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Eye-movement data quality over time and the influence of awareness of being eye-tracked
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To design an experiment that will yield sufficient power, it is important to understand your measurement device and the data quality it produces. Recent work has provided a complete exposé of eye-tracking data quality as a function of screen location and participant characteristics for a series of popular eye-trackers. These results are however based on recordings done within a few minutes after calibration, while in practice experiments often last an hour or more. As such, a description of data quality over time is needed to design experiments that maintain sufficient power for their whole duration. Furthermore, eye-tracking is sometimes done covertly, without the participant being aware that they're eye-tracked. Here we look at the influence this has on data quality.

57 participants participated in an experiment that took approximately 2 hours and consisted of a series of tasks. In between these tasks, a display was shown containing 13 points displayed in random order for 1 second each while participants were asked to look at these points. Participants' eye-movements were recorded with an SMI RED-m at 120Hz, which was calibrated at the start of the experiment. After calibration, participants were either told they're being eye-tracked, or that eye-tracking would only start later during the experiment but that calibration is performed beforehand to avoid later interruption of the experiment.

The results show that accuracy and precision decrease over time. Furthermore, dataloss increases over time. While average accuracy worsened for both the horizontal and vertical recorded gaze positions, only the vertical coordinate showed increasing bias (downward) over time. Information about the participants' position in the headbox will be used to further elucidate worsening data quality over time. Last, the data provided evidence that awareness of being eye tracked did not affect data quality or the rate at which it worsened over time.