

INav Title: Everyday taxi drivers: Do gifted navigators have larger hippocampi?

INav Abstract:

Cognitive mapping – learning distance and direction relations between locations as opposed to stimulus-response associations for places – is supported by the hippocampus (O'Keefe & Nadel, 1978). Taxi drivers who undergo extensive training about the layout of and routes through London have enlarged hippocampi compared to bus drivers (Maguire, Woollett, & Spiers, 2006), presumably as a result of their training (Woollett & Maguire, 2011). But do these gross anatomical differences correlate with navigation ability in non-experts? On the one hand, individual differences in navigation ability are large in normal samples (Weisberg et al., 2014). On the other hand, experts who undergo extensive training may differ from people simply at the upper end of a normal distribution. Here, we used a desktop virtual environment to assess navigation ability in undergraduate students. Participants learned the names and locations of eight buildings. Learning was assessed with an onsite pointing task: participants were positioned at each of the eight buildings, then had to point directly at all other buildings. Structural MRI scans were collected in a separate session. We used a planned sequential analysis (Lakens, 2014), collecting 30 participants, analyzing the data, then expanding the sample by 20 participants three times (maximum $N=90$) if results were equivocal. After 70 participants, we find a small correlation between overall hippocampal volume and pointing accuracy, $r(70) = .20$, $p = .10$. Data collection will continue to 90, but, if this result holds, studies of experts may have limited implications for hippocampal structure-function relations to account for normal variability.