Why is the left hand better (than the right hand) at self-recognition?

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On losing an arm:

When an examiner brought the patient’s left arm into her good visual field, asking whose it was, she answered:

“It isn’t mine. I found it in the bathroom, when I fell. It’s not mine because it is too heavy. It must be yours.”

(Rode et al., 1992, p. 204).
Self-recognition and the…

…right hemisphere

Anaesthetising right frontal lobe impairs self-recognition

Right ventral prefrontal cortex activated in self-recognition tasks
Self-recognition and the…

…left hand

Quicker/earlier responses for ‘self’ than ‘other images when left hand is used

n = 10, mean (± s.e.m)  Keenan et al., 1999, 2000
Self-recognition literature

- Keenan et al. 1999. Left hand advantage in a self-face recognition task
- Keenan et al. 2000a. Self-recognition and the right prefrontal cortex
- Keenan et al. 2001. Self-recognition and the right hemisphere
- Turk et al. 2002. Mike or me? Self-recognition in a split-brain patient
- Brady et al. 2004. My left brain and me: A dissociation in the perception of self and others
- Molnar et al. 2005. Right-hemisphere motor facilitation by self-descriptive words
- Uddin et al. 2005a. Split-brain reveals separate but equal self-recognition in the two hemispheres
- Uddin et al. 2005b. Self-face recognition activates a frontoparietal network in the right hemisphere
- Uddin et al. 2006. rTMS to the right inferior parietal lobule disrupts self-other discrimination

So, right hemisphere & left hand ≈ self, left hemisphere & right hand ≈ other?
But…

Many right-lateralised brain activations:
attentional & inhibitory cognitive control, spatial working memory & other tasks
E.g., ‘guessing’ (compared to reporting) activates R prefrontal, R orbitofrontal, R anterior cingulate, bilateral inferior parietal, and R thalamus
(Elliott et al., 1999; Azzopardi & Cowey, 2002)

What is role of decision- & response processes in self-recognition studies?

What do explicit self-recognition tasks measure?

1) ‘Self’ vs. ‘Other’  2) ‘Self’ vs. ‘Not Self’  3) ‘Familiar’ vs. ‘Not Familiar’
Hand self-recognition

17, 33, 67, 133, 267, 533, or 1000ms

200ms

1500-2000ms

my or someone else’s hand?
## Stimuli

<table>
<thead>
<tr>
<th>POSTURE:</th>
<th>IDENTITY:</th>
<th>SELF</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm down</td>
<td>Left</td>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
</tr>
<tr>
<td>Palm up</td>
<td>Right</td>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
</tr>
<tr>
<td>Palm down</td>
<td>Left</td>
<td><img src="image5" alt="Image" /></td>
<td><img src="image6" alt="Image" /></td>
</tr>
<tr>
<td>Palm up</td>
<td>Right</td>
<td><img src="image7" alt="Image" /></td>
<td><img src="image8" alt="Image" /></td>
</tr>
</tbody>
</table>
How long to recognise hands?

Is it a left or a right hand?

Is it mine or another’s hand?

Errors (%) vs Hand image duration (ms)

n = 14 mean (± s.e.m.)
Hand response effects?

Half of participants

L = ‘self’
    left hand response

R = ‘other’
    right hand response

Half of participants

L = ‘other’
    left hand response

R = ‘self’
    right hand response
Left hand is better than right at self-recognition

Left hand responds ‘self’
Right hand responds ‘other’

Left hand responds ‘other’
Right hand responds ‘self’

Stimulus identity
- Self
- Other

Proportion errors

n = 10 mean (± s.e.m.)
But…

Self-left participants press the self button more often…
And…

Participants respond ‘other’ when not sure…
So, when uncertain…

Participants tend to press the ‘left’ or ‘other’ buttons

![Graph showing proportion of 'self' responses vs. stimulus duration (ms)]

n = 10 mean (± s.e.m.)
And finally…

‘Guessing’ is better than chance…

…so self-left participants tend to ‘guess’ more correctly than the self-right!

n = 10 mean (± s.e.m.)
Self-recognition summary

1. Default response mode:
   Press the ‘other’ button when unsure

2. Left response preference:
   Press the left button when unsure

3. ‘Guess’ better than chance:
   Subjects using simple strategy do worse
Remaining questions

Can criterion shifts and good guessing account well for hand (& brain) lateralizations?
   (Make a model & test it…)

What is the role of right prefrontal cortex?
   (Run a fMRI experiment…)

Do hand-response effects occur in other tasks?
   Ask the crossmodal lab…
fin