hemi-neglect following right parietal cortex injury

graded lack of responsiveness to stimuli presented to L side of body or to L side of visual field (contrast with sharp cutoff with, for example, occipital cortex injury)

lack of responsiveness is multimodal - pertains to tactile, visual, and auditory stimuli as well as to motor movements (e.g., the position of a hand movement’s goal)

lack of responsiveness to stimuli on L side is exacerbated by competition with simultaneous stimuli on R side (competition applies across sensory modalities)

postural dependence - improved responsiveness to L side stimuli when head or eyes are directed to R of body or if stimulation of proprioceptive neurons mimic such postural changes
Some potential explanations for features of hemi-neglect

Graded lack of responsiveness to stimuli presented to L side of body or to L side of visual field (contrast with sharp cutoff with, for example, occipital cortex injury).

Why the neglect only of L side with R parietal lesions and not vice versa? – why graded?

In monkeys, for whom right parietal lesions do not produce hemi-neglect, L and R parietal neuron populations respond mainly to R- and L-visual field stimuli (respectively), but a small population in each hemisphere responds to stimuli in the ipsilateral visual field.

In humans, it is possible (and some EEG studies agree) that R parietal cortex is sensitive to L and R visual fields, but L parietal cortex is sensitive only to the R visual field.
some potential explanations for features of hemi-neglect

lack of responsiveness is **multimodal** - pertains to tactile, visual, and auditory stimuli as well as to motor movements (e.g., the position of a hand movement’s goal)

parietal cortex sub-regions are most often sensitive to more than one sensory modality (e.g., VIP sensitive to tactile, visual, vestibular stimuli, LIP sensitive to visual and auditory stimuli, PPR sensitive to visual and auditory stimuli as they relate to hand movements)
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parietal responses to visual stimuli are strongly dependent on salience as shown in this figure from Gottlieb et al. (Nature, 1998) where the response to a visual stimulus within the cell’s receptive field (gray areas) depends on whether that stimulus matches one given during the cue period

thus, the presence of a right field visual stimulus in a hemi-neglect patient may attain salience (be attended to) over another visual stimulus within the L visual field

in this case, the responses of those few L parietal neurons sensitive to L visual field stimuli may be non-existent

note that this also means that what doesn’t register in the form of neural activity in the parietal cortex does not register perceptually
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answers lie in defining parietal cortex receptive fields, spatial frames of reference, and...gain fields?