INTERNATIONAL CONFERENCE ON ENGINEERING DESIGN, ICED'09
24 - 27 AUGUST 2009, STANFORD UNIVERSITY, STANFORD, CA, USA

ARCHITECTS AND VISUALLY IMPAIRED PEOPLE: ANALYZING TWO WAYS OF TALKING

Peter-Willem Vermeersch[1], Megan Strickfaden[1], Jasmien Herssens[2,1] & Ann Heylighen[1]
(1) K.U.Leuven, Belgium, (2) Hasselt University/PHL, Belgium

ABSTRACT
While architects think and work in a visual way, people who are visually impaired may pay more attention to other senses and, as a result, are able to appreciate other spatial qualities. Because of this particular ability, our research seeks to explore how to enhance communication between architects and visually impaired people. It is imaginable that there is significant disparity between how architects and visually impaired people talk; even so, this paper seeks to discover points of connection that support enabling a genuine dialogue between these two groups of people. The study reported here aims to gain insights into how both groups talk about the built environment by comparing and contrasting two independent data sets: four in-depth interviews with architects, and four with visually impaired people. Through analysis of the spoken word, we identify what common ground exists and what the central differences are between both groups. On this basis, we discuss potential elements that may challenge or facilitate developing connections towards deeper conversation between architects and visually impaired people. While the study focuses on architectural design and visual impairment, the findings may be transferable to communication between designers and non-designers in general.

Keywords: architectural design, communication, non-designers, spoken word, visual impairment

1 INTRODUCTION
The study reported in this paper is part of a larger research project, which explores whether and how dialogue between architects and persons with a disability can improve the multisensory qualities in architecture [1]. Research has shown that architects often tend to centralize their own experiences of spaces, marginalizing and negating the experiences of others [2]. In our quest to understand how to support communication with others, we explore how architects and visually impaired people talk independently about the built environment. The information gained through this exploration is expected to aid in involving more inclusively others' experiences in the design process. Ultimately, our goal is to transform one-way communication characterizing existing participatory design methods into a genuine dialogue [3], where both parties can learn from each other through extensive and symmetrical interaction. A first step towards this goal is to investigate the challenges of how people with different backgrounds and knowledge sets talk about the built environment.
Architects, like other designers, think and work in a visual way [4], as exemplified by their frequent use of visual means to express themselves (*e.g.,* drawings, models) and their ability to describe in detail how artifacts and spaces look. Visual dominance is striking and disguises the importance of other senses. Visually impaired people, on the other hand, must rely on other senses than sight and consequently have learned to pay more attention to haptics and sound [5]. As a result they may appreciate spatial qualities differently than architects. Generally speaking, because of their specific interaction with spaces, persons with a disability develop experiences and insights that are of potential interest for architectural design. Their specific expertise gained through bodily experience is critical in directing the (re)design of accessible buildings [6]. Furthermore, it could potentially inspire innovative design concepts. A major aim of the long-term research project is therefore to investigate whether and how persons with a visual impairment can be involved as expert in a design team.
However, there may be a disparity between how the built environment is spoken about by architects and, on the other hand, by visually impaired people, which may result in major challenges when they communicate with each other. Therefore this paper aims to gain insights into how communication may be enhanced between architects and visually impaired people by looking at two unconnected data sets: a series of interviews with architects, and a set of interviews with visually impaired people, each

conducted independently of the other. Through analysis of the spoken word we explore what the central differences and common ground are between both groups. We present three data derived themes for each group and identify potential areas that may challenge or aid in creating dialogue.

2 BACKGROUND

By way of background, we briefly introduce the notion of talk and the different factors influencing it. Subsequently, we identify characteristics inherent to architects and visually impaired people and review related research on how these characteristics may inform their way of talking.

2.1 Talk in general

While conversation involves multiple levels of communication (*e.g.*, talk, body language, gesture), the central medium is typically understood to be spoken word. When different parties talk, making meaningful connections is not trivial: conversation is a complex activity connected to multiple factors.
Personal factors can facilitate or hamper the development of an understanding within a group or domain. The more one knows about a topic the more semantically specific language becomes, whereas novices typically use a more descriptive language. In general, the way things are articulated is governed by individual cultural capital [7]: instead of developing a uniform understanding or vocabulary of something, individuals link domain specific language to what they already know. For example, an architect builds upon his/her understanding of the domain [8]. The personal language category is thus connected to involvement in a specific domain.
Socio-cultural factors include involvement with a subculture or smaller group of people. In natural conversation pairs or groups tend to create a way of talking that can be very specialized or even exclusive. Additionally, the level of semantic specificity and the way words are interpreted may vary depending on how confident each party is with the topic being discussed.

2.2 Architects and talk

The term 'architect' is legally defined. In several countries, only people who are officially registered or licensed are allowed to call themselves 'architect'. More important to this study are how architects are members of and relate to a specific (sub)culture, *c.q.* architectural practice [9] and how this membership influences their way of talking.
Research has shown how architecture students over the years of their studies become assimilated into the social mores of the profession: they become increasingly remote from the way laypeople describe architecture, and gradually take on architects' language codes [10]. Gradually, they become accustomed to using words and phrases that represent actual and absent visual concepts or materials. These language codes are based on early studies deconstructing the environment into a visual language, typically referred to as the elements of design. The foundation for deconstructing the analytical methods of visualization can be traced back to various individuals involved in design education, including Wassily Kandinsky, Johannes Itten [11] and Donis A. Dondis [12]. This visual language continues to exist as a basis for design education and forms a key ingredient of design expertise. Most generally the elements of design have become a way of sighted the world. They constitute a language that enables discussion around artifacts and spaces.
In order to fully understand how architects talk, however, it is important to look beyond architectural education at the professional design environment. Luck and McDonnel [13] investigate the early stages of the design process when architect and client exchange their ideas, vision and desires about a design before making any sketch or drawing. They use the concept of the 'virtual building' [14] to describe the social construction of a design through verbal conversation. This is a common model that exists in the minds of all parties involved, *c.q.,* architect and client. Luck and McDonnel conclude that architects, through conversational strategies, must activate project participants (*e.g.,* stakeholders such as clients or users) to gain a better common understanding of the design and to raise discussion from a purely functional to a representational level. Through conversation, they contend, architects need to teach participants to think and talk more like an architect [13]. Luck's [15] later work investigates strategies that architects adopt to aid participants' interaction in participatory design situations. To engage participants in design discussion, the architects in her study use the strategy of 'expert facilitation': they encourage a quick understanding of the subject discussed by making it relevant to the participants. In addition, clues are provided in order to develop skills that others would have

acquired over a longer period of time. In conversation with clients, architects are observed to replace precise, technical language by natural, informal language [16]. The inherent vagueness of natural language of is crucially an interactional strategy: it serves to introduce interpretative flexibility and to establish social bond [ibid].
In investigating design talk, Dong [17] adopts "a latent semantic approach to model congruent thinking and distributed knowledge representation in design teams". He states that language and the meaning of words facilitate bridging gaps of knowledge between what individual team members know and the larger body of experience held by the team. In addition, Dong asserts that efficient team dynamics requires a convergence of knowledge characterized by the acquisition of a common semantics. In other words, a shared understanding of the design and designing is crucial if team members are to enter into a dialogue.

2.3 Visually impaired people and talk

Visual impairment can be understood according to different models of disability. The medical model defines visual impairment by means of measurable criteria; the social model situates (visual) disability in the interaction between person and context; the cultural model takes into consideration the former models and looks at the meaning of disability for society.
The World Health Organization (WHO) uses visual impairment as an umbrella term for a range of defects in the visual perception, which are further subdivided in low vision and blindness [18],. The causes are numerous and the effects range from overall blur over central vision loss, peripheral vision loss to spotted sight or any combination. By consequence, there is a huge diversity among visually impaired people. When visual impairment is expressed by measurable criteria, however, an arbitrary threshold defines a person as being impaired. For blindness the WHO defines this threshold as having a visual field of maximum 10 degrees or a visual acuity of less than 1/20 in the better eye with the best possible correction (to see with the same details what a sighted person can perceive from a distance of 20 meters, a blind person must stand at a distance of no more than one meter). For low vision the threshold corresponds to a visual acuity in the better eye with best possible correction of more than 1/20 but less than 3/10 or a visual field of less than 20 degrees.
Butler and Bowlby [19] argue that the threshold at which a person considers oneself visually disabled varies across individuals and may also differ from how others perceive them. In this sense disability is a socially constructed phenomenon. The cultural model of disability combines insights developed in both the medical and the social model [20] [21]. In this model "disability is more taken from its interstitial nature, *i.e.*, its positioning between dominant categories (such as sick and healthy, man and woman), which allows it to question the world. […] [D]isability asks questions of our habitual organization of the material world, our relationships and relatedness, and our worldviews" [21]. In line with this model, being visually impaired is "emphasized in terms of what is won, rather than what is lost and on a critique of the world" [21]. The insight in what is won in terms of experiencing the built environment, is what motivated our research to enhance communication between visually impaired people and architects.
How visually impaired people communicate is a topic of considerable interest in research. First, people with little or no vision receive visual information differently, making it less important than for sighted people. For instance, sighted people use proximity to reinforce their intentions, relationships, and sometimes purposes of exchange. Visually impaired people are less likely to apprehend such non-verbal behavior (*e.g.,* gestures, body language) to the same detail as sighted people [22]. Amar Latif, filmmaker and founder of the Traveleyes travel company, defined what he found to be the worst thing about being blind as the inability to read people's facial expressions when he was talking to them [23]. Second, studies in anthropology point out that culture can emerge and sustain itself based on disability [20]. Being part of such a specific culture is likely to affect how visually impaired people talk as well.
While there is some research on how visually impaired people talk, the details are inconclusive and sometimes contradictory. This lack of consensus may be attributed to methodological problems of data collection and analysis [24][25]. For instance, Hatwell's [26] study reveals how congenitally blind children may compensate with language for their lack of vision (*i.e.,* are more verbally articulate than sighted children). However, Dimcovic [27] could only partially confirm the link between verbal-logical tasks and general verbal competence.
Warren [28] inventories available knowledge about language and talk of visually impaired children. One issue is the tendency to use "verbalisms", words where concrete referents are unknown to the

speaker. In the case of people with a visual impairment these can be words related to sight, *e.g.,* color [29]. According to Warren, these words are not devoid of meaning, but are given alternate meanings that are not purely connected to vision, demonstrating a different mode of experiencing the world [28]. Rosel *et al.* [29] discovered that visual impaired people use verbalisms correctly from a syntactic and semantic point of view. They define language in a more nuanced way as "an organized combination of words with meanings that can differ from one individual to another. However it is language that allows people to share information and experiences using specific personal nuances of meaning, which are, at the same time, universal within the language of the speakers."

The meanings visually impaired children give to words are found to come from perceptual experiences rather than from a visually-oriented vocabulary [28]. To words like 'see', 'look' or 'watch' they give meanings that are more experiential (with more attention to other senses than sight) and cognitive than strictly visual [29]. Language-use and word meanings of children with a visual impairment are very similar to those of sighted children; the differences that do occur might be explained by their different perception and specifically the role of their visual perception [28].

One consequence of lack of vision during language development is that blind children are found to deal with concepts of time before space [30]. Other than for sighted children for whom basic spatial concepts are readily observable, blind children have less difficulties understanding more abstract temporal concepts.

Also significant is Warren's finding that blind children's word usage is more self-referential and less object-referential, which he attributes to the differences in input from their parents/caregivers [30]. Compared to sighted children, blind children receive fewer statements describing the here-and-now [26]; objects identified to them were mostly just labeled instead of described in detail; and lastly, most topics discussed were focused on the child him/herself. These studies indicate that language differences between sighted and visually impaired people might also relate to differences in input on the social level.

3 RESEARCH APPROACH

To understand the details of how architects and persons with a visual impairment express themselves, we look into differences and similarities in how they talk about spaces. Outlined here are data collection procedures, data types and analysis procedures.

3.1 Methods & data

Our study compares two unrelated data sets: the first covers 19 interviews with educators working and teaching within various disciplines of three-dimensional design, including architecture, completed to investigate broad issues in design practice and teaching [7]; the second covers 22 interviews with visually impaired people conducted to gain a better understanding of how they experience and negotiate the built environment [5]. Each data set is collected without the knowledge of the other by researchers who have previous experience in designing and design education. The educators are interviewed by two researchers (author 2 & 4) with design backgrounds, one in industrial/engineering design and one in architecture. A third interviewer (author 3) with a background in architecture and an intimate understanding of visual impairment interviews the visually impaired people.

For each data set, participant interviewing is adopted to record the impressions and perspectives of the target groups. Participants are asked a range of open-ended questions. All interviews result in approximately two hours of discussion. The conversations are recorded and transcribed word-for-word, including the interviewees' questions and all participant responses. This yields a detailed representation of verbal activities of original speech.

The resulting data reflect, on the most part, the participants' rather than the interviewers' interests because of the queries' general nature; nevertheless the questions and discussions are framed by the researchers' backgrounds. The interview topics do not focus on talk or communication *per se*, however, the resulting data represent relatively naturally occurring talk, suited to exploring language, communication and the spoken word in general. The analysis of talk investigates the characteristics of conversation that are explicitly stated, information that is directly revealed rather than tacit and latent references or inferences that may be made by the participants.

3.2 Data analysis

To investigate the participants' contributions, statements and words are analyzed using a thematic approach where the central topics are identified and clustered [31]. This approach is iterative and involves multiple ways of reducing and displaying the data. The themes are based on the transcripts' content, and thus strictly data driven. It is the information presented by the participant rather than the researcher's judgment that makes up the data.

The analysis begins with two researchers reading the transcripts independently and continues with joint discussions regarding significant segments of the conversations. The stages of analysis involve reviewing the interviews separately looking for: evidence of vocabulary linked to the built environment; references and background linked to individual cultural capital; basic forms of communication (*i.e.,* descriptive, domain-specific, word- and phrase-use).

A multi-method approach to analyses is taken using mental maps, basic word counting and theme seeking [ibid]. Following this the wording of the interview questions and the interviewers' reactions is cross-referenced with participant responses, to ensure that word and phrase usage comes directly from the participant, not the interviewer. The information is then reduced by clustering significant phrases and words in mental maps for each interview, followed by a single mental map for each group.

Interview transcripts are revisited iteratively and consecutively in the same manner across all interviews to look for themes. Concepts are isolated and each transcript is reviewed in detail, for example, focusing on how the interviewees talked about the built environment (*e.g.,* words, descriptions). Upon reviewing the transcripts in detail from different perspectives, multiple times a matrix is created for each group. These extensive matrices derive directly from the data, and include various themes for each group. Finally, these themes are cross-linked across the data allowing for contrasts and comparisons.

4 ARCHITECTS

The backgrounds of the participating architects and the data resulting from our interviews are presented here. The data reveal information about designing and teaching and about the participants' perceptions around the domain of architectural design. Our goal is to identify ways of talking, word and phrase usage, and themes that may be common to this group in order to compare them with those of the visually impaired people. Three themes are outlined here: architectural semantic specificity, exclusive vocabulary, and interpretation within conversation.

4.1 Participants

The data for the group of architects are collected from separate conversations between participants and two different interviewers (authors 2 & 4). Four conversations are explored in detail. These interviews took place in the architects' offices in two countries (Canada, Belgium). The four participants have been selected from the larger data set because they represent seasoned designers/teachers with a significant level of experience specifically in architectural design, and because they have both practiced and taught architecture. These participants are assumed to be more articulate and spontaneous in expressing themselves as professionals within architecture because of their extensive experience. Table 1 provides an overview of the selected participants. Each participant is well versed in architectural pedagogy, principles and practice. Even so, the focus of their expertise and interests vary; for example, A3 seems particularly interested in function and structures whereas A1 is more interested in form and space.

Table 1. Architect participants

	gender	level of education	current profession	training	areas of practice	years of experience
A1	male	MDes	professor in industrial design & product designer	architecture & industrial design	electronic products	2 yrs teaching 15 yrs practice
A2	female	MA	architect &	architecture	housing public buildings	10 yrs practice 5 yrs teaching

			university teacher		public spaces	
A3	male	MSc	architect & university teacher	engineering architecture & building technologies	housing fireproofing building law	32 yrs practice 31 yrs teaching
A4	male	PhD	professor in architecture & architect	engineering architecture	housing schools exhibition design	35 yrs teaching 10 yrs practice

4.2 Semantic Specificity

How the architects talk about the built environment is logically semantically specific to their discipline. The interviews show very little repetition of words or utterances, except for words specific to architecture and design. This should not surprise as this set of interviews focused on designing and the interviewer is a designer as well.

The vocabulary used is relative to their perceived notion of and how they are taught to describe the visual realm. The most apparent semantics used include words and phrases learned during basic design education. Participants commonly employ the elements and principles of design; such as "*figure-ground relationships"*, "*focal point"*, "*scale"*, "*structure"*, "*visual dominance"* and "*hierarchical aspects in space"*. In addition, designers are trained to visualize and think about how things look. They use terms such as "*aesthetics"* (A1), "*shape* and *shaping"* (A4), and "*style"* (A2 and A3). Talk about known design concepts is also common: A1 talks about "*more is less",* A1 and A4 mention "*context as ground"* referring to figure-ground relationships. History and art forms, experiences of designed artifacts and spaces, and lectures attended are also common topics for discussion. Moreover, participants note designers, architectural projects, design icons and past projects spontaneously within conversation.

Another significant theme relating to semantic specificity is that the architects often focus their attention on design processes and the role of the designer. All participants talk about the complexity of design processes such as innovation, procedures, or processes of concept development. Much of this talk is centered on the notion of transformation, which seems connected to an innate sense of curiosity about how things could be, a type of future gazing. There seems to be a natural propensity for the architects to be searching and learning through first "*looking"* at the world around them (A2) and "*studying the everyday"* (A3). This also indicates that analysis is a natural part of designing whereby design projects are "*visual questions"* (A1) and problems to be solved. The notion of problem solving and how a design is transformed as a result of this process is common among all participants. The exact phrase "*problem solving"* is present in each transcript, referring to actual and student projects, particular building parts (*e.g.,* corridors), detailed specifications, communication, conflicts with clients, financial issues. Finally, processes of transformation (*e.g.,* sketching and modeling) are also a large part of what the architects talk about. Talk around transformation demonstrates a particular way of sighted and engaging with artifacts. These participants typically focus on how something can change or be transformed and hardly discuss overall experiences within spaces. Because the participants are not asked explicitly to talk about their interactions with the built environment, however, there is no data to explore how they would describe their engagement within spaces.

4.3 Exclusive vocabulary

While the majority of the participants' talk relates most directly to a visual or specialized design language, there are also indications of exclusive vocabulary. This is similar to a personally constructed or invented language; yet, it is deeper in that words and phrases are clearly symbolic and understood by others as well. For example, A1 uses the idea of "*ships and boats"* to describe complexity and A2 openly states that she is "*designing a new language"* in her expression of the built environment.

Interestingly, all participants use exclusive vocabulary and assume that others can understand its specifics. For example, A1 refers to "*ant farm"*, "*Dickensonian sentences"* and "*biomimicry*" without stopping to define what these mean until prompted. At the same time, each interviewee expresses concern about being understood, particularly by those outside of the domain but part of the business of

design (*e.g.*, clients or manufacturers). The extensive use of exclusive language is an indication of an individual being immersed in a local culture. Like having an inside joke with a group of friends, exclusive talk provides a sense of belonging and indicates a particular know-how. Participants not only use an inside language, they seem to be aware of it and can be extremely exclusive, but this nonetheless does not prevent them from using it.

4.4 Interpretation within Conversation

Given that the interviewers and participants are all familiar with design and architecture, levels of interpretation within conversation are not expected to be particularly varied. The researchers and architects are, generally, speaking the same discipline specific language. Nonetheless, the interviewees define "*design"* and/or "*architecture"* in nuanced detail in all cases; however, this detail is still ambiguous and can be interpreted in different ways. For example, to A2 architecture is a "*combination of different threads"* of which *"construction, concept, style and material"* are the most important. A3 sums up design as being *"solutions to problems"* concerning *"techniques, structure, functionality, material choice, maintenance and energy saving methods"*. Similarly A2 and A3 talk about design as made up of a combination of many things although this is accomplished in different ways. A1 seems to think about design a little differently as an *"application of thoughtfulness"* and about the *"process of thinking"* itself and*, "not trying to arrive somewhere" (artefact)*. The most senior and seasoned educator A4 gives the most thorough definition of design and architecture, making distinctions between *"basic design"*, *"furniture design"* and *"building design"* or *"architecture"*. His definitions seem much less derived from personal practice compared to the other interviewees.

Next to specific design language, more general words are used to talk about design and architecture than expected. However these words may have a specific meaning related to the field of architecture or even to the architect self. A3 mentions the difference between *"modern"* and *"contemporary"* and how these words have different meaning for his clients than they do for him. A4 explains how the word *"villa"* has many different interpretations according to students' level of architectural background. These meanings range from a *"19th century cottage on the rocks"* to a *"Barcelona thing"*. A more personal interpretation is found when A2 explains how for her the *"atmosphere"* of a space *"can look like this"* or can be represented by a *"collage of various visual material"*. Also the word *"rhythm"* is interpreted in a visual way. A *"style"* on the other hand has to do more with a *"personal language"* or *"a way of working"* than with formal elements. As already mentioned, architects logically select words and phrases related to design that are familiar to them and derived from their backgrounds in teaching/designing, their personal experience and also their daily lives. As a result some of these words/phrases hold an aspect of ambiguity and sometimes even seem to be missing evident parts . Much of this is a result of how words are carried through conversation, i.e., what is focused on and what is left out and how two or people talk together.

5 VISUALY IMPAIRED PEOPLE

Having analyzed the architects' interviews, we now turn to the interviews with visually impaired participants and the resulting data. These data reveal information about how people with little or no vision talk about how they negotiate, engage, experience and perceive the built environment. Three themes are identified and explored here: level of semantic specificity, invented language, and interpretation within conversation.

5.1 Participants

The data for the visually impaired people are collected from four separate conversations between four participants and one interviewer (author 3). Each conversation occurred in the individual's home. Four participants are selected from the larger data set because they represent a range of abilities to articulate aspects of the built environment; they differ in terms of visual impairment; and they have been visually impaired for some time. Table 2 provides an overview of the selected participants.

Participant VI1 has experienced blindness from birth, while the others became visually impaired in later stages of their life. VI2 and VI4 are more experienced when talking about architecture and the built environment: VI2 is educated as an interior architect and practiced until a few years after becoming visually impaired; VI4 reports that he has always had an interest in history, building materials and architecture in general. He states that his attention to materials grew as a result of his

impairment because it taught him to experience his surroundings in a more multi-sensory way—hearing, touching and smelling combined with his limited sight.

Table 2. Visually impaired participants

	gender	onset visual impairment	duration of visual impairment	profession/ career	hobbies/ interests	environment	type of visual impairment
VI1	male	birth	30 years	employee in telecom company	piano & band	sighted family, girl friend VI friends	Lebers congintal amourosis
VI2	male	23 years	17 years	music recording & interior architect	art & music	sighted wife and kids friends	car accident: lost eye nerves
VI3	male	birth	53 years	unemployed but trained as agricultural engineer	TV	VI father, VI sister, sighted wife and kids, VI friends	Retinitis Pigmentosa
VI4	male	21	24 years	government employee & city tour guide	history & architecture	sighted wife and kids	neurological toxoplasmosis

5.2 Semantic specificity

The visually impaired participants' talk about the built environment represents different levels of semantic specificity. Some have a more developed vocabulary, in the sense that they are articulate in describing the visual realm. Others openly struggle in finding ways to describe even the smallest daily interactions taking place within familiar spaces. Except for VI2, the blind interior architect, the participants have difficulty explaining what spaces mean to them. There is evidence of faltering by use of pauses and breaks, and a clear searching for words. VI4 states several times that he "*has not thought of it before and that he has to search for his words*". Yet participants speak more easily about their personal profession or hobbies. VI2 speaks fluently about the built environment and architectural concepts, whereas VI4 has a larger vocabulary concerning building materials and experiences with his surroundings. VI1 links his understanding of materials (wood) by connecting this to something he is very familiar with, pianos.

When asked about their experiences in spaces, the interviewees show distinct variations in their ability to explain ideas and experiences. VI2, the blind interior architect, can express himself well, especially about the meaning of different objects or elements making up architectural qualities. For instance he "*likes to demarcate zones"* by making use of "*walls, small poles, a plateau, a lamp, colors*." Another example is his use of metaphor to describe building features, "*stairs being the spine of the house*." Although VI4 has a more sophisticated understanding of architecture, his language around space is descriptive and not overtly specialized. As most pleasant space in his house he selects the attic because of "*the inclination, the beams, the woodwork following that slope*." This is, for him, an "*architectonic experience"* in contrast to "*spaces with a banal, common horizontal ceiling*." For VI3 the built environment and the people and objects within form one unity. When talking about space he concentrates on way finding and orientation, which he has likely learned to talk about. He likes "*simple buildings with a simple structure"* and compares two railway stations as an explanation. One is a "*good building"* with "*two subterranean hallways, not too large and a flow in this direction* [points] *and in this direction* [points]", the other station is "*one big space full of stuff (...) where flows occur in all sorts of directions*." Of the four participants, VI1's language is the most basic . He uses very generic words like "*large"*, "*wide"* and *"small"* to characterize spaces and struggles when trying to describe the form of a particular (urban) space. He describes a city square as,

> *"a house with a roof on. So you have a rectangle and err with a short side and two long sides and instead of that the other side is a short side, two long sides are inclined and then*

you have here a short side. But those both corners of that straight line who turn over slantingly, those are both free."

All participants except VI2, trained as interior architect, refer to their own body to describe spaces. Dimensions of a space are estimated and evaluated based on their personal physical dimensions. For example, VI1 counts his steps to help determine his current location, "*the street is so many steps wide. If your foot stands here, then you know for sure I will go so many steps forward*."

In some interviews, repetition of words and phrases indicates that the participant is having trouble with explanations, is trying to emphasize a particular point, or is particularly interested in a theme. In addition, repetition of words sometimes echoes phrasing from the original query. For example VI1 talks about certain spaces in terms of "*short sides"* and "*long sides"* without further specification or description, making it challenging to understand what he means. VI1 and VI3 talk a few times of a "*structural building"* (VI3) and "*having a structural view on a building"* to explain what spaces they like and how they find their way in or move through space. Another word that is present throughout the interviews is "*obstacles"* and is sometimes used with a space being "*a mess*." This notion of obstacles or a mess refers to things, fixed or not, such as benches, stairs and other people— anything that might hinder movement within an area. For those with residual vision the words "*light"* and "*sun"* are used and referred to more often than one might expect. Interestingly, VI2 does not repeat words, phrases or themes as frequently as the others. He does not search for words and is systematic and consistent in how he answers questions. For instance, he can explain his thoughts clearly including his descriptions of architecture.

5.3 Invented language

Another common theme among the visually impaired participants is that, when talking about the built environment, they use a basic language with some invented words or phrases. These pop up when experiential aspects of artifacts or spaces are being articulated. VI3 describes his experience of sitting in his veranda as having a "*misty feeling"*. VI1 appreciates spaces with a "*wooden coziness*" and describes curvilinear forms as "*turned forms"* and "*slow curves"*, which seems to relate more distinctly to their haptic experience than to how they look. Along with using invented language, sometimes participants provide a lengthy description to define what they mean. These descriptions are personal and experientially focused and give the interviewer a better understanding of the meanings. When VI1 talks about "*turned forms"* he describes them as "*creating the idea that you walk straight forward while you in fact are turning around*." In some instances the interviewer enters into a conversation and negotiation of sorts, when an invented word or phrase is not understood. For instance, when VI1 provides an example of materials he likes because of their "*smoothness"* he talks about "*tile tables"*, which the interviewer in turn guesses as being "*the tables in wood with inlayed tiles*."

5.4 Interpretation within conversation

Besides the introduction of completely new words, there is ambiguity around how words and phrases are interpreted. When people use their own invented words that are unconnected to a domain or specialisation, others are able to ask for clarification. However, when specialized words are interpreted generically or vice versa, this can easily lead to a misunderstanding without the conversational partners knowing.

During the interviews, visually impaired people use words and phrases to describe the built environment but their interpretation is more personal, naturally connected to their interactions within spaces. For instance, VI1 talks about a "*tactile-aesthetic"* and VI2 says "*it has to look good"* when referring to the aesthetics; yet, it is not entirely clear what is meant by these descriptions. Interestingly, VI2 and VI4 use the word "*profiles"* to discuss architectural detail; however, VI2 seems to think of these as structural elements contributing to the visual aesthetics of artifacts/spaces whereas VI4 talks about appreciating profiles for their tactile richness as opposed to flat surfaces.

Sometimes a single participant interprets a word in multiple ways. For example, when explaining the design of his house VI2 uses the word "*line"* in two different contexts with different meanings: as a "*guideline to help him with his orientation"* (aspect of blindness and mobility) and as a conceptual element of the design, "*the axis of the design"* (architectural aspect).

The only indication of a specialized language of the visually impaired relates to orientation and way finding systems. Even so, the words and phrases specific to this are also interpreted differently. For

VI3 a building with a "*simple structure"* is a building with "*clear flows of people"* where he can quickly gain a "*good overview"*. The meaning of structure for this participant is completely different from its meaning in architecture, where the term is primarily used to refer to a building's load bearing structure.

6 DISCUSSION

In order to better understand how architects and visually impaired people talk about the built environment, attention is paid specifically to spoken words employed by individuals from each group. Our findings reveal differences and some potential points of overlap between both groups. Morrow [2] asserts that architects are trained to focus on formal and visual elements within buildings, while laypeople have a more implicit relationship with space and experiences within. According to anthropologists, laypeople experience the built environment through the body, including the sense of touch [32], through their hands and feet [33]. Furthermore, Kirsh [34] indicates that people, in general, are spatially located creatures who—often unknowingly—behave and manage the built environment in a highly sophisticated way. These understandings are also present in our analysis.

Because the interviews focus on topics they know intimately, it seems logical that the participating architects are more confident and talk more fluently than the participants with a visual impairment. The architects' consistent use of design language is not surprising since it makes up the common knowledge of the architectural design community and is central to the professionalization of a given domain. Their specific ways of talking about designed things confirms that designers have a particular language capital relating to their way of knowing [35] while relying on their personal backgrounds and using descriptive language to help others understand them.

Among the visually impaired participants, the affiliation with architecture varies considerably and, as a result, the language used does so too: the more familiar they are with architecture, the more nuanced their answers become, possibly because they know the interviewer's background. Yet, we should not mistake lack of fluency with formal architectural vocabulary for lack of architectural sensibility [36]. Sometimes their language is generic and descriptive, at other times it is over-descriptive or includes discipline-specific words, in other instances it is semantically efficient. Furthermore, the visually impaired participants emphasize the experiential more explicitly. This leads to newly invented and re-interpreted words to meet their needs when talking about the environment and aspects of way finding. These profound differences in understanding the built environment could lead to misunderstanding because of specialized language, exclusive even to individuals and personal interpretation.

Not all results indicate differences between the two groups. A significant commonality is that both talk about transforming or encountering the built environment: the architects focus on the transformation of concepts, artifacts and spaces, the visually impaired participants on seeking ways to negotiate the built environment, especially in places they have not visited before way finding. While the latter's talk about way finding may be triggered by the interviewer's questions, it suggests an interesting parallel with the other group: the notion of problem solving has been identified as central part of designing [37]; although not mentioned as such, it seems to play a part in how visually impaired people negotiate the built environment as well. The implications of these results on finding common ground and developing conversations between these two groups are multi-layered. First, architects need to reflect on and be attentive to how they use design language, which may be unknown to visually impaired people. In addition, architects need to be reminded that the experience of spaces is a dynamic, interactive process that evokes associational terms and responses to meaning [34]. Second, although architecture may not have a common language of general significance [8], recognizing that architects' language capital is linked to personal and socio-cultural factors (*e.g.,* training, ways of knowing) is a valuable first step towards enhancing communication. The awareness of having a specific language capital opens up different ways of talking and listening. Third, meaningful conversation that leads to a genuine dialogue needs to be based on a basic vocabulary that allows personal and socio-cultural aspects to emerge. This means that engaging in deepening conversation requires time in order to explore invented words and to define words that either group may take for granted [38]. If both parties acknowledge this, discrepancies become the primary generators for dialogue. Starting from what may seem at first hand banal discussions, both parties can start to learn from each other thus revealing deeper insights. From then on, architects and visually impaired people can start up their dialogue around their newly acquired common semantics. Last but not least, because problem solving is

common between the two groups, this subject can be used to create common ground in order to develop a foundation for enhanced communication.
In both the differences and common ground between the two groups are seeds, ready to grow into dialogue. The precondition however is that both parties be aware of the presence of these differences and overlapping interests. We do not claim to have identified all the possible obstacles, but rather have presented potential as a result of recognizing their presence.

7 FUTURE RESEARCH & CONCLUSION

This study focuses on how the built environment is talked about by two groups of people. Through multiple levels of analysis we demonstrate that four architects and four visually impaired people have particular ways of talking that hold similarities and differences. The specific expertise of each group is gained through training, professional, personal, socio-cultural contexts and/or bodily experience. Interesting as our results might be, obviously they respond by no means to all our research interests. We are inundated with further questions about the differences between how designers and other people use the spoken word and especially about nuances of talk around the built environment used by visually impaired people. Moreover, we recognize that this study is part of a continued exploration into ways of talking about the built environment, conversations, communication, creating a common ground for exploring ways of knowing and developing an enhanced dialogue between architects and non-architects. Future work therefore continues to explore differences and similarities between two groups: by submitting interviews with more participants to analysis, by employing different methods for data collection (*e.g.,* recording conversations between architects and visually impaired people, recording gesture and bodily movements along with conversation), and by operationalizing dialogue through involving visually impaired people in a real-time design situation.
Awaiting the results of this future work, recognizing that all people talk with their personal and socio-cultural language capital is already an important step towards a broader understanding of how designers can engage into deeper, more meaningful conversations with people from outside of their domain. Finally, by revealing that two disparate groups such as architects and visually impaired people have common ground is a reminder that people have exceptional resources for finding and thus making meaningful connections.

ACKNOWLEDGEMENTS

This study has received funding from the European Research Council under the European Community's Seventh Framework Programme (FP7/2007-2013) / ERC grant agreement n° 201673. Peter-Willem Vermeersch received support from the Research Fund K.U.Leuven . Megan Strickfaden would like to thank faculty and staff of Design Studies in the School of Communications at Grant MacEwan College, Edmonton Alberta Canada who provided funding for her interviews through the 2007 Grant MacEwan Faculty Research and Scholarly Activity Fund. Jasmien Herssens' research is funded by a PhD grant from the Institute for the Promotion of Innovation through Science and Technology in Flanders (IWT-Vlaanderen). She would like to thank Spermalie, Kim Bols, Blindenzorg Licht en Liefde, and de Markgrave. Last but not least, the authors would like to thank all research participants for their time, support, patience and honesty.

REFERENCES

[1] Heylighen A., Devlieger P. & Strickfaden, M., Design expertise as disablity. In Communicating (by) Design, Chalmers University of Technology & W&K/School of Architecture Sint-Lucas, Brussels, April 2008, pp 227-235
[2] Morrow R. Architectural Assumptions and Environmental Discrimination. In Nicol D. Pillings S. Changing Architectural Education Towards a New Professionalism, 2000, Taylor & Francis, London, pp.43-48
[3] Strickfaden M. Devlieger P. & Heylighen A. Building Empathy through Dialogue. In Proceedings of Design Connexity, 8th International EAD Conference, 2009, pp.448-452
[4] Cross N. Designerly Ways of Knowing. Design Studies, 1982, 3(4), pp.221-227
[5] Herssens J. & Heylighen A. Haptics and vision in architecture: designing for more senses. In Lucas R. & Mair G. Sensory Urbanism Proceedings, 2008, The Flaneur Press, pp.102-112
[6] Imrie R. & Hall P. Inclusive Design, 2001, Spon Press, London
[7] Strickfaden M. & Heylighen A. Exploring the Cultural Capital of Design Educators. In 16th

ICED Conference Proceedings, ICED '07, Paris, August 2007, pp.899-900
[8] Habraken N.J. Forms of Understanding. In Pollack M. The Education of the Architect, 1997, MIT Press, Cambridge, pp.267-293
[9] Cuff D. Architecture: The Story of Practice, 1991, The MIT Press, Cambridge
[10] Wilson M.A. The Socialization of Architectural Preference. Journal of Environmental Psychology, 1996, 16(1), pp. 33-44
[11] Itten J. Design and Form, revised edition, 1975 [1963], Thames and Hudson, London
[12] Dondis D. A., A Primer of Visual Literacy,1973, MIT Press, Cambridge
[13] Luck R. & McDonnel J. Architect and User Interaction. Design Studies, 2006, 27(2), pp.141-166
[14] Medway P. Virtual and Material Buildings. Written Communication, 1996, 13, p.501
[15] Luck R. Learning to Talk to Users in Participatory Design Situations. Design Studies, 2007, 28(3), pp.217-242
[16] Glock F. Aspects of language use in design conversation. CoDesign, 2009, 5(1), pp. 5-19
[17] Dong A. The Latent Semantic Approach to Studying Design Team Communication. Design Studies, 2005, 26(5), pp. 445-461
[18] World Health Organization, International statistical classification of diseases, injuries and causes of death, tenth revision, Geneva, WHO, 1993
[19] Butler R. & Bowlby S. Bodies and spaces: an exploration of disabled people's experiences of public space, Environmental and planning D: Society and Space 15, 1997, pp.441-433
[20] Devlieger P. Rusch F.R. & Pfeiffer D. (eds), Rethinking Disability, 2003, Garant, Antwerp.
[21] Devlieger P. & Froyen H. Blindness/city: a disability dialect, Devlieger P. *et al.* (eds), Blindness and the multi-sensorial city, 2006, Garant, Antwerpen, pp.17-38
[22] Amedeo D. & Speicher K. Essential environmental and spatial concerns for the congenitally visually impaired. Journal of Planning Education and Research, 1995, 14, pp.113-122
[23] Traveleyes website: http://www.traveleyes.co.uk
[24] Andersen E. Dunlea A. Kekelis L. Blind children's language: resolving some differences, Journal of child language, 1984, 11, pp. 645-664
[25] Andersen E. Dunlea A. Kekelis L. The impact of input: language acquisition in the visually impaired, *First Language*, 1993, 13, pp. 23-49
[26] Hatwell Y. Piagetian Reasoning and the Blind. American Foundation for the Blind, 1985 [1966], New York
[27] Dimcovic N. Verbal Competence and Some Other Factors in the Development of Piagetian Concepts in Blind Children. British Journal of Visual Impairment, 1992, 10(2), pp.55-57
[28] Warren D.H. Blindness and children, An individual differences approach, 1994, Cambridge UP
[29] Rosel J., Caballer A., Jara P., Oliver J.C. Verbalism in the narrative language of children who are blind and sighted, Journal of visual impairment and blindness, 2005, July, pp.413-425
[30] Dunlea A. & Andersen E. The emergence process: conceptual and linguistic influences on morphological development, *First Language*, 1992, 12, pp. 95-115
[31] Ryan G.W. & Bernard H.R. Data Management and Analysis Methods. In Denzin N.K. & Lincoln Y.S. Collecting and Interpreting Qualitative Materials, 2003, Sage, London, p. 275
[32] Hetherington K. Spatial Textures: Place, Touch and Praesentia, 2002, Sociology Department, Lancaster University
[33] Ingold T. Culture on the Ground. Journal of Material Culture, 2004, 9(3), pp.315-340
[34] Kirsh D. The Intelligent Use of Space. Artificial Intelligence, 1995, 73, pp.31-68
[35] Strickfaden M. (In)tangibles: Sociocultural References in the Design Process Milieu, 2006, School of Design and Media Arts, Napier University
[36] McDonnell J. Collaborative negotiation in design. CoDesign, 2009, 5(1), pp.35-50
[37] Golledge R.G. Geography and the disabled: A Survey with Special Reference to Vision Impaired and Blind Populations, Geography and the Disabled, 1993, 18, pp.63-85
[38] Kingsley C. Co-Design and the Use of Stories to Enable Empathy, Proceedings of Design Connexity, 8th International EAD Conference, 2009, pp.255-260

Contact: P.-W. Vermeersch, K.U.Leuven, Architecture, Urbanism & Planning, Kasteelpark Arenberg 1/2431, BE-3001 Leuven, Belgium, +32 16 321334, PeterWillem.Vermeersch@asro.kuleuven.be