Projektarbeit FS2017
The influence of slopes on walking activity
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Goals
Using pedestrian counting data from steeply sloped streets and walkways with high pedestrian volumes the effect of inclines on pedestrian activity as well as on the modal split shall be analyzed. A quantitative relationship between elevation difference and the pedestrian modal choice can then be derived and placed in the context of walk-friendliness.

Methodology
In a first step the relationships of uphill and downhill walking pedestrians from four different locations with different slopes were analysed. Additionally based on the pedestrian and tram ridership data along the walkways a Logit-Model with 200 simulated travelers was processed using the Max. Log-Likelihood method to reveal the influence of the slope on the pedestrian modal split. Therefor two utility functions were designed ($V_F$ and $V_F^*$). $P_r$ gives the probability of a traveler to walk.

$$P_r = 1 / (1 + \exp(-V_F))$$

$$V_F = \beta_0 + \beta_1 * s$$

$$V_F^* = \beta_0 + \beta_1 * s + \beta_2 * \Delta t$$

Data & Results
The following four situations were considered for the analysis.

- Weinbergfussweg: slope 8 %
- Schienhutgasse: slope 10 %
- Olgaweg: slope 4 %
- Rütistr. & Klosbachstr.: slope 11 %

For the Weinbergfussweg and Olgaweg automated pedestrian counts were collected and for Schienhutgasse and Rütistr. & Klosbachstr. handmade countings over five hours were conducted. The corresponding public transport data were provided by Verkehrsbetriebe Zürich (VBZ).

Further, seasonal fluctuations seem to be low, analysing the effect for the situation Weinbergfussweg.

The estimated $\beta$-coefficients from the Logit-Model according to the $V_F$ utility function applied on Weinbergfussweg, Schienhutgasse and Olgaweg show that on average the odds of a traveler to walk decrease by 10 % when adding 1 % of slope to the walkway.

When the time component is extracted ($V_F^*$) the influence of the slope decreases, still by adding 1 % of slope the odds of walking decrease by 8 %.

Discussion
The results from the pedestrian counts reveal a clear indication that the slope of a walkway has a negative influence on the walking activity. On walkways with smaller steepness the Logit-Model indicates that the significance of the slope influence seems to be lower. Therefor further research is advised.