Key Note

# Chapter 14: Attention and awareness

## Key note 14E: Application: Can neurologically healthy individuals engage blindsight systems?

Findings of above-chance response levels to stimuli in blind fields of patients with damage to the visual cortex across a broad range of visual tasks firmly indicate that, at least in some cases, visual information can be processed by neural pathways that bypass V1. But they also raise the question of whether blindsight-like capacity is present in neurologically healthy individuals – this is an important matter if the resultant knowledge could promote the recovery of visuomotor and cognitive functions in cortically blind patients. A common approach to investigating blindsight mechanisms in healthy subjects with normal vision is to use TMS to generate a reversible ‘lesion’ in V1. One such study showed that participants undergoing TMS responded to a change in target location for arm reaching presented in the ‘blind’ field even though awareness of their shift was absent (Christensen et al., 2008), raising the possibility that some aspects of our actions are processed via blindsight systems in the absence of awareness. However, in contrast to patient studies, evidence for type-1 TMS-induced blindsight in tasks that rely on processing stimuli orientation or motion is lacking; rather, V1 appears to be necessary for both unconscious and conscious perception of orientation or motion of stimuli (Fox et al., 2020; Railo and Hurme, 2021). Furthermore, inactivation of the SC or pulvinar does not entirely disrupt visually guided saccade performance in healthy individuals, suggesting that pathways implicated in blindsight are far less prominent than the geniculo-striate pathway in the neurologically intact visual system (Isa and Yoshida, 2021). It is therefore likely that neural plasticity plays a role in shaping blindsight, whereby missing input from V1 as a result of visual cortical lesions induces changes to (white matter) pathways or ‘network level’ reorganisation. The finding that blindsight is not observed in all patients with V1 damage supports such a position.

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Isa T, Yoshida M (2021) Neural mechanism of blindsight in a macaque model. *Neuroscience* 469: 138–161.

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