How to influence choice by monitoring gaze

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In the moments that lead up to a decision, the cognitive processes of choice are revealed in movements of the eye and hand. For example, participants' mouse cursors will veer towards a button marked 'fish' when categorizing a whale as mammal (Dale, Kehoe & Spivey 2007); their eyes will often flit to a picture of a candle in the middle of processing the spoken word 'candy' (Tanenhaus, Spivey-Knowlton, Eberhardt & Sedivy, 1995). In other words, the probabilistic, incremental nature of cognitive processes are played out in the timecourse of graded motor responses (Spivey, 2008). We have developed a gaze contingent technique that exploits this continuity between cognition and action and allows us to influence participants' opinions.

Our participants were asked a series of questions. Sometimes the answers were clear (*Should you brush your teeth everyday?*) but sometimes responses could reasonably be yes or no (*Is murder sometimes justifiable?*). In the latter case of intermediate truth values, previous work has shown that mouse movements will veer between answers (McKinstry, Dale & Spivey, 2008), and our pilot work replicated these findings with eye movements. Participants would look at *yes* and *no* buttons onscreen, settle on one for around 500ms, and at that point make their decision. In the current experiments, we exploited this characteristic of eye movements in order to bias decision making.

A remote eye tracker monitored participants' gaze as they looked at yes and no buttons and considered their answer to a question (*do children need more discipline?*). In the *bias yes* condition, when the eye tracker detected that they had looked at the yes button for a total of 500ms, the buttons disappeared and participants were instructed to respond immediately. On average, statements in the *bias yes* condition were given a yes response 10% more often than statements in the *bias no* condition ($p<.01$). Participants reported no awareness of this gaze contingent manipulation.

In previous work we have shown that eye movements to the external world are yoked to the internal cognitive processes that govern memory retrieval (Richardson & Spivey, 2000; Richardson & Kirkham, 2004; Hoover & Richardson, 2008), figurative language comprehension (Richardson & Matlock, 2007), production and comprehension in conversation (Richardson & Dale, 2005; Richardson, Dale & Kirkham, 2007) and even how we respond to potentially offensive remarks (Crosby, Monin & Richardson, 2008). The current results extend that close relationship to decision making, and demonstrate that simply measuring a graded, incremental motor output allows one to exercise influence over cognitive processing.

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