WALKING IN USERS' SHOES: VISUALLY IMPAIRED SPATIAL COGNITION AND PERSPECTIVE IN ARCHITECTURAL DESIGN

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The initial and critical phase of any design process is: to identify why and for whom we design. Considering the philosophy of design for all, which recommends that all environments should be designed with the widest range of users in mind, this research uses insights from Design for Special Needs with a particular emphasis on those with limitations of vision. In order to support the creation of spaces that are responsive to the blind and partially sighted feedback, we purpose a user-centred approach which is based on the intricate relation between visually disabled spatial cognition research and architectural design. The key point of the proposed methodology is: to structure spaces by developing patterns that are built upon visually disabled wayfinding behavior, strategies and cognitive perceptions. In this regard, we perform an open-search experiment which can be regarded as a pilot study in which, the direct observation of natural wayfinding behavior of visually impaired through an unfamiliar healthcare multilevel setting under time constraints, contributes to determine, from multiple perspective, the architectural ability to lend himself to exploration; the ability that cannot be "viewed" only from the designers/researchers point, but has to be seen through the "eyes" of visually impaired building users.

As a prerequisite to participate in this experiment and carrying out the site audit, visually impaired participants are required to have no visiting experience with the research setting before. First, we read, investigate, explore, compare and evaluate together the quality of the setting's internal /external spatial organization, the physical structure of pathways, the articulation and nature of architectural and environmental features, the level of environmental information provision as well as the measures of EL (Environmental Legibility at both global and local scale), and then, we abstract the experimental setting by means of a point grid of architectural features that have to be taken into account during the future designing phase. This is only an initial but fundamental step in our planning process which can provide a basis that leads to the formulation of post-hoc interpretations.

Since our design ideas are triggered from wayfinding behavior and spatial information needs of the visually impaired participants, we will draw the subsequent experimental design step of our research, once more, upon a collaborative process, the visually impaired involvement in design: **design by people for people.**

- STUDY SHEET

PURPOSE AND AIMS

THE MAIN AIM:
- ARCHITECTURAL DESIGN SUPPORTING VISUALLY DISABLED TO HANDLE THE COMPLEXITY OF THEIR SURROUNDINGS

- Visually disabled spatial cognition research
- Architectural design

- MULTIDISCIPLINARI RESEARCH TEAM
- Interdisciplinary qualitative approach

- THE DIRECTION OF THE RESEARCH FOCUS

- User experience study (UX)
- User-Centered Design process

Co-evaluators:
-congenitally totally blinds,
-adventitiously totally blinds,
-subjects with weak visual residue

- SHARING OF KNOWLEDGE

Control group:
-principal researcher(architect& Graphic designer),
-designers,
-architects,
-a wayfinding designer,
-a cognitive scientist,
-a psychologist,
-a certified orientation and mobility(O&M)instructor,
-experts in accessibility and UD (universal design),
-an expert in UX (User Experience)Design,
-an expert in audio description for the blind.

STATE OF THE ART
a review of:
-spatio-cognitive theorical background;
-current thinking;
-several previous descriptive studies;

INTERVIEW
with certified orientation and mobility (O&M) instructor, the one that designs training programs for co-evaluators;
- conducted on 26th of July 2019 in Trieste.

PREVIOUS RESEARCH PHASE

to illustrate, explore and uncover from different perspective:

- the visually disabled underlying spatio-cognitive competences in small and large-scale environments, and their ability to form architectural elements into meaningful wayfinding information;
- the way Architectural and Urban spaces are experienced from visually impaired perspective;
- what environmental legibility/complexity means for them;
- the various ways in which they engage with their surroundings, matching their performance with architectural and sensory cues;
- their cognitive mapping ability and their sense of direction;
- the variety of technical or human aids used in handling wayfinding tasks;

FOCUS GROUP DISCUSSIONS WITH CO-EVALUATORS:
- subject self – reporting instrument;
- conducted in UIC head office in Trieste on the 8th of May 2018 and 13th of August 2018;
- a record on visually disabled self-reported past in-door and out-door experiences and memories with both physical structures and social relations;

For more information about the results please refer to:
Afshary, G., Garofolo, I., Svetina, M., Zupancic, T.(2018): User Experience study for a sound understanding of the interaction between the visually impaired and the environment, Annales, Series Historia et Sociologia, 28, 2018, 3, 569-588

COLLECTING OBSERVATIONAL AND VERBAL DATA

ANALYZING DATA AND INTERPRETATION

- The relevant findings
- Backbone
for experimental phase

CURRENT PILOT EXPERIMENTAL PHASE

- From visually impaired individual experience, do an experience together;
- Carrying out internal/ external audits on-site; discussing architecture with direct exploratory experiences;

CASE STUDIES
Investigation areas:
TRIESTE, GORIZIA

- Emergency conditions
- The First Round of Case Studies:
making a journey through an unfamiliar Healthcare Environment under time constraints.

- Recreational wayfinding conditions
- The Second Round of Case Studies:
a shopping mall where participants can design their own tasks.

- Normal wayfinding (day-to-day) conditions
- The Third Round of Case Studies:
a familiar public transport building (Train station), a square in rapid and unexpected transformation which also serves as inter-modal hub.

put to the challenge the blind and partially sighted spatial awareness, abilities and adoption of various way-finding strategies, for the purpose of:

- testing the validation of our general approach and hypothesis directly in targeted experimentation;
- understanding the extent to which the findings of the previous research phase can be transferred to different scenarios;
- studying the architectural responses to visually impaired wayfinding behavior in order to link and detect connections between architectural design and wayfinding performance (cognitive-architectural analysis);
- discovering what information is sought by visually impaired users in the interpretation of environment;

- connections
- new interpretations

The 2nd step consists of:
shedding light on the issues and themes revealed from the comparative analysis of experimental data with information gathered from previous research phase.

The 1st step:
the shortcomings of verbal protocol, the data deduced from examination of sketches, interview notes and the observer notes, video recorded and mapped spontaneous non-linguistic spatial behavior according to both performance measures (journey time, walked route length, errors and stops) and navigation strategies, goes through several phases of quantitative and qualitative analysis.

EXPERIMENTAL DATA ANALYZED& INTERPRETED IN SUBJECTIVE AND OBJECTIVE WAYS

"GoPro footage": recording information- seeking behavior
- an "extended first-person perspective" which enhances the ability to observe without distance the visually impaired perspective;

"think-aloud protocol" – TAP: access to silent thoughts
- capture and record visually impaired ongoing verbalized thoughts, directly triggered by the situation.

a post-test Survey Interview: retrospective interpretative method
- is reported in a temporal sequence after completion of the walk-through and is used to compare "postponed" behaviour and self-report responses of the participants about their spatial experience.

Rating Scale method – RS: closed-ended survey question
visually impaired subjective attributed rating to the various physical, perceptual and sensorial aspects of architectural elements according to their being hinderer, obstructer, facilitator or supporter.

Sketch mapping: Method of Externalizing Cognitive Map
- is used to map out and identify the relevant spatial aspects and the shared vocabulary of significant focal points which make sense of environment.

A number of systematic patterns might emerge from this phase, such as:
trouble spots, challenging or critical points present inside or outside the building, where act as physical/ perceptual barriers and thus, indicate all the instances participants were stopped, confused, worried, frustrated, distracted or even lost as well as the number of communicative points, recognizable and memorable places with legible function and meaning which conveyed certainty and ensured safety.

COLLECTING BEHAVIORAL AND VERBAL PATTERN
a novel multi-modality recording method which:

- correspond to two temporal perspectives: during the audit, and after performing the walkthrough;
- achieves not only an accurate representation and an unfiltered account of the cognitive experiences of the participants but also their spontaneous reactions, emotions, and thoughts;
- by combining visual data, observational data, and both types of verbal reports, i.e. concurrent verbalization and retrospective verbalization, symmetrically investigates performance patterns and associated languages, pointing to shared underlying cognitive processes, mental conceptualizations, and the wayfinding strategies employed;

THROUGH

CHECK POINTS:
Useful starting point for the future designing phase.

FUTURE DESIGNING PHASE

Design Criteria which echoes in the perspective of:
- introducing people with visual impairments to wayfinding design process.
- linking the experimental data to architectural design, using the outcomes as inputs in design process.
- adapting the environment to the visually impaired experiential pattern, (re)organizing the space from their perspective.
- establishing a "common language" between visually impaired users and designers who can translate perceptual and cognitive space into built and graphic form, through spatial planning and environmental communication.
- improving the compatibility between the spatial environment and the strategies and abilities of the blind and partially sighted users.

THROUGH

PARTICIPATORY DESIGN WORKSHOP/ LIVING LAB → WAYFINDING DESIGN SOLUTIONS/ STRATEGIES → VERIFICATION OF SOLUTIONS/ STRATEGIES

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