'Looking at nothing' is neither automatic nor an inevitable consequence of human cognitive architecture

Ramesh K. Mishra\textsuperscript{a}, Niharika Singh\textsuperscript{a}, & Falk Huettig\textsuperscript{b,c}

\textsuperscript{a}Centre of Behavioral and Cognitive Sciences, University of Allahabad, India
\textsuperscript{b}Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands
\textsuperscript{c}Donders Institute for Brain, Cognition, and Behaviour, Nijmegen, The Netherlands

Contact: rkmishra@cbcs.ac.in

In studies using the blank screen paradigm (Altmann, 2004; Spivey & Geng, 2001) a visual display containing some objects is shown first for a few seconds, then a spoken sentence follows while a blank screen is shown. Such studies have shown that, as the spoken sentences unfold, people tend to re-fixate the regions on the blank screen that were previously occupied by relevant objects suggesting that language-mediated eye movements are not contingent upon a visual item being co-present during that expression. Altmann (2004, cf. Richardson & Spivey, 2000) has proposed that "the spatial pointers are a component of the episodic trace associated with each item - activating that trace necessarily activates the (experiential) component encoding the location of that item, and it is this component that automatically drives the eyes towards that location" (p. B86). Similarly, Ferreira, Apel, and Henderson (2008) claimed that "whether the looks are intentional or are unconsciously triggered, the conclusion is the same: looking at nothing is an entirely expected consequence of human cognitive architecture" (p.409). In the present study we tested these strong claims. We studied Indian low literates (2 mean years of formal schooling) and high literates (15 mean years of formal schooling) on the same 'look and listen' task as used by Altmann (2004). If 'looking at nothing' is automatic and reflects human cognitive architecture in non-trivial ways then it should be present in all proficient speakers/listeners regardless of their level of formal schooling. Even low literates integrate language with objects in their visual surroundings every day, and this experience should result in similar language-vision mapping as for high literates.

In Experiment 1, high and low literates were presented with a visual display of four objects (a semantic competitor, e.g., 'kachuwa', turtle, and three distractors) for five seconds. Then the visual display was replaced with a blank screen and participants listened to simple spoken sentences containing a target word (e.g., 'magar', crocodile, a semantic competitor of 'kachuwa', turtle). High (but not low) literates looked at the empty region previously occupied by the semantic competitor as the spoken target word was heard. Interestingly, the blank screen effect was also absent for low literates in the filler trials. Filler trials consisted of line drawings of the referent of the spoken critical word (e.g., a plate if the spoken target word was 'plate'). In Experiment 2, the same participants were presented with the identical materials except that the visual display (containing the semantic competitor and the distractors) was present as participants heard the spoken sentences. With such a set-up both low literates and high literates did shift their eye gaze towards the semantic competitors (and the targets in the filler trials) immediately as the target word was heard (cf. Huettig & Altmann, 2005; Yee & Sedivy, 2006).

These data strongly suggest that the 'looking at nothing' phenomenon is modulated by formal literacy. Accounts which assume that this language-mediated eye
movement behavior is automatic or a (non-trivial) consequence of human cognitive architecture must be revised.