TACTILE PAVING IN SWISS AND SWEDISH LEGAL FRAMEWORKS, ON HOW REGULATIONS INFLUENCE USABILITY AND ARCHITECTURAL DESIGN

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ABSTRACT
This paper explores the different legal frameworks regarding tactile paving systems for people with visual impairments in Switzerland and in Sweden. The Swiss system is based on distinct regulations with very limited possibilities for deviation in the architectural design. The Swedish system lacks defined requirements to respect and allows for individual interpretation in various architectural designs. The comparison of the two legal frameworks pertained to identifying similarities and differences.

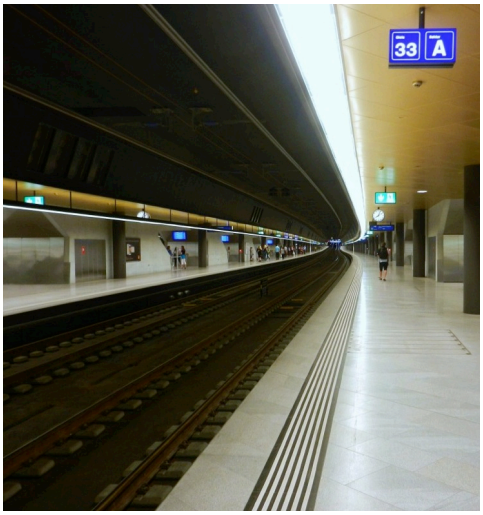
Keywords: Universal Design, Usability, Tactile Paving, Building Act, Design Strategies

INTRODUCTION

The tactile paving system as it is applied in Switzerland has a very dominant effect on architecture and the built environment. It was developed by Karl A Weissenberger in 1987 but became first effective for Swiss public buildings and built environment in 1997. Neighboring countries display more subtle requirements that are seamlessly integrated in the architectural design. However, the most unobtrusive approach is found in Sweden, whose system is very different compared to the Swiss one.

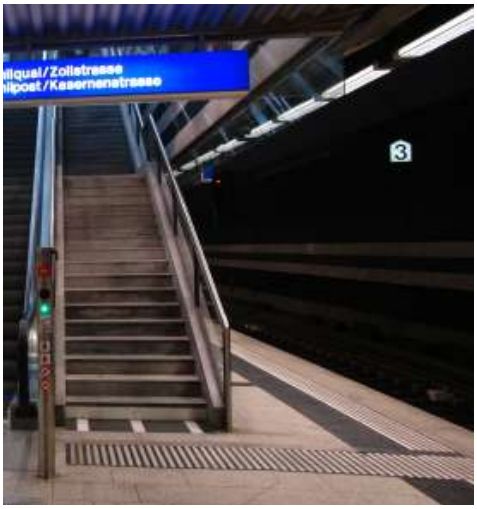
In order to demonstrate the differences between the two countries, two poignant examples will be used throughout this study, i.e. the central station in Zürich, Zürich Haupbahnhof and and the counterpart in Stockholm, Stockholms Centralstation (Figure 1). Train stations are places of transition where it is important for all users to navigate independently while respecting concerns for personal safety and security they are interesting places. As public spaces, they also have a special role in the sense that these stations are exemplary models for other buildings. With respect to the forth-coming EU directive, stations are to be designed so that fundamental accessibility requirements are integral in architecture. Stations supply constitute a crash courses in how tactile paving can look like and how it can be...with regard to...universal design of the UN CRPD.

FIGURE 1. Comparative design features found at the Zürich HB and the Stockholm Centralstation.

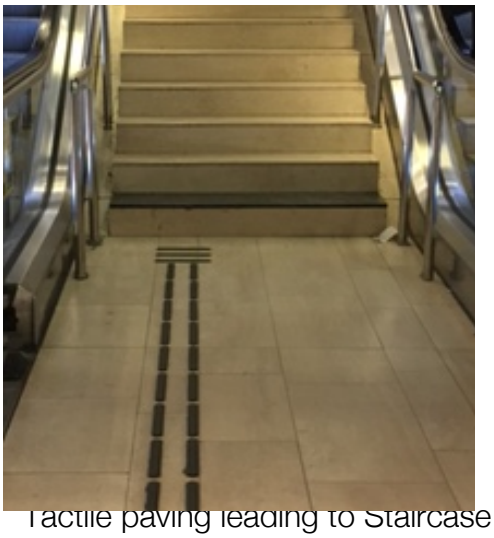
Zürich HB	Stockholm Centralstation
 Tactile paving leading to platforms (Weber 2016)	 Tactile paving in Centralstation (Stauffer 2016)
 Tactile Paving along platform (Monnet 2016)	 Tactile Paving along Plattform (Stauffer 2016)

Attention Field indicating a change of direction
(Palomino 2003)

Different paths coming together allowing change of direction
(Stauffer 2016)



Tactile Paving leading to Staircase
(Schmits 2012)



Tactile paving leading to Staircase
(Stauffer 2016)

The eight images that are presented give an overview of striking differences between the Swiss and the Swedish requirements:

Zürich HB	Stockholm Centralstation
- white continious stripes - always the same color - black background - always the same background color	- shiny or black short plates - different colors for guide lines - two-colored or white background - different backgrounds

- change of direction in 90° angle - attention field all along steps of stairs	- change of direction in different angles possible - attention field in short part in front of stairs

By comparing building regulations for public buildings in Switzerland and Sweden, the paper assumed that it would be possible to identify the requirements regulating effect on architectural design. This effect was then analyzed in terms of positive and negative influences for the ulterior outcome as being an accessible and usable environment for people with visual impairments.

REASEARCH QUESTION

This study is centered on the dual research questions:
- Can differences in the design of tactile paving in Sweden and Switzerland be considered as direct outcomes of the legal frameworks?
- If so, which system produces the most appropriate type of tactile paving for people with visual impairments?

METHODOLOGY

In the initial step of this study, legal frameworks concerning tactile paving were mapped in the two countries. The original German version of the Swiss framework was used and translated in to English. In a similar way, the Swedish system was translated into English.

In order to verify the perceived usefulness of the two systems with reference to the needs of people with visual impairments, both frameworks underwent a scrutiny by use of the PDF accessibility checker (PAC 2) that the Swiss organization 'Access for all' supplies.

Another instrument for comparing texts of different origins is the emphasis on tactile paving (Seger et Ael). The Swiss text, executed in German, is about 30 per cent longer than the Swedish one. This analysis gives some information on the level of detailing of the texts, but also the level of regulation.

ANALYSIS

Another question that occurs when comparing the different texts is in which way the texts are illustrated. What kinds of visualizations are used to exemplify the laws and how they should be applied in the built environment other than the text form?

In a last step one can compare the content of the legal frameworks. To do so one has to be able to read and understand the texts. For this the texts have to be in a language one comprehends. If not one has to translate them. Modern translating tools can help in this regard. For this study Google translate was

used. Once one has read and understood the text one can analyze the relevant topics that are mentioned. This highlights the strategies that each country has regarding tactile paving and how it should be applied. It allows identifying the common and different aspects of the legal frameworks.

RESULTS

Given the complexity of comparing two legal systems, the comparison will be executed in a matrix with 19 themes.

	Switzerland	Sweden
1. Which regulations apply?	- SIA 500 (SN 521 500) - Markierungen - Taktilvisuelle Markierungen fur blinde und sehbehinderte Fussgänger (SN 640 852) - Merkblatt Nr. 14, Leitliniensystem Schweiz, Taktilvisuelle Markierungen fur blinde und sehbehinderte Fussganger	- Boverkets Building Regulations: Accessibility and usability in public space ALM (BFS 2011:5 ALM 2) - Boverkets Building Regulations: Easily eliminated objects HIN (BFS 2013:9 HIN 3) - Myndigheten för delaktighet, MFD (SFS 2001:525 - International Organization for Standardization (ISO 21542)
2. Where can the regulations be found?	- SIA – Swiss society of engineers and architects (online under: www.sia.ch) - SNV – Schweizerische Normenvereinigung interdisziplinärer Normenbereiche (online under www.snv.ch) - Schweizer Fachstelle für behindertengerechtes bauen (online under: www.hindernisfrei-bauen.ch)	- Boverket – National Board of Housing, Building and Planning (online under: www.boverket.se) - Myndigheten för delaktighet, MFD (online under: www.mfd.se) - ISO (online under: www.iso.org)

3. How can the regulations be acquired?	- SIA 500: from the webshop of SIA (shop.sia.ch) for 200 CHF (about 1800 SEK on 30.11.2016) - SN 640 852: from the webshop of SNV (shop.snv.ch) for 35 CHF (about 320 SEK on 30.11.2016) - Merkblatt Nr. 14: from the webpage of Schweizer Fachstelle für behindertengerechtes bauen (www.hindernisfrei-bauen.ch) for free	- Boverkets Building Regulations: can be downloaded for free from www.boverket.se. - MFD: can be downloaded for free from www.mfd.se - ISO: from the webstore of ISO (www.iso.org/webshop) for 198 CHF (about 1800 SEK on 18.12.2016)
4. Are the PDF versions of the regulations accessible to people who are blind? (According to the PDF Accessibility Checker (PAC 2))	All documents are not accessible at all.	- ALM: partly accessible - HIN: not accessible at all
5. How long is the part about tactile paving?	6 pages (about 4 times longer than Swedish regulation)	1.5 pages (¼ of length of Swiss regulation)
6. How are the regulations visualized?	- 28 drawings with dimensioning - 5 pictures of built examples	-18 pictures of built examples
7. In which languages are the legal frameworks available?	- SIA 500: German, French, Italian - SN 640 852: German, French - Merkblatt Nr. 14: German, French	- Swedish - English (translation just for understanding and not legally binding)

8. What concepts regarding tactile paving do the countries follow?	First built elements should be used as guidance paths on open spaces. Where these elements aren't enough or can not be ordered in a logic way one has to use tactile-visuell marking.	Natural joint surfaces should be completed with artificial joint surfaces to continuous routes.
9. Where does tactile paving have to be applied?	Mandatory: - by redlight to find lightpost - at stops of public transportation To be verified: - complex traffic situations - big open spaces - to connect different stops of public transportation - in and around special institutions with higher needs	- guide paths have to be established to and between target points - between selected destinations in open space
10. When does tactile paving have to be integrated into the build environment?	- if something new is being built - if an alteration is being made to the built environment - for the existing built environment until 2024	- if something new is being built - as soon as it is not unreasonable in view of practical and economical conditions - older regulations still apply for earlier cases
11. What kind of solutions are allowed?	The norm gives one solution that has to be applied in all designs.	The text indicates how someone can act to meet the regulations. However, the individual is free to choose other solutions if these comply with the regulations.

12. How should tactile paving be planned?	In a first step the necessity should be determined. Then one should talk with an expert in orientation and mobility (Orientierungs und Mobilitäts Fachperson).	Not mentioned.
13. What are the different used elements for the guide paths?	- guide line - security line - turn off and closure field - attention field	Not mentioned.
14. How does tactile paving have to look like?	Tactile paving consists of 30mm parallels stripes that are 4 to 5 mm higher than the surrounding paving. They consist of at least 6 stripes next to each other and are continuous (max 30mm gaps for drainage because otherwise the cane can get stuck)	Very open and different possibilities are shown (see: www.boverket.se enklare-utan-hinder)
15. What kinds of materials are possible for tactile paving?	The material for tactile paving is lime scale plastic mass. It can retroactively be applied to surfaces such as asphalt, composite stone and concrete. It is weather resistant, durable, can be cleaned machined and to drive on it with heavy vehicles is unproblematic.	The material has to deviate in its surface finish and in its brightness from the surrounding ground.
16. What colors can guide lines be?	- white - on road yellow	Not mentioned.

17. How should the materiality surrounding tactile paving be?	The pavement around tactile paving should be smooth and without joints. It should in a dark color or otherwise a dark accompanying strip or dark primer has to be used.	Not mentioned.
18. What contrasts to the surroundings have to be fulfilled? (K = brightness contrast)	- K=min. 0.6 for warning function - K=min. 0.4 for guiding function	- K=min. 0.4
19. How should the turnoffs of the guide paths be?	A change of direction has to be done in a 90° Angel (± 10°) as this makes it easier to orientate.	Not mentioned.

PRELIMINARY CONCLUSIONS

Regarding the formal aspects one can say that in Sweden it is much easier to get access to the legal framework. It can be downloaded from the webpage of Boverket (Board for Housing, Planning and Building, BHPB) for free and all the applying rules are found (only the ISO standard has to be bought). In contrast, in Switzerland, one has to consult three different parties to get all the laws. Furthermore one has to pay quite a lot of money to read them if one is just interested as an individual and not a firm who needs them for work.

The text about tactile paving in the Swiss law is about four times longer than the one in the Swedish law. This correlates with the fact that tactile paving is subject to more regulating aspects in the Swiss legal system. Not only is the emphasis on the text longer but also the fact that many drawings with dimensions and pictures of built examples are used to illustrate the law shows that the design of tactile paving in Switzerland is very clearly defined by the law.

The fact that the Swedish law also has a translation into English makes it possible for 374 Mio. people around the to read it. Even though the Swiss law is translated into three languages (German, French and Italian) only 226 Mio. People can read it. (Nations Online Project: Languages around the world, under www.nationsonline.org (30.11.2016)) It would be a enormous advantage if the Swiss law was also translated into English. That way it would also be easier for

many foreign architects to work in Switzerland without having to overcome the language barriers.

DISCUSSION

When one starts looking at the content of the laws one surprisingly realizes that the main concept how guide paths in the built environment should be built are the same. Both counties lay the focus on using elements that are built anyway as a starting point and that tactile paving should only be added when it is not possible to otherwise form continuous paths.

Even though the laws correspond in the concept the way the appearance is regulated is very different. In Switzerland there is a very clear system and the idea is that tactile paving should look exactly the same everywhere. The planner doesn't have any freedom in the design. The law regulates the design, the material, the color, the color of the surrounding,... On the other hand in Sweden none of these aspects are regulated. The planner gets to choose any solution as long as it complies with the regulations. The only design aspect that is regulated is that the contrast of the guide lines to the surrounding has to be at least 0.4 K.

Both Systems have advantages and disadvantages. In Switzerland a clear System exists that facilitates it to recognize tactile paving and there are standardized solutions so that even in an unknown space a person that is visually impaired or blind knows how the system works. The downside of this system is that it doesn't really allow any freedom in the design and that mostly the system is just added as a last layer on top of the built environment. In Sweden on the other hand it is easy to find a solution to integrate the design of guide paths into the design of the built environment because so many options are possible. This allows planners to search for a universal design integrating tactile paving into the architectonical concept. The fact that it always articulated differently also makes it harder to use because one has to understand a different system in every environment.

CONCLUDING REMARKS

To have the built environment as a stating point for guide paths and only adding tactile paving when not possible otherwise seems to be a very logical concept. The best solution is if one has a clear system of how tactile paving works but allows different universal design solutions. This makes it possible to integrate tactile paving into design concepts in various situations.

The future Switzerland should think about loosening their regulations regarding the looks of its tactile paving system and Sweden should think about a clear system of how the guide paths should work without loosing the openness to design.

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