

Assessing the automaticity of intramodal and crossmodal spatial attentional orienting

Charles Spence • Valerio Santangelo •

Cristy Ho • Marta Olivetti Belardinelli

In this talk, we review recent research that has attempted to assess just how automatic the intramodal and crossmodal reflexive orienting of spatial attention really is. A number of studies will be described in which we have investigated how manipulating the perceptual / working memory load of a central attention-demanding auditory or visual task influences the exogenous cuing effects elicited by the peripheral presentation of spatially-nonpredictive, auditory, visual, tactile, and bimodal audiovisual cues (Santangelo et al. 2006; Santangelo and Spence, submitted). The results of these experiments clearly show that intramodal and crossmodal spatial cuing effects are typically eliminated under conditions where a central attention-demanding stream is presented in either the auditory or visual modality. Our results therefore suggest that reflexive unimodal visual, auditory, and tactile orienting are not truly automatic. The only exception to this result appears to be that the exogenous attentional orienting elicited by the presentation of bimodal audiovisual cues (while no more effective in-and-of-themselves than unimodal cues) appear resistant to concurrent task demands: That is, the

peripheral presentation of a bimodal cue appears capable of capturing a person's spatial attention regardless of what else they happen to be doing at the same time. Overall, our results add further weight to the view that auditory, visual, and tactile reflexive spatial orienting are all controlled by a common underlying neural substrate. Finally, we will also provide a number of examples of how the study of attentional cuing effects under concurrent task demands may be of particular applied relevance, as when considering how best to capture the attention of a car driver (or other interface operator; see Ho et al. 2005, 2006; Ho and Spence 2005).

References

- Ho C, Spence C (2005) Assessing the effectiveness of various auditory cues in capturing a driver's visual attention. *J Exp Psychol Appl* 11:157–174
- Ho C, Tan HZ, Spence C (2005) Using spatial vibrotactile cues to direct visual attention in driving scenes. *Transp Res 8(Pt F)*:397–412
- Ho C, Reed NJ, Spence C (2006) Assessing the effectiveness of “intuitive” vibrotactile warning signals in preventing fronto-rear-end collisions in a driving simulator. *Accid Anal Prev* 38:988–996
- Santangelo V, Spence C (submitted) Bottom-up and top-down visual modulation of reflexive tactile orienting. *Psychon Bull Rev*
- Santangelo V, Olivetti Belardinelli M, Spence C (2006) The suppression of reflexive visual and auditory orienting when voluntary attention is engaged. *J Exp Psychol Hum Percept Perform* (in press)

C. Spence (✉) • V. Santangelo • C. Ho

Department of Experimental Psychology, University of Oxford, UK
e-mail: Charles.Spence@psy.ox.ac.uk

V. Santangelo

e-mail: valerio.santangelo@uniroma1.it

C. Ho

e-mail: cristy.ho@psy.ox.ac.uk

V. Santangelo • M. Olivetti Belardinelli

Department of Psychology,
University of Rome “La Sapienza”, Rome, Italy

M. Olivetti Belardinelli

ECONA, Interuniversity Center for Research on Cognitive
Processing in Natural and Artificial Systems, Rome, Italy

