Adjusting for Cognitive and Spatial Biases of VGI: The Case of Perceived Risks in Urban Cycling

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The increasing number of opportunities to collect Volunteered Geographic Information (VGI) creates new means to plan, manage and improve our cities. However, utilisation of VGI in urban planning and policy making is slow, mainly due to controversies surrounding its reliability and representativeness. In particular, the data visible to the planner/researcher as an output of a VGI project is aggregated from multiple contributions of a number of users - each acting under different circumstances, with varying levels of commitment or expertise, and following a chain of very different individual experiences. Additionally, VGI contributions are typically performed in retrospect (and not on-the-spot), which might result in judgment being influenced by the interaction with other online map users (e.g. high popularity/visibility of some already existing VGI entries).

We propose a method for validating VGI contributions based on a data set collected by a major German newspaper in the city of Munich (Germany). Respondents were asked to mark and textually describe locations considered dangerous for cycling on an online map of their city. Users were also able to 'like' the already existing comments. The project generated over 5000 entries within a week. On the basis of this data set, we conducted an exploratory case study investigating the impacts of spatial and cognitive biases on the validity of VGI. A sample of 20 locations was selected (e.g. those receiving high number of VGI 'likes'). A 360-degree panoramic view of these locations was sourced from Google StreetView and presented to a group of 15 participants through a head-mounted display (Occulus Rift 2). Participants were asked to rate the subjective risk associated with the given location as well as grade their agreement with the textual description derived from the original VGI contribution.

The results are analysed with respect to the viewing behaviour of the participants (measured by the dynamism and distribution of head movement) and spatial complexity of the area visible from the respective location (measured by how 'spiky', 'circular', large or small the *isovist* of the given intersection is). The main focus of the analysis is the degree to which participants in a laboratory-based study agree with the VGI data. We hypothesise that some spatial characteristics of the intersections are likely to result in similar perception of risk in both cases. We claim that instances for which VGI 'likes' do not correlate with the perceptual judgement performed in-the-lab are those especially susceptible to biases of any VGI project - such as their dependence on popularity of a given location or social processes moderating the interactions of online map users.