# Wayfinding Performance of Visually Impaired Pedestrians in an Urban Area

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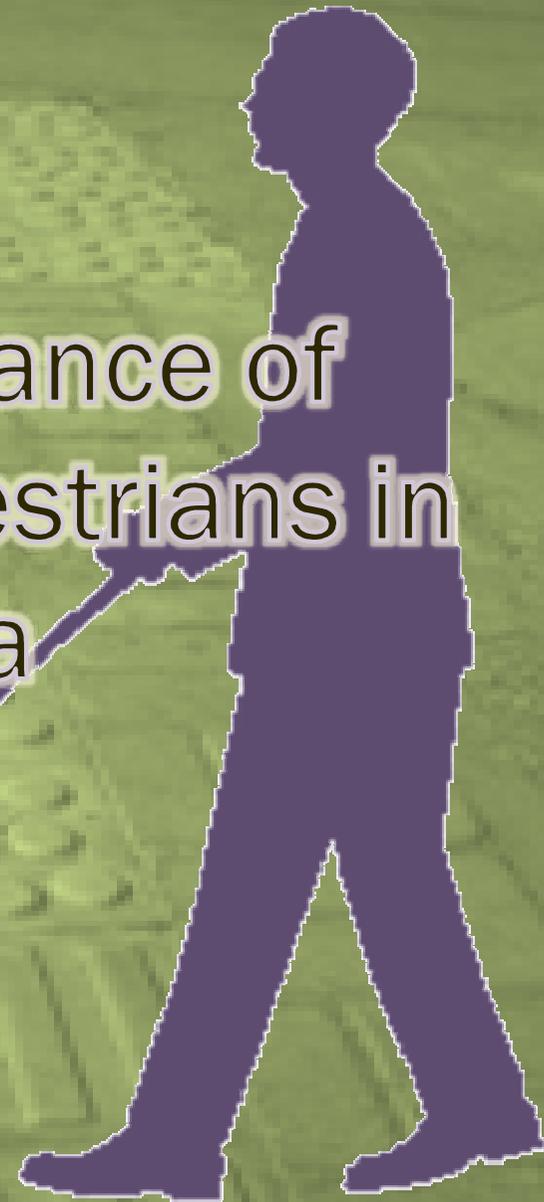
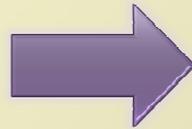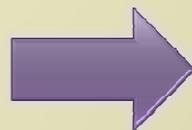□ **Orientation** → **An awareness of one's position in the environment by maintaining the relationship to other objects**

□ **Problem** →
- **Lack of information**
- **Not making independent journeys outside their neighbourhood areas**
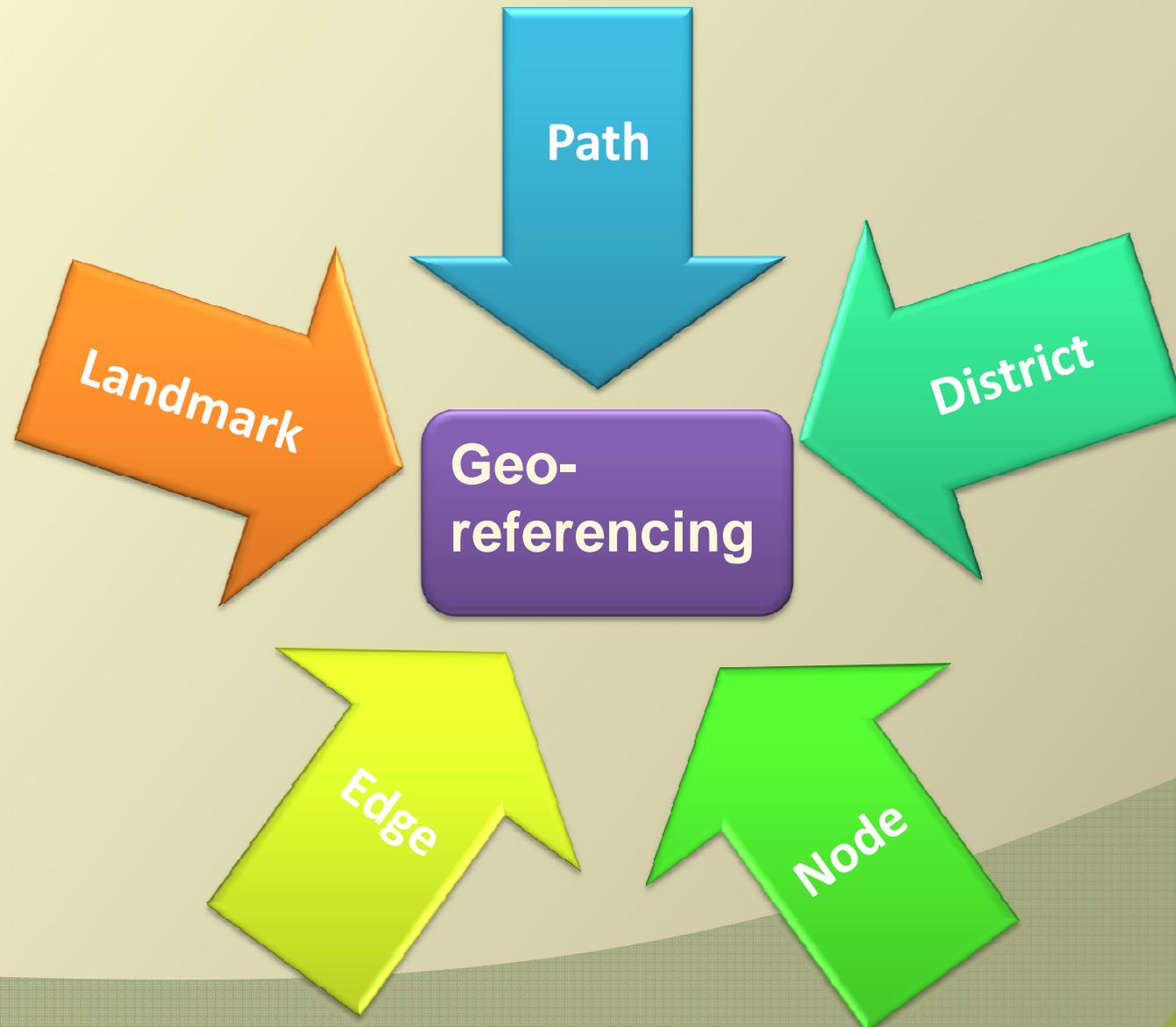
What are the characteristics of the reference points such as the type and frequency of usage of these among the blind and low-vision users separately?

Which of the senses are important for the target group?

How can the street pattern influence the wayfinding process?

How do blind students differ from low-vision students in their wayfinding process?

If the user is visually impaired (either blind or low-vision), then reference points are used to obtain information in familiar environments.

If the user is blind, then the dominant sense is to rely on familiar urban areas as a tactile experience (touch).

If the user is low-vision impaired, then visual cues similar to those used by sighted people are used for wayfinding

If the user is visually impaired (either blind or low-vision), we argue that the grid street pattern is clearer and more legible for him/her in their wayfinding process.

| Gender | Visual impairment | Frequency | Age | | Years of education | | Years of blindness | |
|---|---|---|---|---|---|---|---|---|
| | | | Mean | Age | Mean | School level | Mean | Years (min-max) |
| Female | Blind | 6 | 18 | 15-21 | 3.2 | 1-4 | 7.35 | 0-21 |
| | Low-vision | 6 | 16.5 | 14-19 | 2.8 | 1-4 | 12.25 | 10-19 |
| Male | Blind | 6 | 18.5 | 15-22 | 3.5 | 1-4 | 6.5 | 0-22 |
| | Low-vision | 6 | 17.5 | 15-20 | 3.1 | 1-4 | 14.30 | 13-20 |

# Results

- Reference points
- wayfinding process
- Senses
- Problems
- Street pattern

**What are the reference points you keep in mind when finding your way between Faramarz junction and the school?**

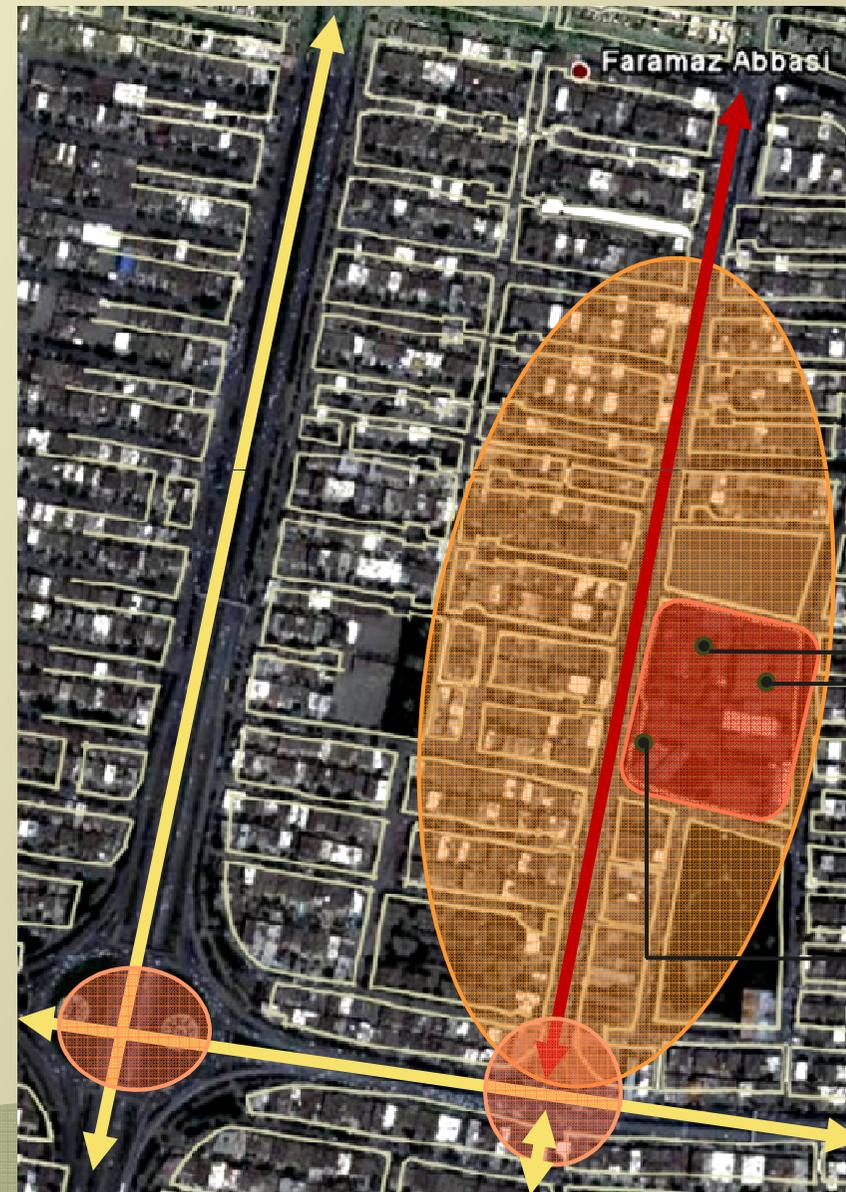| | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| Braille p... | | | 2.5 |
| Bakery | | | 0.8 |
| Strip Mall | 50 - 8.3 | 50 - 8.3 | 100 - 8.3 |
| Supermarket | 66.7 - 16.7 | 33.3 - 8.3 | 100 - 12.5 |
| Bank/ATM | 37.5 - 25 | 62.5 - 41.7 | 100 - 33.3 |
| School ... | | | 2.5 |

➤ **Differences in the type and the number of the reference points.**

➤ **Reference points are related to senses other than vision**

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

Faramaz Abbasi

Taghva School

Omid School

Hatami School

**Describe your imagination during your way when finding your way between Faramarz junction and the school?**

|  | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| Park | 66.7 - 16.7 | 33.3 - 8.3 | 100 - 12.5 |
| Shops | 100 - 8.3 |  | 100 - 4.2 |
| Hatami School | 44.4 - 33.3 | 55.6 - 41.7 | 100 - 37.5 |
| People waiting at bus stop |  | 100 - 16.7 | 100 - 8.3 |
| Street trees in Faramarz st. | 55.6 - 41.7 | 44.4 - 33.3 | 100 - 37.5 |

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

## Blind

- Bus Stop
- Number of intersection
  intersections
- Shops

## Low-vision

- Shops
- High buildings
- Bus stop

...ore to find your way...

| | Blind (%) | Low-vision | Total |
|---|---|---|---|
| | | 100 | |
| | – 50 | 14.2 | |
| | 33.3 | | |
| | 16.7 | 75 | |

## Relying on senses of hearing and smell

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

# Results

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**Blind students: are being used to asking residents in these situations (83.3%)**

| How | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| Ask residents | 71.4 - 83.3 | 28.6 - 33.3 | 100 - 58.3 |
| Keep in mind some elements | 20 - 16.7 | 80 - 66.7 | 100 - 41.7 |

**Low-vision students: try to keep in mind some landmarks or reference points as visual cues to assist them find their way (66.7%).**

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

**How do you understand when you are getting closer to school?**

|  | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| Braille pavement | 100 - 25 |  | 100 - 12.5 |
| pedestrian bridge | 50 - 25 | 50 - 25 | 100 - 25 |
| children's noise in the Hatami school | 40 - 50 | 60 - 75 | 100 - 62.5 |

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

# Results

Reference points

wayfinding process

Senses

Problems

Street pattern

How do you understand when you reach a junction or an open space in the city?

|  | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| noise of vehicles and the sound of a crowd | 54.5 - 50 | 45.5 - 41.7 | 100 - 45.8 |
| feel a vacant and open space | 46.2 - 50 | 53.8 - 58.3 | 100 -54.2 |

- **Junction**

- **Open Space**

➤**Noise**

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

**Do noises from vehicles and the sound from crowds help you in wayfinding?**

| | Blind (%) | | Low-vision (%) | | Total (%) | |
|---|---|---|---|---|---|---|
| | Vehicles noise | Crowd sound | Vehicles noise | Crowd sound | Vehicles noise | Crowd sound |
| Yes | 80 - 33.3 | 63.2 - 100 | 20 - 8.3 | 36.8 - 58.3 | 100 - 20.8 | 100 - 79.2 |
| No | 42.1 - 66.7 | | 57.9 - 91.7 | 100 - 41.7 | 100 - 79.2 | 100 - 20.8 |

**Hearing is a sense that a sizeable proportion of the respondents get help from noises and crowd soud.**

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

# Results

Reference points

wayfinding process

Senses

Problems

Street pattern

**What problems do you have on pedestrian pathways?**

| | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| unsuitable walkway | 72.7 - 66.7 | 27.3 - 25 | 100 - 45.8 |
| barrels on the pedestrian pathways | 33.3 - 16.7 | 66.7 - 33.3 | 100 - 25 |
| Do not feel safe | 100 - 8.3 | | 100 - 4.2 |
| lack of suitable signage for visually impaired | 16.7 - 8.3 | 83.3 - 41.7 | 100 - 25 |

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

# Results

Reference points

wayfinding process

Senses

Problems

Street pattern

**Do you prefer to walk through a curvilinear path or a straight one?**

|  | Blind (%) | Low-vision (%) | Total (%) |
| --- | --- | --- | --- |
| curvilinear | 20 - 8.3 | 80 - 33.3 | 100 - 20.8 |
| straight | 57.9 - 91.7 | 42.1 - 66.7 | 100 - 79.2 |

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

**Do you prefer to walk through a different path or the same path?**

|  | Blind (%) | Low-vision (%) | Total (%) |
|---|---|---|---|
| same | 64.7 - 91.7 | 35.3 - 50 | 100 -70.8 |
| different | 14.3 - 8.3 | 85.7 - 50 | 100 - 29.2 |

[1] Note: The first percentage value represents the row percent; the second percentage value represents the column percent.

What are the characteristics of the reference points such as the type and frequency of usage of these among the blind and low-vision users separately?

The reference points the target group have utilized in our study –bakery, shops, ATM, Hatami School, street trees, school wall, pedestrian bridge, Braille pavement-  were all related to those senses other than that of vision.

Smell emanating from particular shops such as the bakery and flower shop proved very practical in guiding them to understand their current position in relation to other elements in the area.

## Conclusion

Which of the senses are important for the target group?

If the user is blind, then the dominant sense is to rely on familiar urban areas as a tactile experience (touch).

- The principal sense that both groups relied on was hearing.
- Blind students did not rely much on the sense of touching.

How can the street pattern influence the wayfinding process?

If the user is visually impaired (either blind or low-vision), we argue that the grid street pattern is clearer and more legible for him/her in their wayfinding process.

Straight streets or a grid pattern is generally a much easier pattern to learn and experience for both groups.

## Conclusion

**How do blind students differ from low-vision students in their wayfinding process?**

**Low-vision student respondents showed similarity to the blind respondents in selecting some common cues such as the bakery, flower shop, crowd noise, street trees, and "Hatami" school. However, reference points differ in type and the number of them among the two groups.**

## Conclusion

If the user is low-vision impaired, then visual cues similar to those used by sighted people are used for wayfinding

Some of the visual cues like high buildings are the similar reference points for the low-vision and sighted people because of the physical structure of the built environment.

## Implications

✓ **Greenery: the need to insulate walkways with green facilities to reduce the problem of noise.**

✓ **Street Pattern: to avoid designing complicated curvilinear paths, especially in areas which are likely to be used by the visually impaired.**

✓**Legible Signage: size and character; and consideration for the color-blind users**