

Language and gaze cues: findings from the real world and the lab

Ross Macdonald, Maria Staudte, and Benjamin Tatler

1 Introduction

People follow the gaze cues of others. Lab-based studies have shown that we reflexively follow gaze cue stimuli [1, 2], however it is unclear whether this occurs in the real world, as lab-based paradigms often lack key features of natural gaze cueing, such as the social and communicative context. We explored how social context and language affect gaze cues using real world tasks and complemented these tasks with more controlled lab-based studies.

2 Our Contribution

2.1 Exploratory real world tasks. In Study 1 (Figure 1a) two participants worked together to make a cake, while wearing portable eye-trackers [3]. Half of the pairs were given roles (“Chef” or “Gatherer”) and the other half were not. We found that our social manipulations within and between these pairs affected the way participants aligned their gaze with each other and how they sought out the gaze cues of their partners. Study 2 (Figure 1b) used a real world search-task to explore how gaze cue utilisation varied depending on the form of concurrent language used [4]. An instructor varied his referring expressions (featural or spatial) and the presence of gaze cues (absent, congruent, or incongruent). Participants used the inherently spatial gaze cues strategically; cues were sought out and followed more when they were more informative relative to the accompanying verbal referring expressions. Combined, the results of these studies show that far from reflexively following gaze cues, people strategically used gaze cues in real world interactions depending on their beliefs about the gazer and the language accompanying the gaze cues. Moving away from traditional lab-based gaze cueing paradigms and using real-world eye-tracking methods was crucial to identifying these effects.

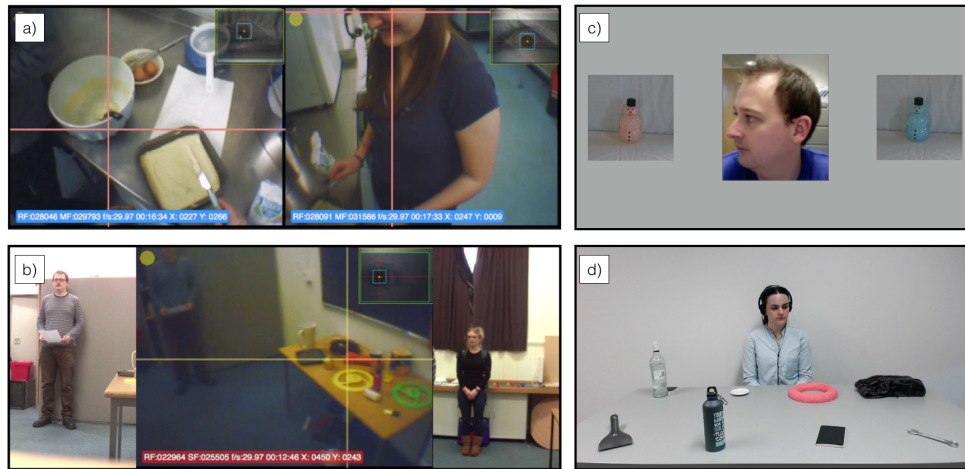


Figure 1. The left panels show stills from real world eye-tracking studies: a) a natural collaboration and b) a search task. The right panels show monitor-stills from lab-based eye-tracking studies, investigating c) the effects of language and gaze cue reliability and d) gazer intention.

2.2 Controlled lab-based tasks. Due to the complexity of real world tasks, many of our manipulations were necessarily course-grained. We have therefore used lab-based tasks to more thoroughly explore factors we found to be relevant in the real world. The effect of the informativeness of gaze found in Study 2 was investigated in Study 3 (Figure 1c). Gaze and language cues were reduced to equivalent artificial stimuli and the reliability of each was manipulated in a fine-grained manner [5]. Language was preferred when cues were equally informative. Reflexive gaze cueing effects were found, however these effects were modulated by gaze cue reliability. Study 4 (Figure 1d) further explored the effect of the beliefs about a gazer (Study 1) by manipulating the intention of the gazer in a controlled setting. Preliminary results show no evidence of perceived intention affecting gaze following, but some evidence that participants looked more at a gazer's face when the gazer and participant's intentions were aligned compared to when they were distinct.

3 Discussion

Our real world studies have provided insights into gaze following that could not be achieved with typical gaze cueing paradigms and these insights were used to inform the design of more controlled lab-based studies. Combining real world and lab-based paradigms is essential to fully understand the use of gaze cues in natural interactions.

References

1. Friesen, C. K., & Kingstone, A. (1998). The eyes have it! Reflexive orienting is triggered by nonpredictive gaze. *Psychonomic Bulletin and Review*, 5, 490–495.
2. Ricciardelli, P., Bricolo, E., Aglioti, S. M., & Chelazzi, L. (2002). My eyes want to look where your eyes are looking: Exploring the tendency to imitate another individual's gaze. *Neuroreport: For Rapid Communication of Neuroscience Research*, 13, 2259–2264.
3. Macdonald, R. G., & Tatler, B. W. (2013). *Proceedings of the 35th Annual Conference of the Cognitive Science Society* (pp. 942-947). Austin, TX: Cognitive Science Society.
4. Macdonald, R. G., & Tatler, B. W. (2015). *Journal of Experimental Psychology: Human Perception and Performance*, 41 (2), 565-575.
5. Macdonald, R. G., & Tatler, B. W. (2014). *Proceedings of the 36th Annual Conference of the Cognitive Science* (pp. 910-915). Austin, TX: Cognitive Science Society.