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Paving the Path: Understanding Children's Perspectives on Urban Mobility

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Session: Poster session: Everybody walks, Oct 15, 2024 17:00 - 18:00 AM

BACKGROUND

- **Physical inactivity in children**: Many children globally are not meeting WHO's recommended activity levels, leading to physical and mental health issues.
- **Decline in active mobility:** Fewer children are walking, cycling, or scootering for school & recreation
- **Causes of inactivity:**
  - Dominance of motorized traffic
  - Lack of child-friendly infrastructure, insufficient open/green spaces
  - Parental restrictions due to perceived safety risks in public spaces
- **Reversing the trend! Solutions include:**
  - Understanding behavior change and environmental perceptions.
  - Studying the influence of social environment, technology, and policies.
  - Enhancing environments to support independent, active mobility for children.

OBJECTIVES

- **Basic research**: How children evaluate the street space in terms of well-being and safety, as the focus to date has been from the perspective of experts and parents
- **Criteria for a traffic area** in which children feel safe and comfortable are jointly identified
  - Structural criteria
  - Situation-related aspects
- Conduct **a comparative analysis** in SPSS using dummy variables and linear regression to determine which approach yields more accurate and meaningful.

METHODOLOGY

1	2	3
Preliminary Study	**Best-worst scaling experiments**	**Ex-post interviews**
Identification of attributes in urban environments and of disruptive elements	Best-worst choice out of 4 images (15 choice sets from pedestrian, 15 from cyclist perspective)	Reflection on BWS3 Freedom of choice Perception of the environment
• *In-class workshops: PAPI*	• *PAPI (BWS3)* • *Eye-tracking (VPS 19)*	• *PAPI* • *Group interview*

1 PRELIMINARY STUDY

- Objective: To identify the most important attributes in the street space from the children's point of view.
- Workshops in schools: topic of safety and well-being, active travel
- Paper-and-Pencil survey: 30 images of different street situations

Task:

- Evaluate well-being from the perspective of pedestrians and cyclists (five-point Likert scale (scores).
- Name three aspects that children notice in the picture.

Results:

- 44 different attributes were identified
- Matrix of attributes mentioned & correlation analysis between walking / cycling scores of 3 mentioned attributes
- Six attributes (see Table 1) with specific levels were used for the BWS3:

Attribute	Level 1	Level 2	Level 3	Level 4
Percentage of green	without	lawn	single trees	row of trees
width of pavement/cycle path	0.9 / 1.0 m	1.2 / 2.0 m	2.0 / 3.0 m	-
distance from motorized vehicle traffic	kerbside	narrow green stripe	wide green stripe	-
amount of motorized traffic	none	medium	many	-
number of other pedestrians/cyclists	none	medium	many	-
amount of litter and graffiti	none	little	a lot	-

Table 1: Six attributes with their level for BWS3

2 BEST-WORST SCALING EXPERIMENTS

Design: Discrete Choice Experiment - Balanced Incomplete Block Design (BIBD) - BWS3 method

Setup: 4 blocks (4 pictures per choice set), orthogonal array based on attribute-level structure (41*35 design) → Photoshop was used to manipulate one base-image taken in Vienna → creation of 36 unique street scenes with a variety of combinations of attributes.

Refinement: Initial BIBD: 72 rows (blocks) of 4 pictures → 14 (with dominant images) removed → 58 rows

Distribution: 58 rows split into 4 folders with 15 blocks each, 60 rows achieved by recycling 2 blocks.

Final: 8 versions: 4 starting with walking, 4 with cycling. A4 folders, with introduction

Eye-tracking: Analysis of where children look first and what attributes they perceive first

Experiment: Each participant: 15 blocks each walking / cycling, 30 minutes, small groups of six people

Responses: 1,290 responses from the pedestrian perspective and 1,272 responses from the cyclist perspective

Data processing: using R, preliminary analyses with IBM SPSS 29.0

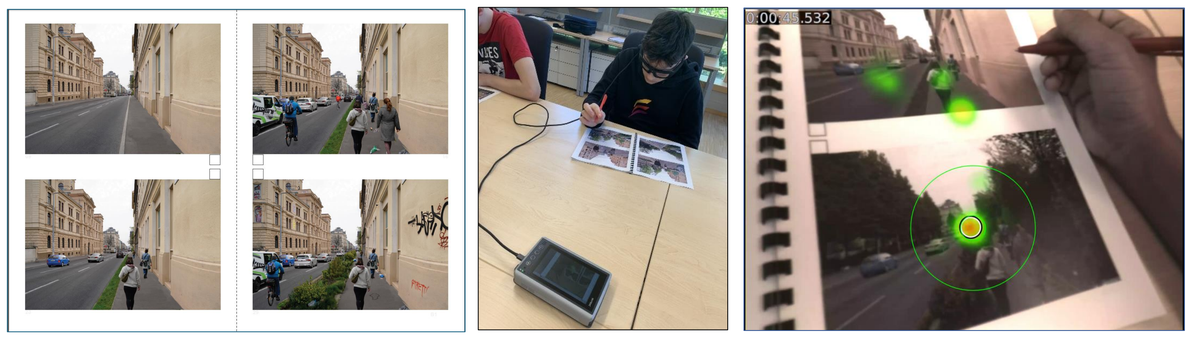

Figure 1-3: left: One choice set (pedestrian perspective), middle: eye-tracking, right: heat maps show the eye fixation on area of interest (AOI)

3 EX-POST INTERVIEWS

- Group interviews (face-to-face, six people)
- Reflection of best-worst scaling experiments
- Discussion on individual perceptions of surroundings, freedom of decision making, main factors of route choice
- Pencil-and-Paper questionnaire with five closed questions (five-point Likert scale) on children's route choice

PRELIMINARY RESULTS

Table 2 compares the **linear regression** and **dummy models** to assess the influence of street attributes (from walking perspective). Significant effects are observed for greenery, sidewalk width, and litter. The dummy model further refines these results by breaking down attribute levels, particularly highlighting traffic density as another factor influencing children's perceptions.

			Lineare Regression						Dummy Modell			
			B-Wert			t-Wert			B-Wert			
Attribute	Symmetric	Modell	Best	Worst	Best/Worst	Best	Worst	Best/Worst	Level 1	Level 2	Level 3	Level 4
Green	yes	Linear	0,039**	-0,038**	0,077**	3,612	-3,468	4,340	-0,145	0,131	0,211	0,233
wcWidth	no	Linear	0,038*	-0,028	0,065*	2,523	-1,847	2,676	-0,054	0,028	0,129	-
wcDist	yes	Linear	-0,007	-0,011	0,004	-0,446	-0,716	0,174	0,269	-0,032	-0,023	-
carNum	no	Dummy	-0,019	0,03	-0,049	-1,261	2,033	-2,009	0,228	0,005	0,651	-
wcNum	no	Linear	-0,073**	0,038*	-0,111**	-4,840	2,528	-4,515	0,312	-0,043	-0,146	-
litter	no	Linear	-0,165**	0,131**	-0,295**	-11,647	9,053	-12,920	0,329	-0,38	-0,592	-

Table 2: Comparison of Linear Regression and Dummy Models for Street Attribute Impact from walking perspective, * ≤0.05, **≤ 0.01; grey - dependent variable used to compare the linear model with the dummy model

Figure 4 shows first results for the influencing factors for walking and cycling. In terms of cycling, distance to motorized traffic (+) and number of cars (-) are very important factors, whereas for walking, litter (-), number of other walking people (-) as well as greenery (+) seem to be crucial to whether children feel comfortable and safe.

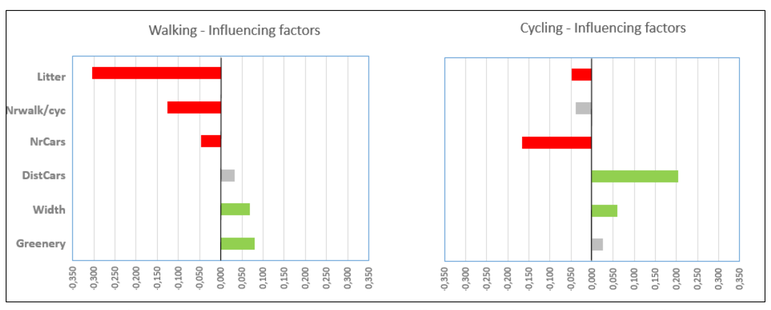

Figure 4: Influencing factors (red – negative, green – positive, grey – not significant), B-values (best/worst cycling, worst walking)

Figure 5 shows results from the post-ex interviews, revealing children's attention to their surroundings during walking and cycling:

- 46 pay close attention to the surroundings when walking (56% cycling).
- 49% are willing to take longer routes for a more attractive environment, highlighting the importance of aesthetics in their mobility choices.

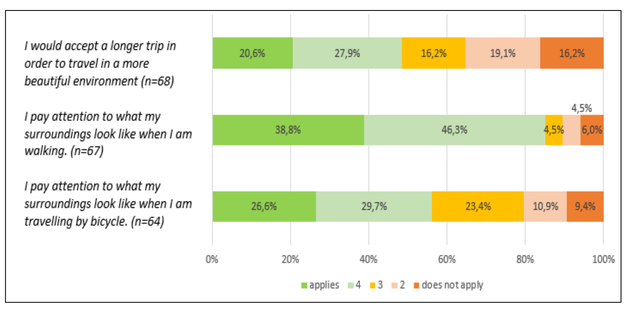

Figure 5: Responses from the post-ex interviews (questionnaire)

Next steps: (i) DCE Model Generation.(ii) Analysis of eye tracking data and heat map development. (iii) Ex-post interview Interpretation to qualitatively analyse children's reflections on their experiences and perceptions of urban street design

WALK21 LEADING THE WALKING MOVEMENT

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