

# All senses matter

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**Abstract.** The concept of universal design is fairly new, just a little more than two decades. The architect Ron Mace based is one of the key persons who have worked on developing the concept. This is a quite different approach to disability than the American with Disability Act, ADA, has developed after 1990, working with detailed ADA guidelines, and focusing much on the rights for persons with different sorts of impairment. The Norwegian, *universell utforming*, were first in a small report published in 1997, and is a strange hybrid of the American universal design congregation and the ADA. For understandable reasons there has been most focus narrowly on physical for wheelchair users and for persons with visual impairments. This paper try to remind us that persons characterised as disabled are human beings, with senses that are not so much focused on when working with universal design.

Further the paper comments on two Nordic researchers, the architect Camilla Ryhl and the landscape architect Per Hedfors. The paper also refer to another researcher, Inger Marie Lid, who takes us to an even wider perspective, by reflecting on the work by Hannah Arendt and Martha Nussbaum dealing with issues like dignity and participation

**Keywords.** universal design, ADA, sensory experience

## Introduction

The concept of universal design is a fairly new concept introduced in USA in the 1980s by the architect Ron Mace, University of North Carolina, He wanted to describe the concept of designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life. In Norway we translated this to the concept *universell utforming* and was introduced in report publishes by the Norwegian State Council on Disability in 1997. [1].

In addition to the American concept universal design we find concepts like inclusive design, much used in UK, and design for all used by EU. Common for all these concepts are that they for a long time have focused mainly on accessibility for wheelchair users. The last two decades we can recognize an increasing attention on visual impairment. To some degree we can now also see an increasing focus on hearing impairment.

Much of the interests for this issue come from USA, and mostly from the development of the American with Disability Act, ADA from 1990, focusing much on the rights for persons with different sorts of impairment. And here the accessibility of just wheelchairs and their users dominates. [2]

## **1. Much about accessibility and safety, but little about sensory experiences**

It is easy to understand the focus on accessibility and safety when working with the different juridical tools for the right for persons with some sort of impairment. Formulations such as removing manmade barriers of physical, economical and organizational character naturally have to use the accessibility views.

It is easy to understand for everybody that the door must not be too narrow, that a single step in the floor or the pavement is a barrier for a person using a wheelchair.

And it is not difficult to understand that persons with visual impairment should not stumble in objects in their way indoors as well outdoors, and they should not even fall in poor and dangerously designed stairs.

After 50 years we know quite a lot about the use of wheelchairs. This knowledge is already implemented in standards, acts and regulations with measures of doors, turning circles for wheelchairs and design guidelines for stairs and ramps.

Dealing with vision, we see also increasing use of measures and numbers in different sorts of regulations.

Hearing impairment is still very modestly presented in these kinds of documents.

Yes, it is easy to understand that these formal documents were concentrated on the functional issue, it should make accessible and safe solution for "all".

And it is primarily headed at persons with reduced ability to move by walking and to reach different objects in their daily life, such as door handles, shelves in shops and different kinds of buttons both indoors and outdoors.

When you focus so strongly on these aspects, you easily forget that to be a human being very much is related to experiences of different sorts. Sensory experiences and different kinds of emotional experiences are among the most severe and crucial.

In addition to physical functional accessibility, we could start talking about emotional and social accessibility.

We live in an era very much based on visual stimuli, in the dictatorship of the eye, even if we cannot object the fact that 90 % of our sensory input comes through the eyes.

This paper invites the reader to expand his view related to persons who in some way have reduced capacity to move, see, hear and fully experience her environment.

## **2. The senses**

The body knows more than the head. We have more senses than we think we have. Sight, hearing, taste and smell we are conscious about, and these give us continuously positive and negative experiences.

Through sight we can have good and esthetical visual experiences, but also frightening and unpleasant feelings can be obtained through what we see.

Music and different sounds in nature such as bird singing and the sound of water from a river or at seaside can often give us positive and calming effect.

But noise from traffic and other unpleasant sounds can make us feel unpleasant, and can even be dangerous in the way our hearing ability can be damaged.

Good smells and pleasant tastes we are all well aware of, but also unpleasant and not good smells and tastes.

But there are a couple of senses we are less aware of. The sense of touching or the haptic sense is the sense that gives us impulses through touching different objects, and gives us feeling of hard and soft, smooth and rough, cold and warm and also dry or wet.

Senses of experience we not so often hear about, is the sense of kinesics, the sense we experience when we move down or up stairs, walk slopes, steep and almost flat, walk in wetland or on hard dry surfaces, climb a steep mountain.

These are both senses persons with reduced capacity, in one or another way is very important for way finding, but also to have the good experiences in daily life.

We can also talk about how senses work on short and long distances. Vision is the sense that reaches the longest distance. On a good day we can see very far from the top of a mountain. We can also hear over long distances. These are examples of senses that reach far away.

We can smell over a fairly short distance compared to vision and hearing. The sense of smell needs direct contact with the tongue.

### *2.1. Vision*

We live, as mentioned above, under the dictatorship of the eye. Researchers working with the human brain have taught us that more than 11 million bits hit our senses every second. Our eyes send 10 million bits further to the brain every second.

The skin sends one million bits, the ears and the sense of smell 100 000 bits each, and the sense of taste modestly 1000 bits a second.

The size between the information that reaches the brain and what the brain can handle, is something like 40 bits!

Consciousness does not deal with information that is present, but about information that is gone. [3]

In this way it is not surprisingly that the visual impulses dominate, but may be just therefore it is so important to keep attention also to the other senses.

When I in lectures at the university or at seminars on universal design, ask for one minute's silence for no reason, and afterwards ask if someone heard something, the hands raise. Some heard the door of a car being slammed, some heard the ventilation system in the building, and some heard someone walking in the corridor outside the room.

I ask if they heard something, and people answer by telling what kind of physical object that made the sound. Their ears heard the sound, but they answer how the objects making the sound look like!

### *2.2. Hearing*

We depend very much on hearing to be able to communicate with other human beings. We can say blind persons lose the contact with physical objects, but deaf persons lose contact with other people. We are surrounded by sounds of different kinds all places and all the time.

The visible part of the ear is formed in a way most sounds find its way to the inner ear. Because of the asymmetric form we can sense sounds from any direction.

The time from air molecules start moving until the impulses are registered in the brain, is very short. The brain transforms the sound to thoughts, feelings and experiences, which further generates reactions of human beings.

Sound can both be stimulating as esthetical experiences, but also dangerous by hurting our hearing. Harmful decibel areas for hearing can be:

- 180 dB: cannon shot, the eardrum bursts
- 160 dB: sound of a gunshot

- 125 dB app.: pain threshold
- 120 dB: measured average at music concerts

Other levels of risk for hearing harm:

- 110 dB: disco, music in headset, pneumatic drills
- 90 dB: heavy traffic street

Safe areas:

- 80 dB: hairdryer, intense baby crying, vacuum cleaner
- 60 dB: normal conversations
- 39 dB: whispering

### 2.3. *Smell*

There is a close connection between smell and taste. It is calculated that the sense of smell is 10 000 stronger than the sense of taste. The sense of smell makes us able to recognize and identify different molecules that move around.

The less different substances can be blended in water, the more we experience the smell of the substance.

When we use the sense of smell to know something, we sniff, that means that the air in the nose circulates faster, that means more molecules passes.

When we use the sense of smell and the sense of taste together, we get a much richer experience compared to using just one of the senses.

One interesting point is that we experience less smell under different ways of stress, because the air we inhale goes directly to the lungs without taking the time to pass the sense of smell in the nose.

### 2.4. *Taste*

The sense of taste has much to do with the ability to discover and identify different chemical substances. We often talk about the four basic categories of taste, salt, sweet, sour and bitter.

The cells that locate and inform the brain about different tastes are called taste buds. Every human being has about 10 000 such cells spread in the mouth. Most are located on the tongue, there are also this kinds of cells located in the palate.

When we move the tongue around in the mouth, we can taste without swallow. In earlier times that was very important to recognize what could be eaten.

There is difference in the degree of sensitivity in different areas of the tongue sorting out what is the basic category of taste as mentioned above. Sweet and salt are best recognizes at the tip of the tongue, sour is best located along the sides of the tongue, the taste of bitter is best felt at the inner part of the tongue and the palate that makes us feel different tastes when we chew and before we swallow.

### 2.5. *The sense of touching*

We often talk about the five senses of a human being, where the sense of the skin is used as a common concept for different senses of the skin. But touch is more than one sense.

These senses are basic for all senses, and we call them the limbic system. This principles rule the sense of smell. That is part of the explanation why smell so strongly influences our emotional reactions.

The sense of touch located in the skin we can categorize in three, sensing pain, sensing pressure and sensing temperature. Further we can divide in sensing temperature as sensing cold and sensing hot.

The sense of touch has neural paths ways, tracks of nerves going to the brain through the spinal cord.

This deals among others how small details can be recognized. Dealing with the issue of universal design, this ability in fingertips makes it possible to read Braille.

The skins ability to sense different stimuli cover a very wide range, from a sensitive touch to hard and brutal meeting with other hard materials when falling or being hit by someone or by an object.

An interesting phenomenon is that pain can be perceived fairly slowly, step-by-step, but a sensitive touch is registered immediately.

## *2.6. The sense of kinaesthesia*

The sense of kinaesthesia is also known as the sense of movement or the sense of muscles. The word come from the Greek kinesis; movement and aesthesis; feelings.

This sense deals with how bodies are conscious about the positions and movements of different parts of the body. Think of going down stairs. After a few steps, the body “knows” how the next step will be, if the steps are regularly built.

The sense is directed by receptors in muscles, tendons and joints coordinated with the sense of balance, that all together make the kinaesthesia sense a necessary condition for coordinating balance and movements.

This sense further corporate with other senses such a sight and the sense of balance, so the body can move in direction and at wanted speed.

This also includes the precision and coordinating the sense of touch that makes us able to evaluate form, temperature and also the weight of an object.

## **3. Two Nordic researchers**

Camilla Ryhl, a Danish architect and Per Hedfors, a Swedish landscape architect are two researchers who have worked with having a wider scope of universal design than just physical solutions just focusing on accessibility and way finding.

### *3.1. Camilla Ryhl*

Ryhl works at SBI, the Danish Building Research Institute, in Copenhagen. She argues that architectural quality, as well as the importance of accommodating user needs the concept combines three equally important factors; architecture, the senses and accessibility. Sensory accessibility accommodates aspects of a sensory disability and describes architectural design requirements needed to ensure access to architectural experiences.

In the context of architecture accessibility has become a design concept of its own. It is generally described as ensuring physical access to the built environment by accommodating physical disabilities. While the existing concept of accessibility ensures

the physical access of everyone to a given space, sensory accessibility ensures the choice of everyone to stay and be able to participate and experience. [4]

In her thesis, *Sansenes bolig, living with your senses*, from 2003, Ryhl writes with engagement and great empathy how we as human beings experience our surroundings.

*“We are present in the world, we move through, over, under and are approaching our surroundings, we see, hear, feel, pay attention to, smell and taste our nearby environment every day and all the time. When we sleep and when we are awake we continuously receive sensations, telling of form, size, texture and character of what our body directly or indirectly is in touch with.*

*Our senses never rests, the sight opens up to the sky with stars, and our skin register the almost invisible variation of the surface of a wooden object.*

*We are consciously or unconsciously present in sensing our surroundings. Our body is an active part in the process as we move up and down stairs, lean at sun warmed brick wall, sitting down on a kerbstone or go through doorways.*

*Or when our body is a passive receiver, we recognize the circulation of smooth air from open windows, or we hear a door being locked upstairs.*

*Our senses are incessant active in a play and connected to our perception of space, form and architecture.” [5]*

Can it be said more beautiful?

Ryhl argues that basically in the thesis that all our senses continuously receive impulses. The intention of the research is to investigate what happen to our sensorial experiences when one of our senses is lacking or reduced. More concrete she formulates her research such:

*“Does reduction of one of our senses ask for special requirement to the architecture of housing?”*

This question she intend to answer through a concrete case study. She based her empirical data from two housing area, both designed by the well-known architects Vandkunsten; Dianas Have in Hørsholm and Søhusene in Birkerød. 23 persons were involved in the project. Three persons were blind and four persons had reduced visual capability. Three persons were complete deaf and seven persons had reduced hearing capability. In addition there was a control group defined as having normal visual and hearing capability.

For this paper it is of special interest to look closer to what Camilla Ryhl concludes on the relation between the need for persons with visual and hearing impairments. And the findings conclude very much of how important the acoustic is.

She writes:

*“My starting point is that I think the acoustics is important, and sometimes crucial for our experience of spaces and architecture. The acoustic landscapes of buildings are not realized before the building is finished and users of the building take the different parts of it in use.... The acoustic can be experienced so dominating and*

*overwhelming that our body reacts to the sound as being as a part of the sound, and physically we can really experience the body react to the sound, as the inner part of the body has its own frequencies, and the body experience resonance in relation to sound outside. All this are experiences that contribute to our individual experiences of the acoustic character of the room we are in.”*

One of the important questions in this investigation was to figure out if there are solutions that are preferable for all four categories of impairments. Or said in another way, if there really are forms of universal design that are good solutions for all?

The answer is both yes and no. One of the findings is an interesting difference between the group with visual impairment and the group with hearing impairment. The first group prefers smaller rooms where literary everything can be reached easily within short distance. The other group with hearing impairments easily experienced the rooms to be too small and narrow and they got claustrophobic feelings.

Ryhl concludes that it is not possible to set the same specifications for the different groups. The only one right solution does not exist. Immediately acoustic is a clear factor of great importance for all for groups.

That means that we have to work consciously on acoustic in housing, for instance with maximum reverberation [5].

### 3.2. *Per Hedfors*

The other person, Per Hedfors, landscape architect who is working at the Department of Landscape Planning Ultuna, Swedish University of Agricultural Sciences

He has in his research tried to investigate how we can use sound more consciously in our outdoor environments. And he argues there is a need for new sonic tools for landscape architecture in practical spatial planning and landscape design for acoustic considerations, beside issues of noise abatement.

In his PhD thesis, *Site Soundscapes; Landscape architecture in the light of sound*, from 2003, Hedfors has done an important pioneering work.

He states that landscape architects works with questions where different aspects of sound should be integrated.

The last ten years the concept soundscape has been established as an expression of sound or combination of sounds that forms or arises from an immersive environment. The study of soundscape is also sometimes named acoustic ecology.

The idea of soundscape refers to both the natural acoustic environment, consisting of natural sounds, including animal vocalizations and, for instance, the sounds of weather and other natural elements, and environmental sounds created by humans, through musical composition, sound design, and other ordinary human activities including conversation and work. It also includes sounds of mechanical origin resulting from use of industrial technology. The disruption of these acoustic environments results in noise pollution. [6]

By taking a phenomenological approach to the study of landscape, a person's experience of a place occurs through the medium of the sensing body. This embodiment of space can occur through different sensory perceptions such as taste, touch, smell, and sound.

This approach has an obvious relevance to the questions this paper raise.

In an article, *Urban Sonotopes: Towards a Participatory Design*, written together with Peter G. Howell, Hedfors follows up the issue from his thesis, with less focus on unwanted noise and more on positive sensory experiences from sounds in cities.

The authors argue that it is necessary with a new vocabulary. And they propose words such as sonotope design, and where they point to the three main groups of relevance for this approach, technical, mimicry (the act or art of copying or imitating closely) and emotional.

Part of the article is written almost in a lyric way such as:

*“Reality is a continuously ongoing concert and urban designers should act as ambassadors of sounds.” [7]*

To my opinion, quite obviously, this approach to sound is an inspiring way of looking at sound also in relation to sensory experiences of persons with reduced hearing in different ways.

#### **4. How to enforce a broader view on universal design?**

I have argued above, that so far much or most attention has been paid on physical accessibility when arguing for the rights for persons classified as disable. And I have presented a couple of Nordic researchers who have worked with a wider scope, with more focus on sensory experience and I also hinted that there are some senses that are not very focus on. To strengthen a broader interpretation of universal design, it might even be necessary to go to more basic humanistic approach. What does it mean to be a human being? Good old Aristotle claimed that the smallest unit for a human being is not one person, but at least two. With this in mind it is fruitful to take into use concepts like social and emotional accessibility.

So we might also to lean on some researchers and writers in the fields of philosophy, sociology and ethics. Last year, 2013, a Norwegian researcher Inger Marie Lid had a new book published; *Universal design. Core values, knowledge, and practices*. I find that this book provides very good suggestions about topics relating to issues such as how people should be able to develop in the community with others and how to look after issues relating to dignity and bodily vulnerability. This expands and challenges the discourse around the concept of universal design.

Lid, introduces Hannah Arendt with a quotation:

*“A common world disappears when it is viewed just from one point of view; it can only exist in a diversity of perspectives”.*

The reader is challenged to the problematic relationship between an individual and community views, which among others Arendt has discussed in some controversial ways.

Lid elaborates this issue when she argues it has to do with the interaction with physical and social environments that in many ways are characterized by frictions and sometimes resistance.

The author further points to the fact that our western industrialized societies are characterized by an ideal for a modern human being shall be independent, healthy, well fit and also show some extra effort both home, at work and in the leisure time.

She writes that the concept universal design indicates conceptions of being able to live a meaningful life in a common world, as promoted by the independent movement organizations, established first in Berkeley in the early 1970s.

But that should also mean that there should also be acceptance to be bodily vulnerable. Lid leans much on the thinking and writing by Martha Nussbaum when discussing this issue when she point to the standpoint that it must a public responsibility to verify each human beings dignity through policy and legislation. And she connects the concept of vulnerability to the concept of dignity.

Through Nussbaum, Lid also links the concept of universal design to the question of participation by referring to the concept of capabilities.

Also here Nussbaum, who is much concerned of how human beings shall be able to develop in interaction with other people, referred to. [8]

These are approaches that should be fruitful to develop the concept universal design further to a broader view, by including what I have already named social and emotional accessibility. This in addition to physical accessibility by making doors wide enough, ramps not too steep and way finding by physical means, there is a need of a wider approach.

## 5. Closing remarks

The concepts like universal design, inclusive design, design for all and universell utforming are all young, most of them just 25 years or less. And they mean different thing in different national legislations.

But maybe that is very good. This might increase the attention to the issue. The paper indicates that there are lots of interesting question to discuss relating to all our senses.

It also takes us to more basic question of what it means to be a human being. This is exemplified by referring to the thinking and writing of persons like Hanna Arendt and Martha Nussbaum.

But we should not forget that much have happened to improve the understanding of the rights and needs of people classified as disabled.

And we should not forget that it is just forty years since Ed Robert and some other pioneers established the movement for independent living in Berkeley California. In 2011 the Ed Roberts campus was opened in Berkeley.

And last, but not least, United Nation has shown an increasing engagement in the issue the last twenty years, started by the Standard Rules on the Equalization of Opportunities for Persons with Disabilities in 1993.

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