

SUMMARY REPORT

Title

„Visuelle Barrierefreiheit durch die Gestaltung von Kontrasten“ - Visual accessibility by designs of contrast

Occasion/ Initial situation

Based on the protection objective of visual barrier-free design, influences of flooring materials in interior and exterior spaces on the contrast impression are investigated in order to facilitate the design of contrasts for planners and building owners. The project uses both photometric measurements and judgements of visually impaired people on a large number of practical materials under various application situations.

Subject of the research project

The objective of the project is a ground-bound characterization of "visual accessibility" for public indoor and outdoor spaces in accordance to the DIN 18040 Part 1 and Part 3, which are primarily result by the choice of flooring materials and their designs.

Dangerous areas along the walkway or stairs were not taken into account.

For floor design the DIN 18040 explicitly points out the frugal use of ground indicators (highly specialized ground guiding elements) according to DIN 32984. These should only be used if there is no other clear recognizable guiding effect. The fact of 'clear recognition' is described out of the user's point of view throughout the representative requirement of high-contrast design.

The comprehensive status quo survey, which includes the evaluation of DIN standards as well as research on the state of the art, shows that for the influence, among other things, the following factors are considered to be most import: the size (in the case of floor coverings of the width) of guiding elements and their shape (mould pattern, joint proportion), the spatial arrangement (e. g. interruptions, joint formation), the viewing distance (influence of observation geometry) and the lighting (influence of luminous color/ lighting direction) on the contrast effect, there are currently no valid studies available from which practically oriented information could be derived. Contradicting the assumption of the research application several central influencing factors were examined (by laboratory and perception test).

Several laboratory and perception tests were developed to investigate the effects on visual accessibility. The tests are based on systematic measurements of the luminance contrasts of a standard selection of typical interior and exterior floor coverings in the lighting laboratory of the TU Dresden, carried out in accordance to the DIN 32984 measurement method. The results were used for further laboratory tests on the influence of lighting and observation geometry on effects of contrasts for floor materials. Additionally perception tests were carried out with visually impaired people based on and depending on the results of the laboratory tests. The images for these tests of conventional indoor and outdoor floor materials were generated throughout the laboratory test.

Based on these tests previously unexamined influences of surface roughness, the internal material structure as well as correlations between the perception of ground guiding elements and their joint pattern were investigated. Specifically joint bond and its combinations as well as boundary areas as well as the percentage of joint areas to the total area were focused. A further object of the perception tests was the investigation on the correlation between the dimension of the ground-based guiding elements and their luminance contrasts, in order to take into account the great variety of widths of guiding strips and guiding lines according to the differences in European standards and to develop implications for design related parameters.

Furthermore, to relate to the construction practice, selected outdoor projects which were realized within the past 10 years were analyzed according to their achieved visual accessibility. Since the construction of the projects was completed at least two years ago, it was possible to obtain information about the realized perceptibility and usability of the visual contrasts by local visual impaired people. The evaluation of the realized outdoor projects and perception test served as basis for the development of two test tracks (indoor and outdoor) realized on the campus of the TU Dresden. The selection of materials dimensions of guiding elements and the contrast variation were based on the results of the laboratory and perception tests. The study at the test tracks was carried out to validate and specify the results of the laboratory test conditions.

Conclusion

The results of the various studies reveal significant findings for practical implication on and specification about the criteria for visual accessibility as well as numerous indications for target-oriented further research. Furthermore, recommendations for action for planners were derived. Another central output derives from the results of the luminance measurements at the Light Laboratory of the TU Dresden, which were carried out in accordance to DIN 32984 measurement method. For the first time a reference guide

concerning the luminance contrasts, reflectance levels and structural proportions for common indoor and outdoor floor materials is available and can be an useful instrument for Planners before and during several planning phases.

Basic information

Short title: Barrierefreie Kontraste

Researcher / Project management:
Technische Universität Dresden
Bereich Bau und Umwelt | Fakultät Architektur
Institut für Landschaftsarchitektur
Lehr- und Forschungsgebiet Landschaftsbau

Working Group Visuelle Kontraste:
Lehr- und Forschungsgebiet Landschaftsbau
Prof. Dipl.-Ing. Irene Lohaus
Dipl.-Ing. Sören Meyer
Dipl.-Ing. Stefanie Kreiser

Professur für Verkehrspsychologie
Dipl.-Ing. Dipl.-Psych. Christoph Schulze
M.Sc. Dipl.-Ing. (FH) Katharina Rehberg

universalRAUM – Institut für evidenzbasierte Architektur im Gesundheitswesen GmbH
Dr.-Ing. Arch. Nadine Glasow
Ing.-Arch. Šárka Voříšková

Overall Costs: 240.977,40 €
Proportion of federal subsidy: 162.204,40 €
Project duration: 15 month

ILLUSTRATIONS/FIGURES:

Illustration 1: Bild1_Projektablaufplan.jpg
project schedule

Illustration 2: Bild2_HomogenitätDesReflexionsgrades.jpg
Surface characteristic homogeneity of the reflectance. With sample photo and the corresponding spatially resolved distributions of the reflectance diff/45 and representation of the reflectance scale in pseudocoloring.

Illustration 3: Bild3_Situation I-3Licht seitlich.jpg
Scheme for a viewer situation (situation I-3, light from the side)

Illustration 4: Bild4_TrendMerkmalFugenbild.jpg
Trend for the characteristic joint pattern. Surfaces with pronounced joint pattern combined with a homogeneous surface are detected much faster than the test patterns with combined joint patterns.

Illustration 5: Bild5_TestreckeAussen.jpg
Design of the test track in the outdoor area with display of the test run as well as photos from measuring the luminance contrast and passing over the test track with a test person.

Illustration 6: Bild6_TestreckeInnen.jpg
Design of the test track in the interior with presentation of the test run and photos of the built test track as well as passing over the test track with a test person