, M. (2016). A Natural History of Human Morality. Cambridge (MA): Harvard University Press.

Van der Linden, V., Dong, H., Heylighen, A. (2016). From accessibility to experience: Opportunities for inclusive design in architectural practice. *Nordic Journal of Architectural Research* 28(2), 33-58.

Winance, M. (2014). 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),

1315-1319.