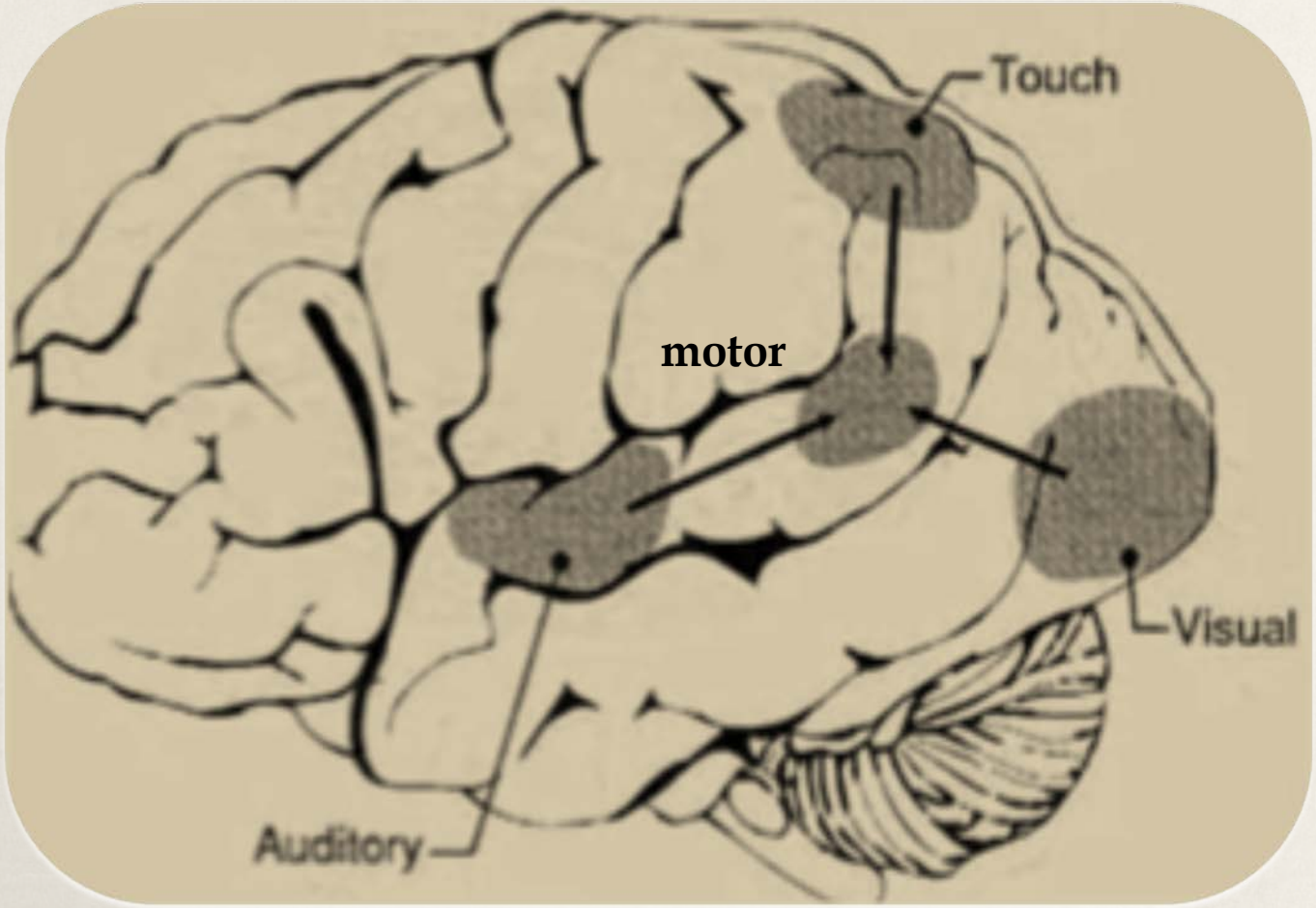
The Incongruent Self

Mary ET Boyle, Ph.D.
Department of Cognitive Science
UCSD

Part 2



somatosensory

visual

auditory

motor

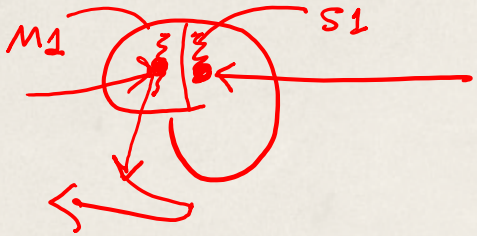
Integration in Right-Parietal Lobe

Right Parietal Lobe Damage

Loss of awareness of his/her own body and limbs and their positioning in space

Denial of deficit

Disruption of experience



Supernumerary

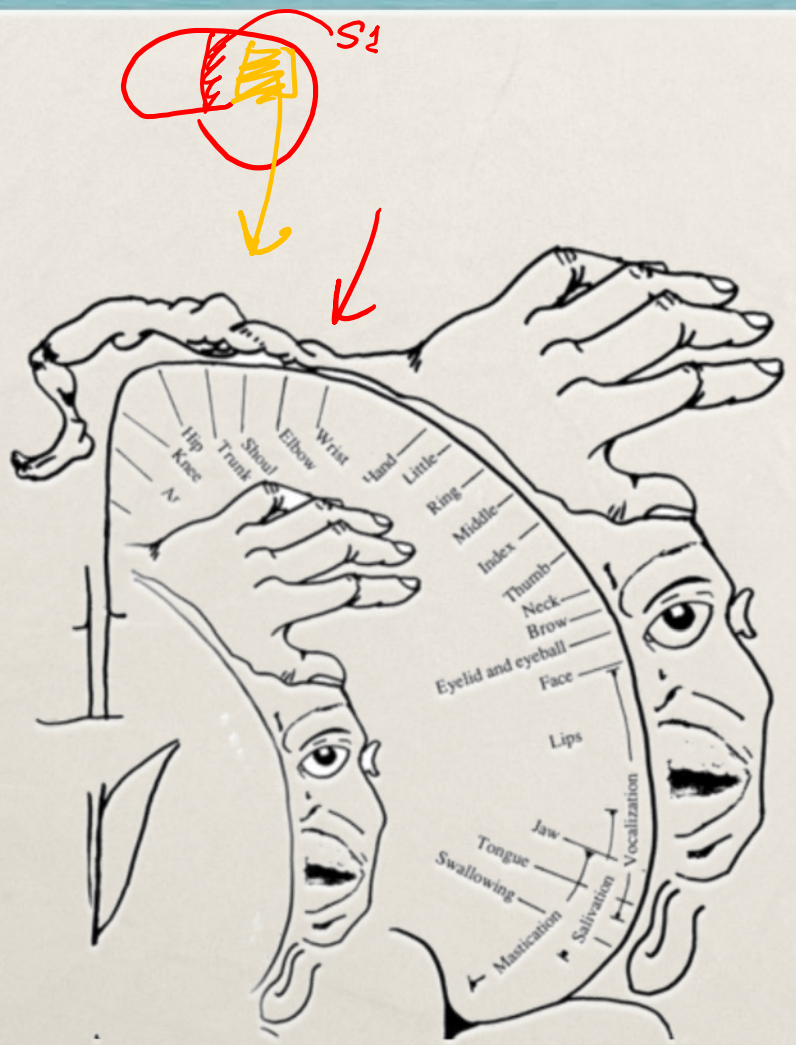
- Phantom limb

Disownership

- Somatoparaphrenia
- BIID

Positive and Negative Effects

Bilateral Representation?



the hypothesis that the *right parietal lobe contains* a representation of **both the left AND right** body

Somatoparaphrenia

Refusal to believe that their limb belongs to them

Dis-ownership of body on contralateral side of lesion

The Man who Fell out of Bed

'Look at it!' he cried, with revulsion on his face. 'Have you ever seen such a creepy, horrible thing? I thought a cadaver was just dead. But this is uncanny! And somehow - it's ghastly - it seems stuck to me!'

He seized it with both hands, with extraordinary violence, and tried to tear it off his body, and, failing, punched it in an access of rage.

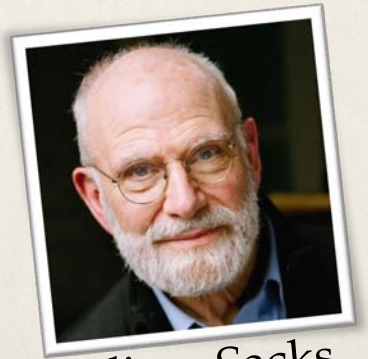
'Easy!' I said. 'Be calm! Take it easy! I wouldn't punch that leg like that.'

'And why not?' he asked, irritably, belligerently.

'Because it's your leg,' I answered. 'Don't you know your own leg?'

He gazed at me with a look compounded of stupefaction, incredulity, terror and amusement, not unmixed with a jocular sort of suspicion, 'Ah Doc!' he said. 'You're fooling me! You're in cahoots with that nurse - you shouldn't kid patients like this!'

'I'm not kidding,' I said. 'That's your own leg.' He saw from my face that I was perfectly serious - and a look of utter terror came over him. 'You say it's my leg, Doc? Wouldn't you say that a man should know his own leg?'



Oliver Sacks

Somatoparaphrenia: a body delusion. A review of the neuropsychological literature

Giuseppe Vallar · Roberta Ronchi

Received: 30 May 2008 / Accepted: 27 August 2008 / Published online: 24 September 2008

Abstract A review of published brain-damaged patients showing delusional beliefs concerning the contralesional side of the body (somatoparaphrenia) is presented. Somatoparaphrenia has been reported, with a few exceptions, in right-brain-damaged patients, with motor and somatosensory deficits, and the syndrome of unilateral spatial neglect. Somatoparaphrenia, most often characterized by a delusion of disownership of left-sided body parts, may however occur without associated anosognosia for motor deficits, and personal neglect. Also somatosensory deficits may not be a core pathological mechanism of somatoparaphrenia, and visual field disorders may be absent. Deficits of proprioception, however, may play a relevant role. Somatoparaphrenia is often brought about by extensive right-sided lesions, but patients with posterior (parietal-temporal), and insular damage are on record, as well as a few patients with subcortical lesions. Possible pathological factors include a

Between the end of May and the beginning of June 1669, "generosus dominus" Johannes Jakobus Schenck de Stauffenberg, who was going to leave for the fortress of Horn, suddenly fell down, hit by left hemiplegia and aphonia. Once revived, he spoke again, and his only complaint was that he referred that he had lost his left arm, and, when a servant came close to him, he grabbed firmly his (i.e., the servant's) arm, and stated that it was his own arm, and, in order to prevent that it were taken away from him, he held it tight. (Case 169 Hemiplegia; Wepfer 1727)

Introduction

In 1942, the neurologist Josef Gerstmann (see a biographical note in Triarhou 2008) reported the cases of two right-

Hemispatial Neglect

Left side of sensory space becomes non-existent

Allocentric

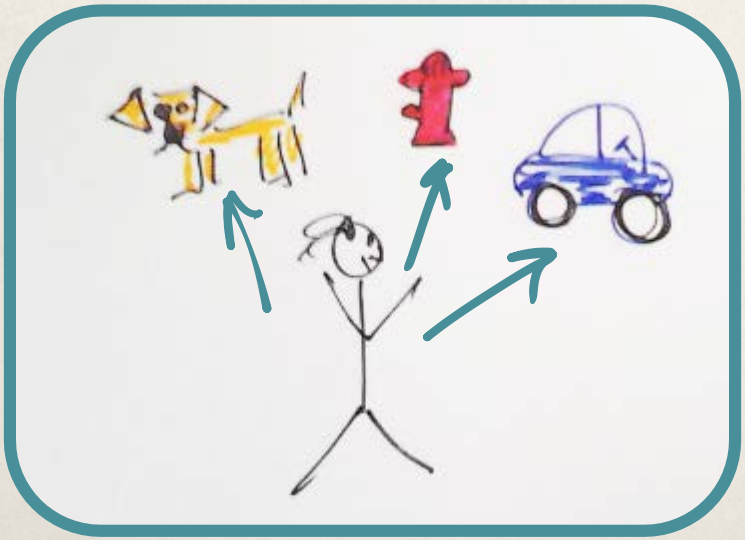
Egocentric

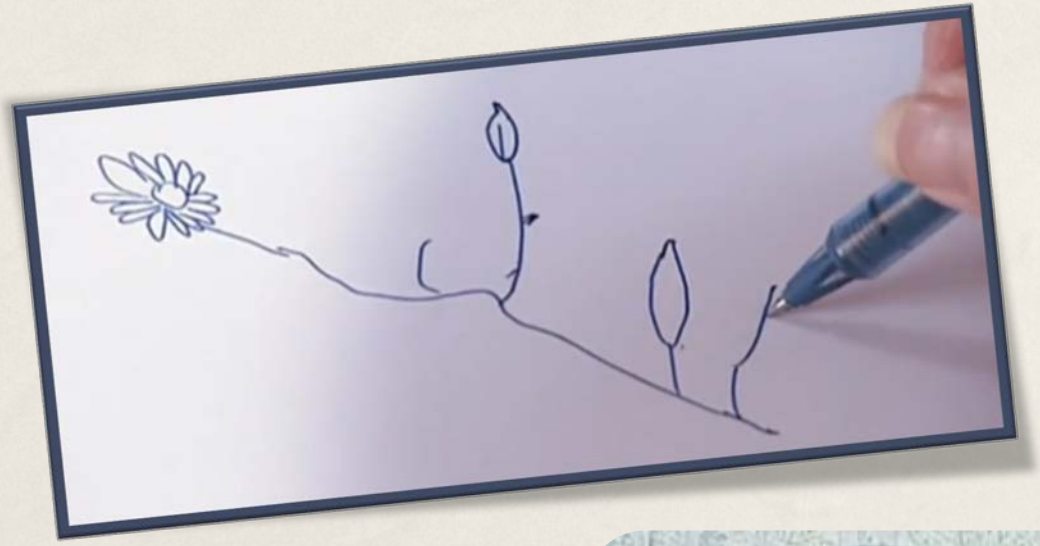
allocentric

object-to-object

egocentric

self-to-object





Anosognosia

E: How is your left arm?
P: Very well.
E: In what sense?
P: Ninety-five per cent.
E: Does it move?
P: It moves depending on the teacher.

E: Could you clap your hands?
P [raises her right arm]: Where has it gone? I must go and look for it [presumably referring to her left hand]. It must come back by itself.
E: Where is the left hand?
P: I do not know. I think that it has gone for a walk.
E: Has it gone by itself, detached from your body?
P: Yes.
E: At this very moment is your left hand away from you?
P: Yes.
E: Try and look towards the left.
[P looks to her left and sees her left hand.]
E: Is your left hand away?
P: Now it has come back.
E: Does it move now?
P: It is too far away to give an answer.

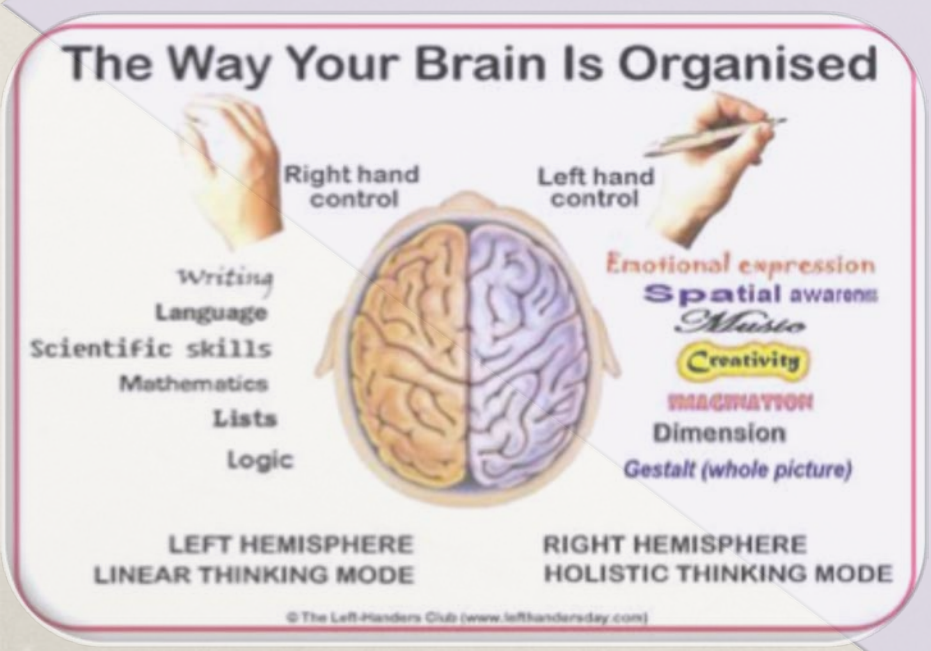
Unawareness of deficit

denial of deficit

confabulation

Confabulation

information at damage site not transferred via corpus callosum



left brain is clueless to the defect

Joseph Jules François Félix Babinski

French Neurologist

Coined the term in 1914

Greek: "nosos" disease and "gnosis" knowledge

Apotemnophila or BIID

(Body Integrity Identity Disorder)

overwhelming desire to amputate one or more healthy limbs

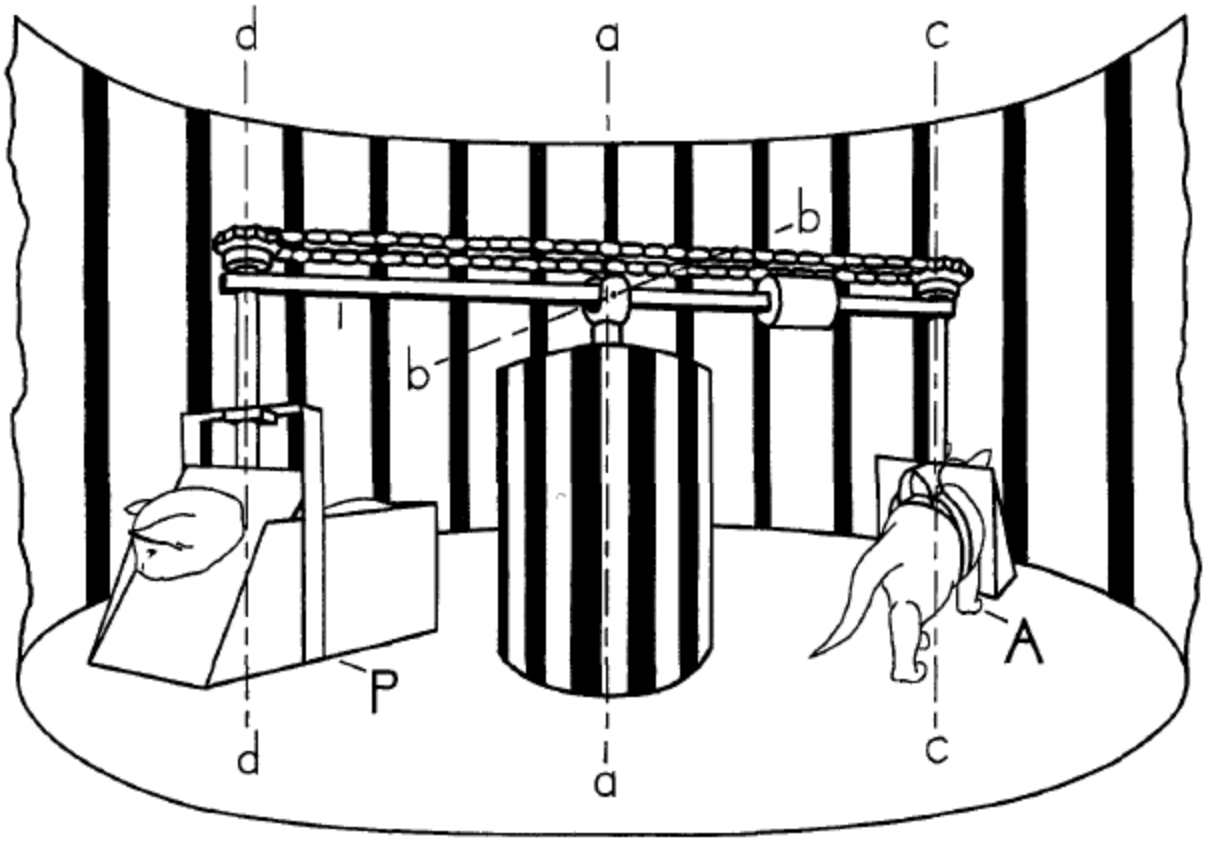
majority of cases it is the left limb

"Your body is not just a vehicle for your brain to cruise around in. The relationship is perfectly reciprocal: Your body and your brain exist for each other. … Meaning is rooted in agency (the ability to act and choose), and agency depends on embodiment."

Sandra Blakeslee and Matthew Blakeslee – The Body Has a Mind of It's Own

Journal of Comparative and Physiological Psychology
1963, Vol. 56, No. 5, 872–876

MOVEMENT-PRODUCED STIMULATION IN THE DEVELOPMENT OF VISUALLY GUIDED BEHAVIOR[1]



Journal of Comparative and Physiological Psychology 1963,
Vol. 56, No. 5, 872-876

human brain holds and continuously updates an internal map of the body

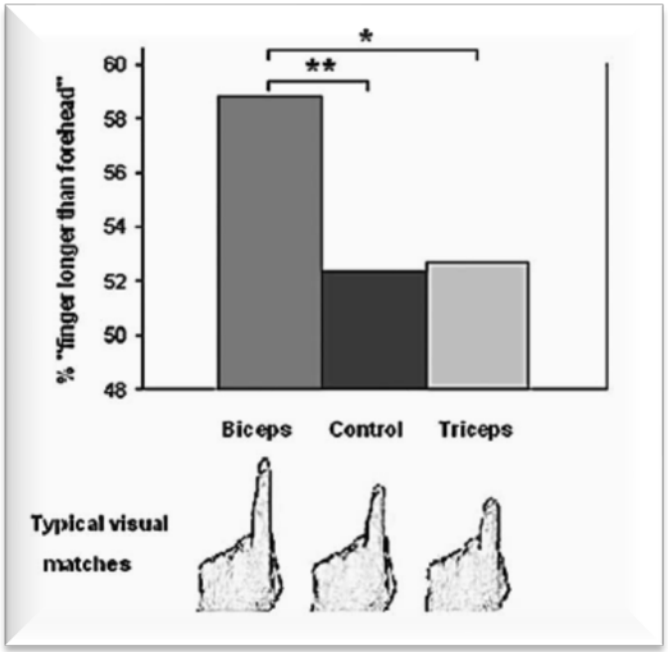
Current Biology, Vol. 15, 1286–1290, July 26, 2005, ©2005 Elsevier Ltd All rights reserved. DOI 10.1016/j.cub.2005.06.067

Bodily Illusions Modulate Tactile Perception

Frédérique de Vignemont,[1,3,*] Henrik H. Ehrsson,[2] and Patrick Haggard[1]
[1]Institute of Cognitive Neuroscience and Department of Psychology
[2]Wellcome Department of Cognitive Neurology and Functional Imaging Laboratory
University College London
17 Queen Square
London WC1N3 AR
United Kingdom

Using tendon vibration distort volunteers' brains rapidly adjusted the processing of touch information to match information from proprioception –the position to the limbs relative to the body.

Blindfolded subjects held their left index finger with their right arm.



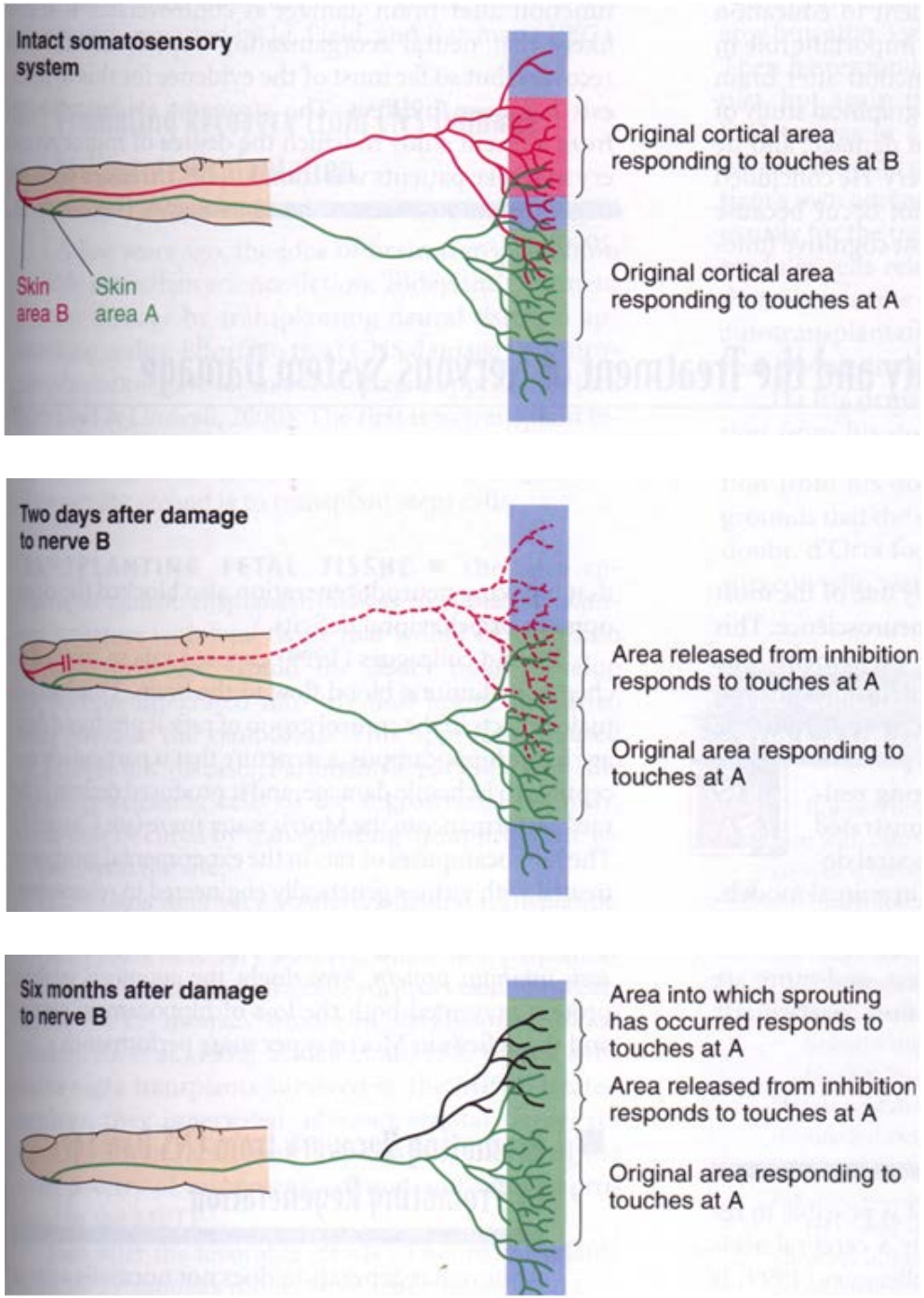
Vibration was applied to the right arm on the biceps tendon.

…. a subjective elongation of the left index finger.

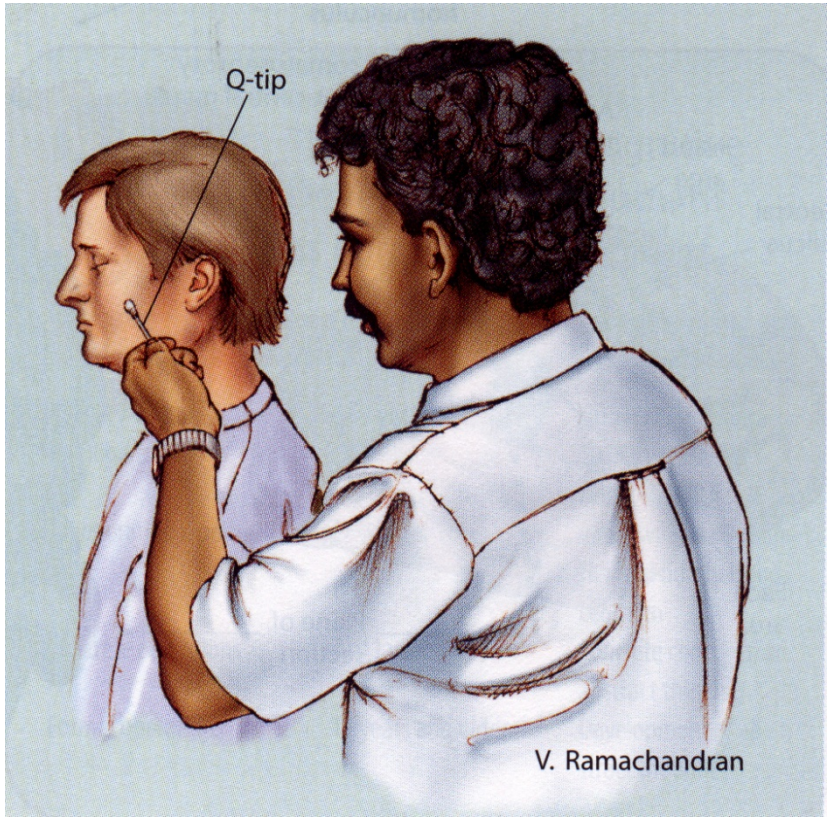
The triceps vibration induced a subjective flexion of the right arm and, consequently, a subjective shrinking of the left index.

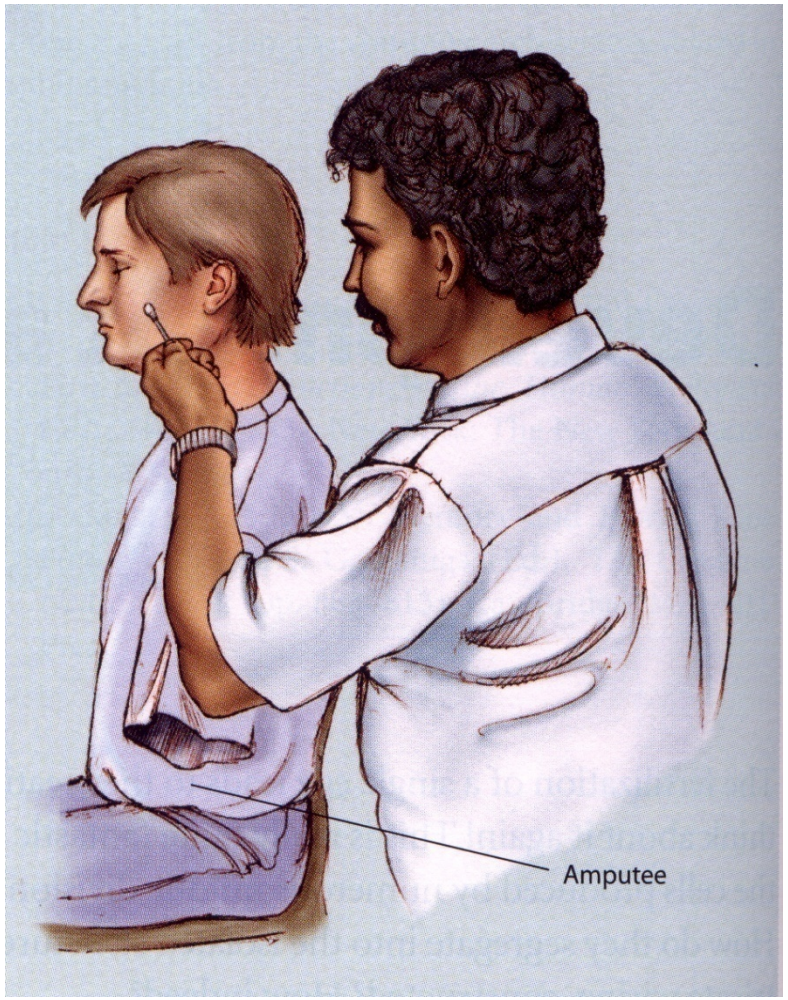

STANLEY

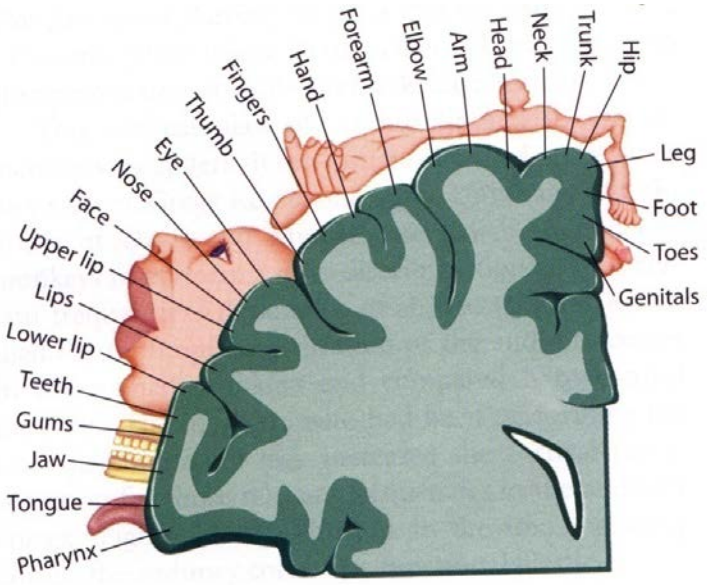

TWO

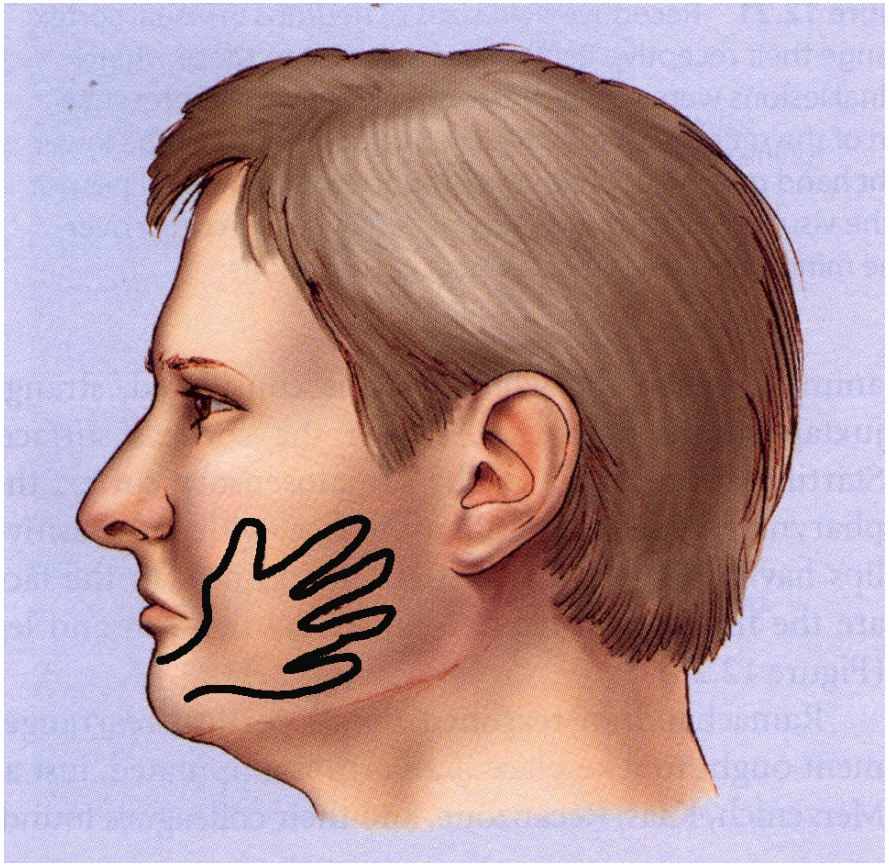

Intact somatosensory system
Skin area B
Skin area A
Original cortical area responding to touches at B
Original cortical area responding to touches at A
Two days after damage to nerve B
Area released from inhibition responds to touches at A
Original area responding to touches at A
Six months after damage to nerve B
Area into which sprouting has occurred responds to touches at A
Area released from inhibition responds to touches at A
Original area responding to touches at A

The case of Tom and Philip...

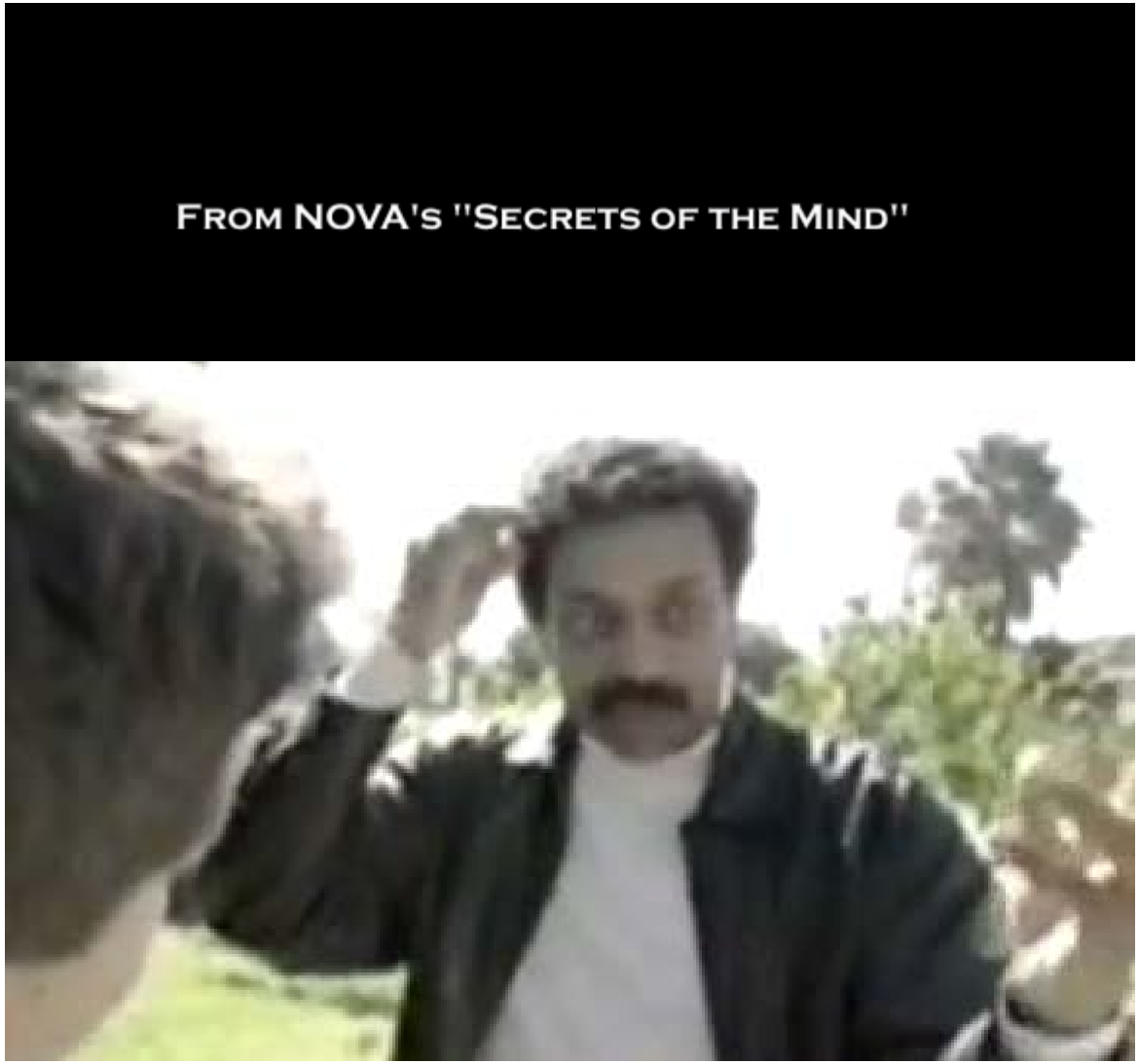




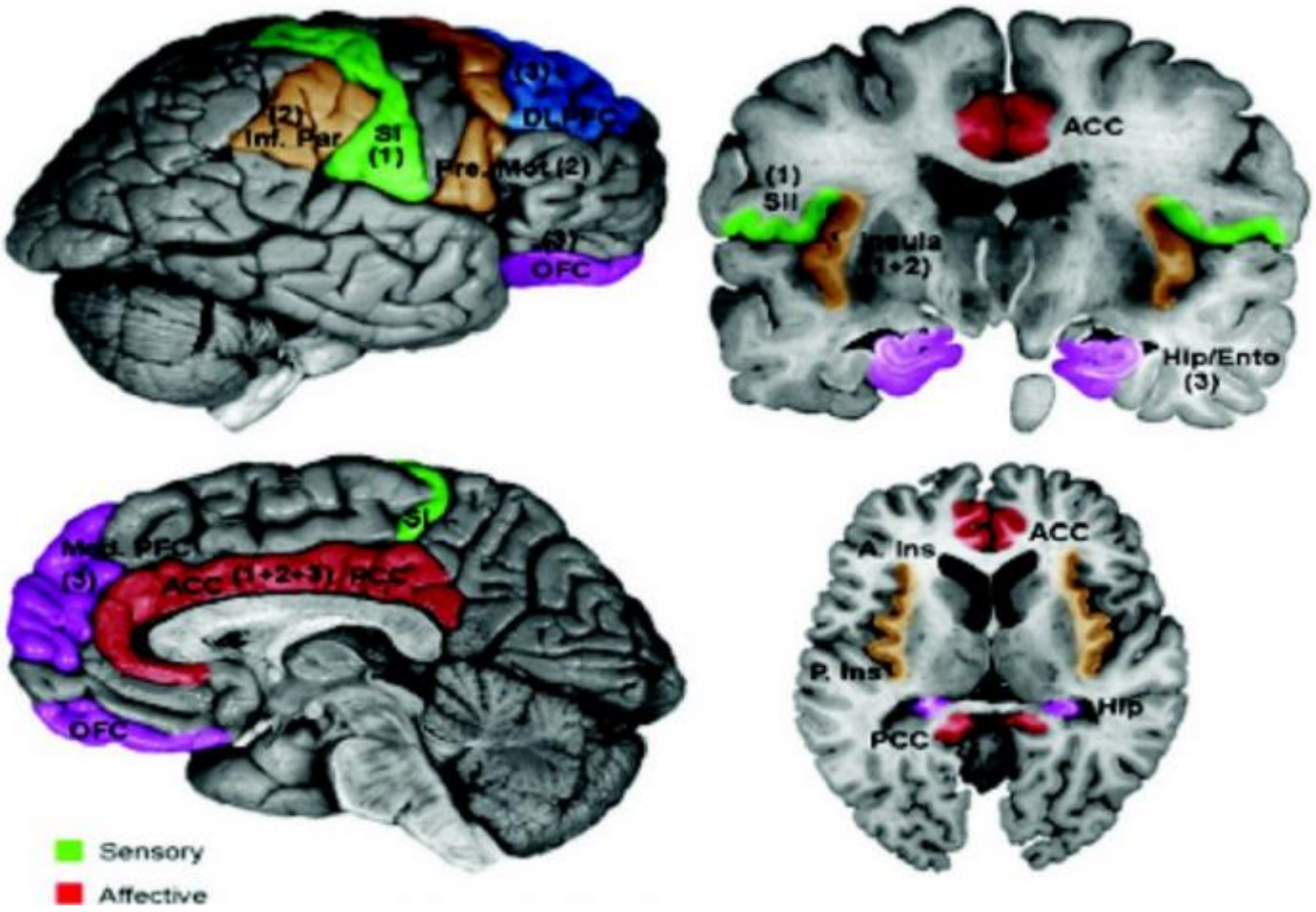

Forearm
Elbow
Arm
Head
Neck
Trunk
Hip
Hand
Fingers
Thumb
Eye
Nose
Face
Upper lip
Lips
Lower lip
Teeth
Gums
Jaw
Tongue
Pharynx
Leg
Foot
Toes
Genitals



Phantom Limb – From “
https://www.youtube.com/watch?v=1mHIv5ToMTM

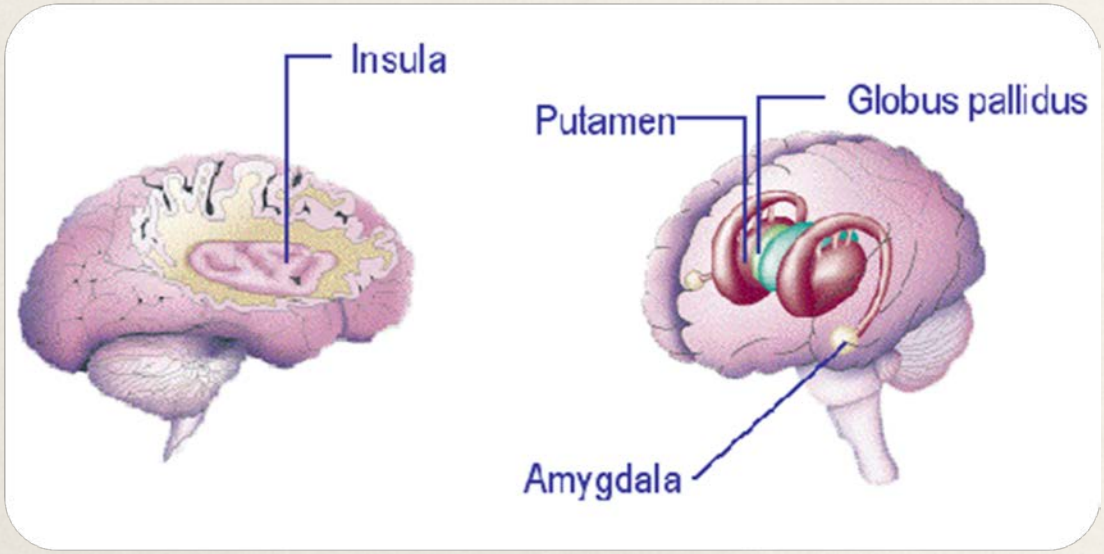


There is a secondary somatosensory cortex (*region S2)* (Brodmann Areas 40 and 43)

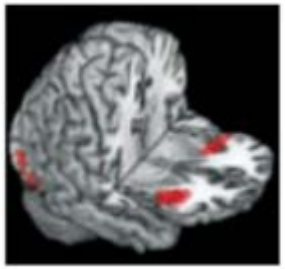


Area is responsive to light touch, pain, visceral sensation and tactile attention. Very large receptive areas.

Insula and Amygdala



Both are involved in the mediation of emotion and emotional states



Profile of the Anterior Insula

The anterior insula is implicated in reactions of disgust and has been shown to support general bodily awareness. The region senses our visceral states, which form the basis of gut feelings that inform decision making. Previous research has also shown that neural activation in the anterior insula is important for assessing risks, responding to breaches in trust, representing expected financial risks and predicting the safety of choice outcomes, according to the *PNAS* paper. —*M.W.M.*