Brain Sensory Maps

Homunculus

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Brain Initiative
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The Human Connectome Project

Finding how 100 billion neurons make 100 trillion connections.

http://www.whitehouse.gov/share/brain-initiative
Wilder Penfield

Neurosurgeon

Brain stimulation
Brain Mapping

Motor Areas

Sensory Areas

- Primary somatosensory area
- Primary visual area
- Primary auditory area
Brain Mapping
Brain Mapping

Motor Areas

Sensory Areas

Primary somatosensory area

Primary visual area

Primary auditory area
What is being mapped here?

Surface area?

SENSORY RECEPTOR DENSITY
Two-point discrimination tool

Also - 0.75 cm and 0.38 cm on a separate card.
Two-point discrimination test

- Head
- Torso
- Arm
- Hand
- Leg
- Foot
Your Personal Homunculus
Constructing your Homunculus

The two-point discrimination threshold for each body part is reciprocally related to the size of each corresponding homunculus region.

Calculation

\[
\text{Body part size (cm)} = 10 \times \left( \frac{1}{\text{two-point discrimination threshold (cm)}} \right)
\]

Figure 6. Reciprocal relation between the two-point discrimination threshold and the size of the body region representation on the homunculus
Constructing your Homunculus

Body parts with more sensory receptors, such as the fingers, map to larger areas of the brain, and should be represented by a larger picture in your personal homunculus.

Body part pictures of various sizes, taped together:
26 cm, 13 cm, 6.7 cm, 1.7 cm
Do it Yourself!

• Download the workshop handout, which contains major lecture points and a detailed description of the homunculus activity.

• Download the homunculus body part cutouts and replicate the activity in your classroom.

Visit BrainFacts.org to download supplementary workshop materials.
Your Personal Homunculus

http://www.maxplanckflorida.org/fitzpatricklab/homunculus/