

Remote usability testing in cognitive cartography: Evaluation of 3D interactive (geo)visualizations

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Abstract:

Remote usability testing is a method based on an insight platform to record test participants' activities when they interact with a given product in their natural environment (e.g., at home). This method has been frequently used in the last decades in web design (Tullis et al., 2002; Rosenbaum and Kantner, 2008; Liu et al., 2012; Chynal and Sobiecki, 2014; Sauer et al., 2019) or mobile application evaluation (Takahashi and Nebe, 2019). This method has been used only rarely for cartographic purposes (Ingensand and Golay, 2011; Mendonça and Delazari, 2012). Although Roth et al. (2017) consider this method as 'other potentially fruitful research opportunity,' its significance is rapidly increased nowadays (in 2021), when there are many problems with realizing user testing in a laboratory conditions.

This contribution deals with asynchronous (automated) remote testing. Automated usability testing can record users' interactions and collect users' opinions and even from large numbers of participants. On the other hand, it does not allow insight into the reasons for the user's decisions. Questionnaires and other self-reporting methods are limited in this respect (Rosenbaum and Kantner, 2008).

The advantages and limitations of asynchronous testing are demonstrated in the application 3DmoveR (3D Movement and Interaction Recorder). 3DmoveR is a research tool designed for user testing of interactive 3D (geo)visualizations in web browsers based on the combination of user logging method with practical spatial tasks. The current version (3DmoveR 2.0) is implemented using open web technologies such as PHP, JavaScript, and the Three.js library. The author has more than five years of experience in using different versions and variants of this tool (Herman and Stachon, 2016; Herman et al., 2016; Herman et al., 2017; Herman et al., 2018a, Herman et al., 2018b, Herman and Stachon, 2018, Jurik et al., 2018; Herman, 2019; <http://olli.wz.cz/webtest>). Although most of the presented research was conducted in controlled (laboratory) conditions, Jurik et al. (2018) describe the tool's pilot deployment outside of controlled conditions. The tool supports eliminating specific interferences (e.g., pop-up menu in the browser, optionally excluding some controls such as keyboard) and monitoring some intervening (nuisance) variables (e.g., web browser colour depth, screen resolution, used controls).

Following list of possible extensions of 3DmoveR 2.0 were identified:

- Sound recording (WebRTC, getUserMedia API, Web Audio API)
- Video recording (WebRTC, getUserMedia API)
- Screen capture (Screen Capture API)
- Eye-tracking integration (Webgazer.js),
- Adaptation for mobile devices
 - o Responsive design (Bootstrap)
 - o Integration with Geolocation API (GPS) and Orientation API (accelerometer)
- Integration with WebVR and available head-mounted displays, especially low-cost ones.

Note that these extensions represent the functionality applicable in remote usability testing, not only in cartography. Examples of technologies demonstrate that these functions can indeed be implemented within a web browser. The open issue is their integration into existing tools such as 3DmoveR. Another option is to combine these tools and functionality with synchronous (moderated) user testing procedures.

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