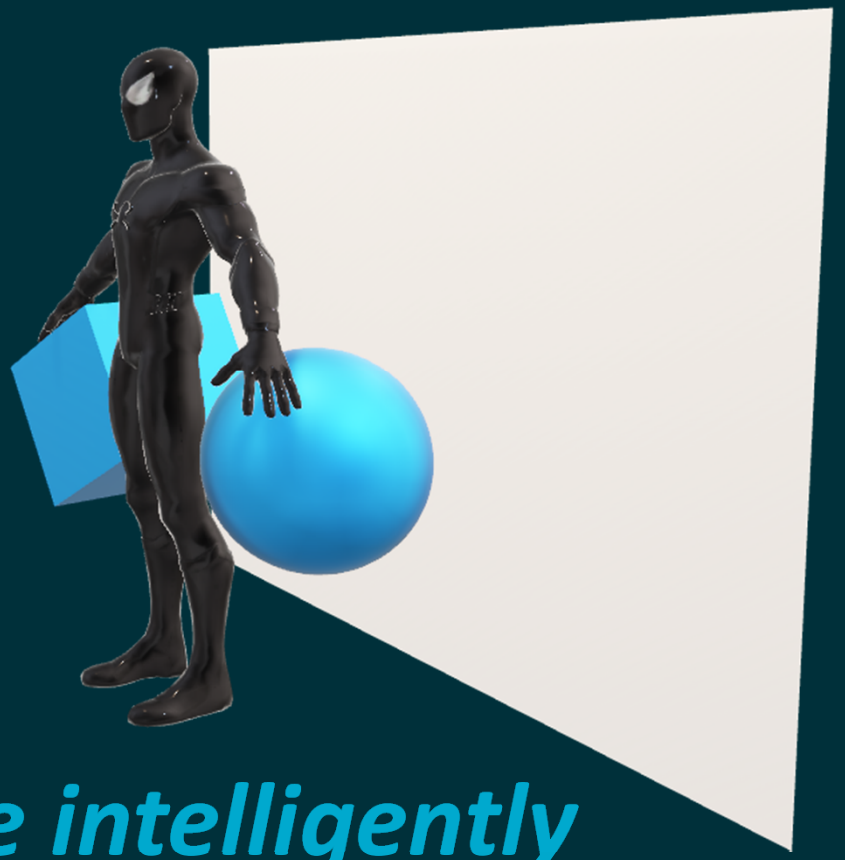
The Eleventh International Conference on Advanced Cognitive Technologies and Applications, COGNITIVE 2019
May 05, 2019 - Venice, Italy



Dr. Charlotte Sennersten
CSIRO Mineral Resources, Australia

Tutorial:

Why and how do we intelligently combine IoT and non IoT?

Outline of Tutorial

1. Background
2. Matrix Cognitive Senses, IoT, Non IoT and Brodmann Brain Areas.

3. 10 minutes -plot out your own matrix to what you currently work with or would like to work with or just from a general interest point of view, see matrix slide 5.

4. Define in own words what IoT is –make an elegant definition (10 minutes).
5. Define in own words what non IoT is –make an elegant definition (10 minutes).
6. Define in own words what intelligence is –make an elegant definition (10 minutes).
7. Define in own words what artificial intelligence is –make an elegant definition (10 minutes).
8. Define what IoT actions and why (10 minutes)

9. Present your overall matrix/context and/or group's/your own 4 definitions (10 minutes per person/group).

Background

Charlotte Sennersten, Cognitive and Computer Science background, working at Commonwealth Scientific and Industrial Research Organisation (CSIRO); Business Unit; Mineral Resources; Hard Rock Mining Group. Working on a Tech Platform called VoxelNET supporting people, robots and material.

The Commonwealth Scientific and Industrial Research Organisation is an independent Australian federal government agency, Australia's National Science Agency, responsible for scientific research. Its chief role is to improve the economic and social performance of industry for the benefit of the community. Approx. 5000 employees.

Wi-Fi is one important innovation from CSIRO which is in common use everywhere today (1992/1996).

Question(s):
How do we make computers understand IoT (people/animals/robots/material/chemistry) individually and together regarding domain knowledge?

What is really 'deep' learning –deep domain knowledge?
Deep learning is part of a broader family of machine learning methods based on the layers used in artificial neural networks.

How do we treat concepts like 'rational' versus 'irrational'?

A little quick snapshot of "Artificial neural networks (**ANN**) or **connectionist systems** are computing systems vaguely inspired by the biological neural networks that constitute animal brains. The neural network itself is not an algorithm, but rather a framework for many different machine learning algorithms to work together and process complex data inputs. Such systems "learn" to perform tasks by considering examples, generally without being programmed with any task-specific rules. For example, in image recognition, they might learn to identify images that contain cats by analyzing example images that have been manually labeled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any prior knowledge about cats, for example, that they have fur, tails, whiskers and cat-like faces. Instead, they automatically generate identifying characteristics from the learning material that they process.

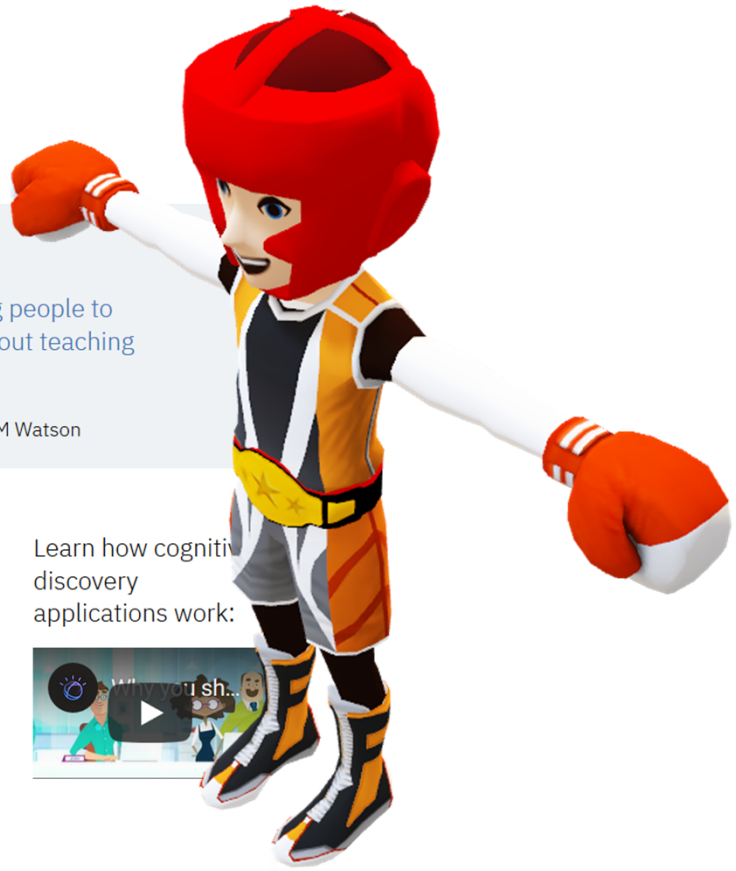
An ANN is based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal from one artificial neuron to another. An artificial neuron that receives a signal can process it and then signal additional artificial neurons connected to it. "

https://en.wikipedia.org/wiki/Artificial_neural_network

News collection. Discovery News includes primarily English-language news sources that are updated continuously, with over 300,000 new articles and blogs added daily from more than 100,000 sources.

> We've spent the last 50 years or so teaching people to operate computers. Cognitive computing is about teaching computers to understand people.

Rob High, Vice President and Chief Technology Officer, IBM Watson



The Watson Discovery service provides search capabilities through queries. The search engine finds matching documents from the processed data. Then, the engine applies a formula that provides relevance scoring to return the best answer to the query. When an application uses the Watson Discovery service, the people who use that application can gain insight from textual data. These examples are typical:

- Customer service applications that support a workflow to find and deliver the answers to complex customer questions
- Social media and news channel applications that provide real-time

Learn how cognitive discovery applications work:

https://www.ibm.com/cloud/garage/architectures/cognitiveDiscoveryDomain

Today we live our everyday lives in a noisy and beauty of digital and non digital things. If we look at our next generation, the so called Z generation with its digital and savvy use of technology we have to understand how we make use of our combined knowledge and needs for the future. How do we combine a combinatorial space of cognitive abilities with technical and shared needs –how do we design for comprehension of IoT, people and individuality in a more universal space/system?

This workshop will gather 'thinkers' who wants to draw up some lines or a matrix for how we can combine cognitive abilities with certain IoT actions and present this for the rest of the group.

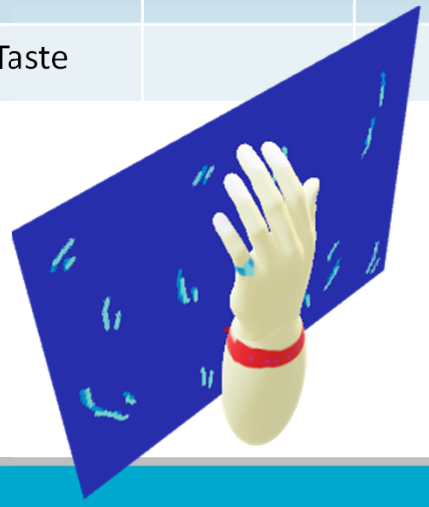
Let's see what we can do together in a few hours so bring computer, pen and paper so we can get 'smart' together ☺! You can of course already start off on beforehand and quickly present your own matrix in how you think we could combine all or parts in a best way.

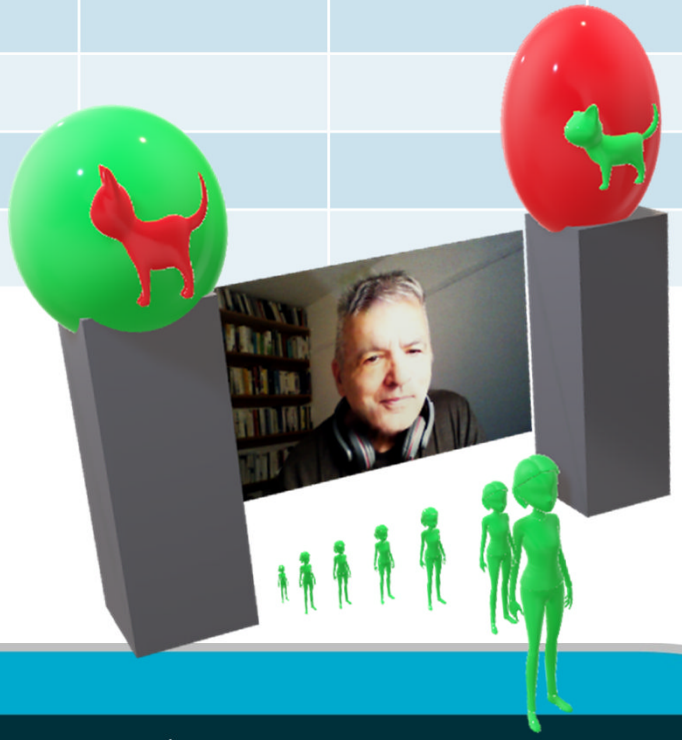
Environmental & Physiological Sensors

Our 5 Basic Senses combined with IoT, Non IoT and Brodmann Areas –which ones, what do we think of and choose?

We can do it as an exercise all together or if we are many maybe in groups? What do you prefer? Do we prioritize any of the senses due time limitation?

	IoT domain	IoT Actions	Software Tools	Non IoT Domain	Non IoT Actions	Software Tools	Brodmann Area(s)
Senses							
Vision							
Hearing							
Haptic							
Smell							
Taste							



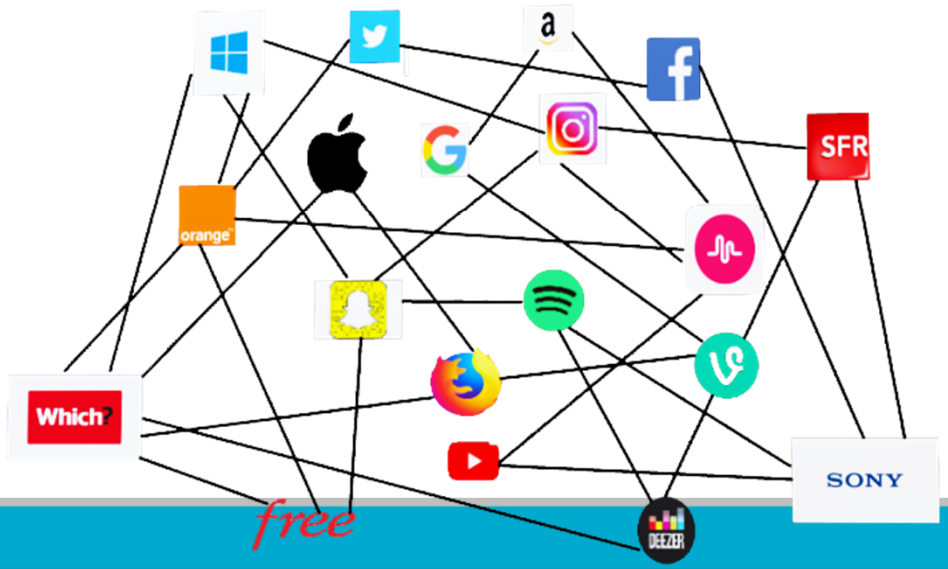


10 minutes

What do we ‘mean’ when saying Internet of Things (IoT)?

Do we mean

Things? Do we use the search term ‘Things’?
Objects? Do we use the search term ‘Objects’?
Items?
What do we classify as IoT? And what do we not include? and why?
Is it a matter of ‘Time’?...

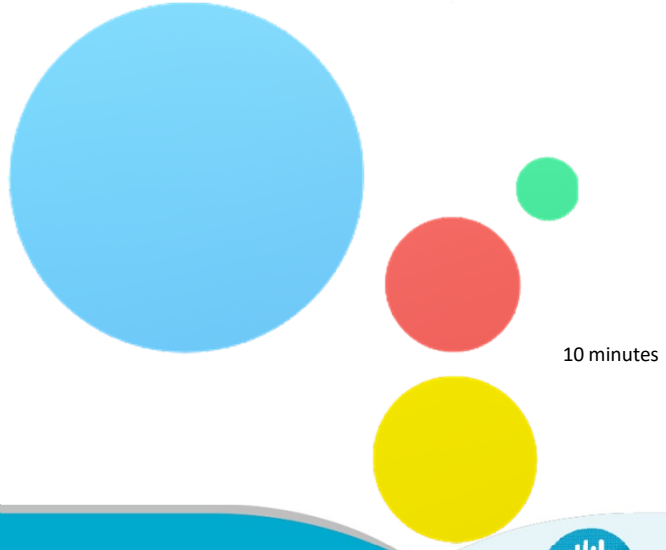


10 minutes

What do we ‘mean’ when saying Intelligent/Intelligence?

Do we mean

Intelligent? Do we use the search term ‘Intelligent’?
Smart? Do we use the search term ‘Smarts’?
Do we mean certain brain areas are involved?
Do we mean reasoning?
Intelligent Algorithm?
What do we classify as Intelligence? And what do we not include? And why? Is it a matter of time?...



10 minutes

What do we ‘mean’ when saying Artificial Intelligence?

Do we mean

Artificial Intelligence? Do we mean the search term ‘Computer Intelligent’?
Smart? Do we use the search term ‘Smarts’?
Do we mean certain computer areas are involved?
Do we mean how the computer reason about data?
Intelligent Algorithm or is it just an artificial construct being intelligent?
What do we classify as Intelligence? And what do we not include? And why? Is it a matter of ‘real time’?...

10 minutes

Definition(s) of AI

In computer science, artificial intelligence, sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and animals. Wikipedia

John McCarthy is one of the "founding fathers" of artificial intelligence, together with Marvin Minsky, Allen Newell, and Herbert A. Simon.

Techopedia explains Artificial Intelligence (AI)
Artificial intelligence is a branch of computer science that aims to create intelligent machines. It has become an essential part of the technology industry.
Research associated with artificial intelligence is highly technical and specialized. The core problems of artificial intelligence include programming computers for certain traits such as:

- Knowledge
- Reasoning
- Problem solving
- Perception
- Learning
- Planning
- Ability to manipulate and move objects

Another Question:
Who is creating the intelligence for the intelligent machines?

10 minutes

Define what IoT <u>actions</u> and why (10 minutes)

Leoanardo

Brodmann areas

Originally defined and numbered into 52 regions by the German anatomist Korbinian Brodmann in the early 1900's, the **Brodmann areas** of the cerebral cortex are defined by its cytoarchitecture (histological structure and cellular organization).
It is important to remember that the same Brodmann area numbers in humans and primates often do not translate to other species. In addition, these Brodmann areas have been widely redefined, discussed, debated, and refined exhaustively based on cytoarchitecture, cortical functions, and brain plasticity.

https://www.kenhub.com/en/library/anatomy/brodmann-areas

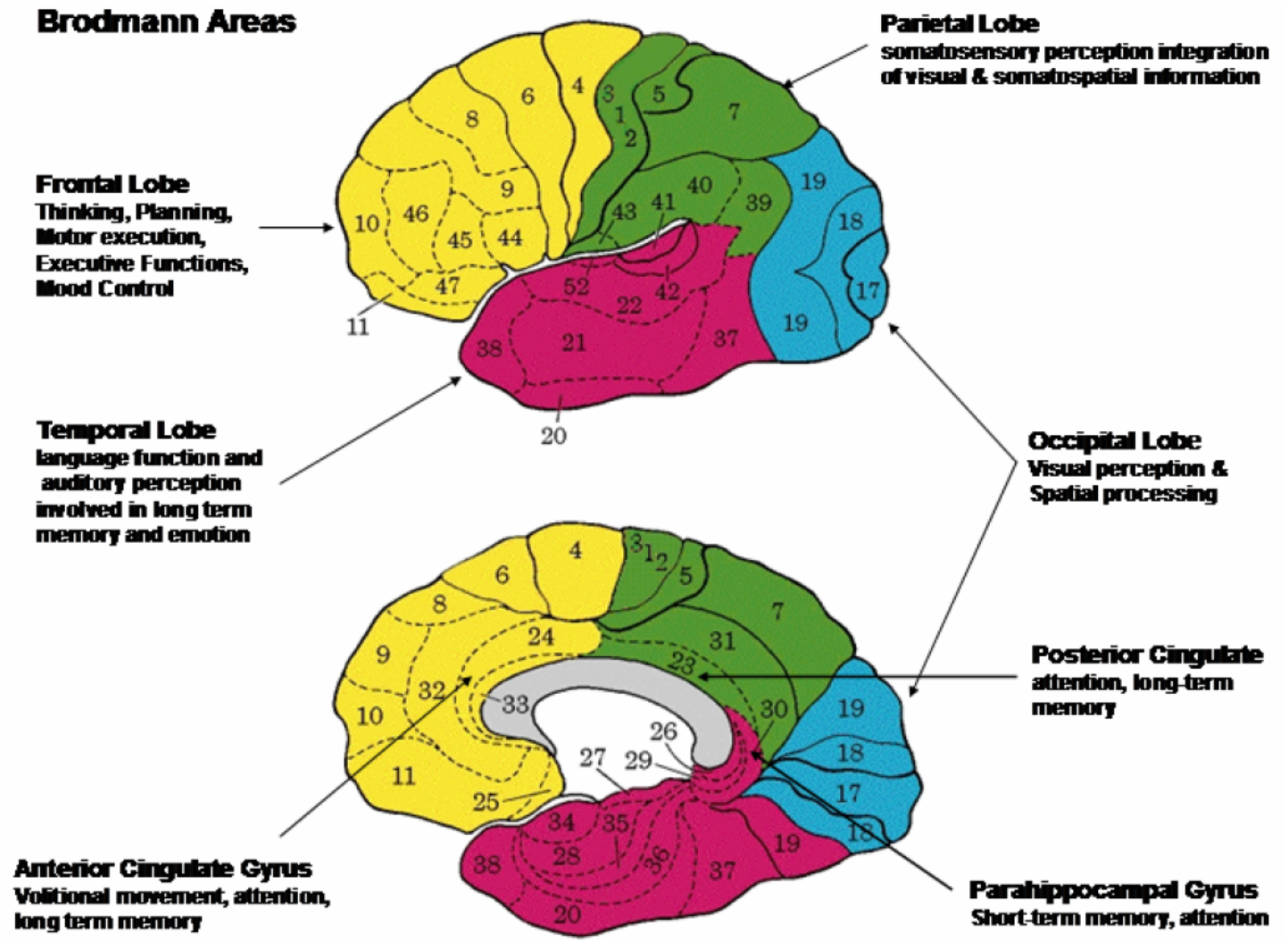
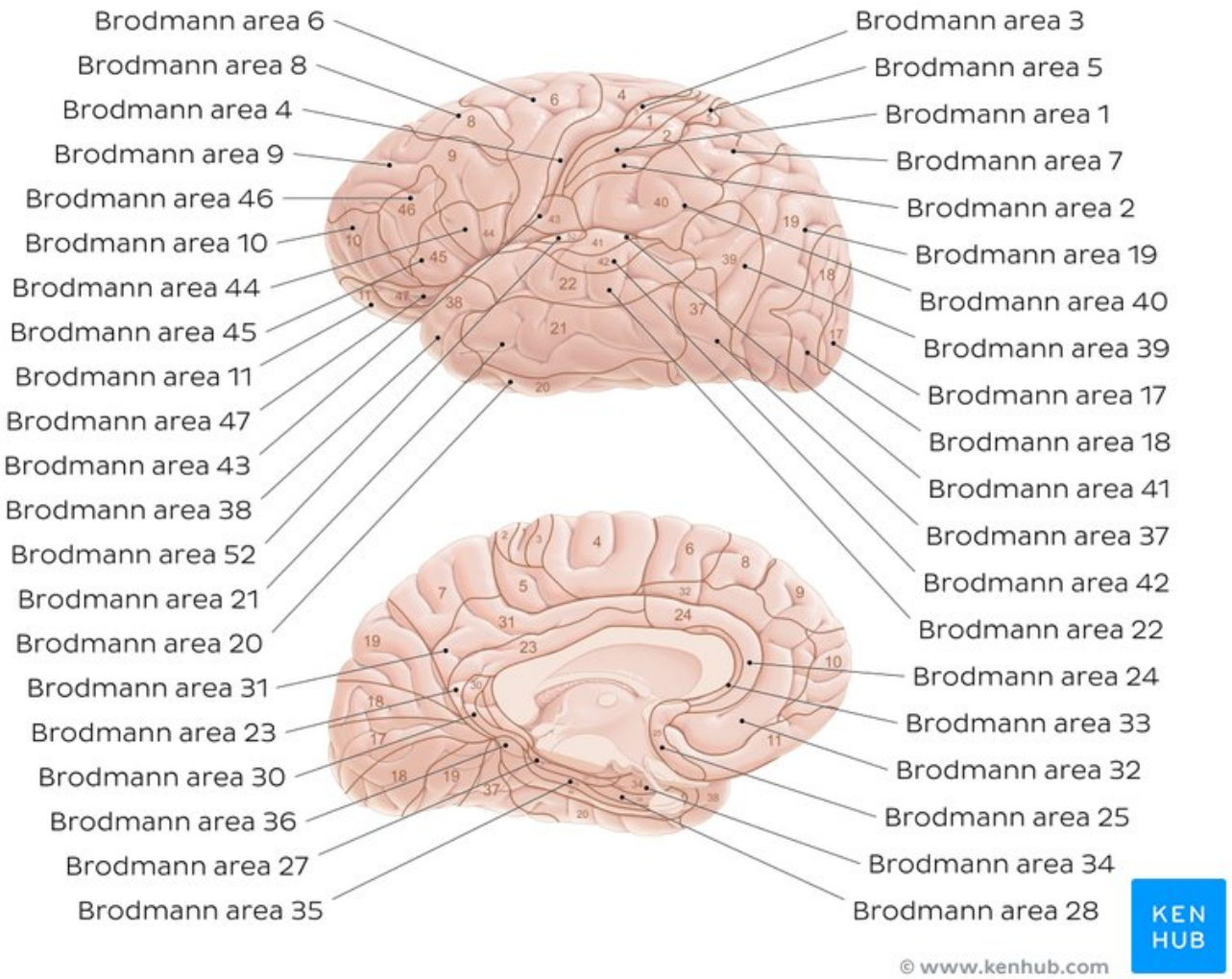
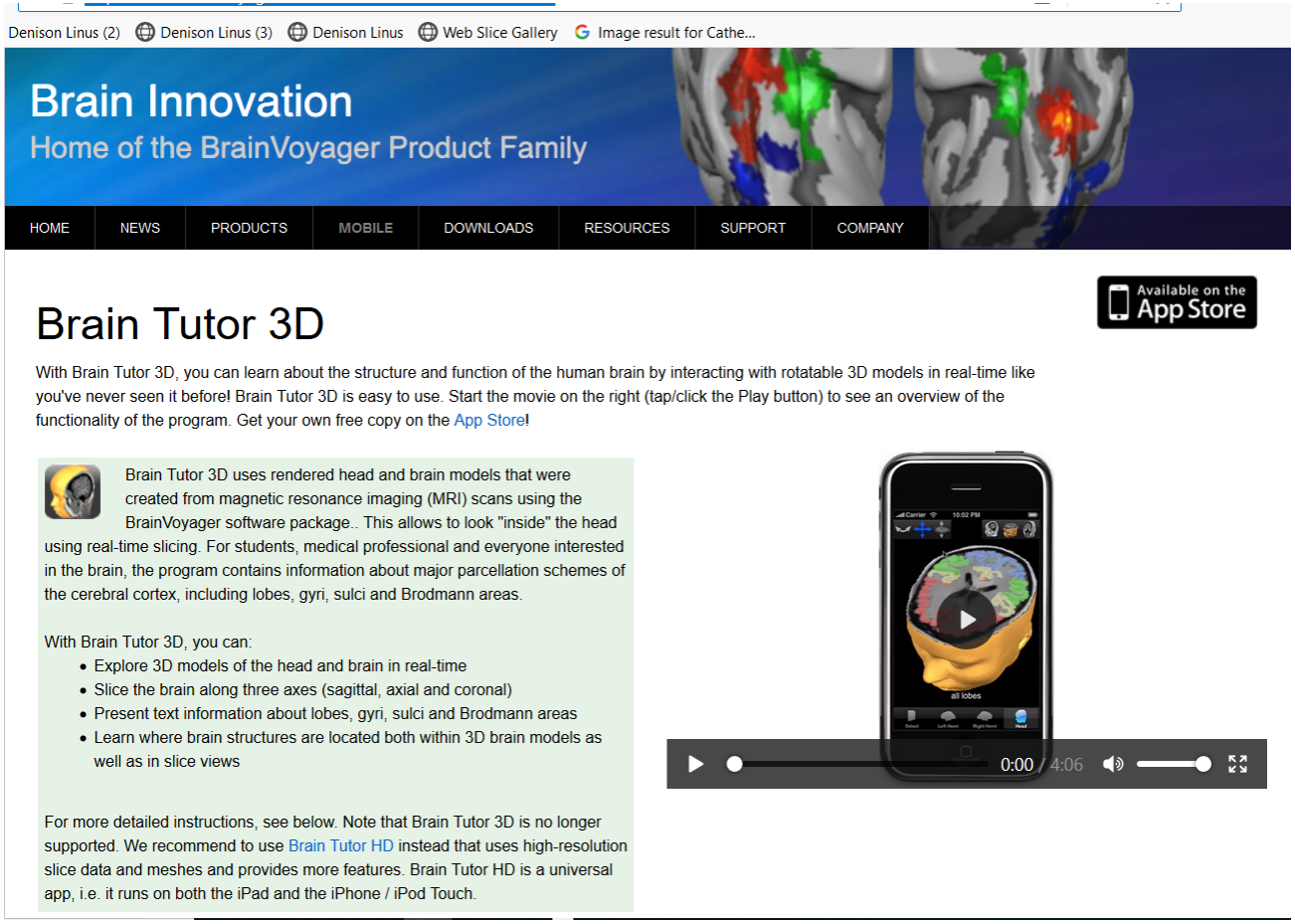


Fig. 1- General structure-function linkages to Brodmann areas (Brodmann, 1909).


Brodmann area 6
Brodmann area 8
Brodmann area 4
Brodmann area 9
Brodmann area 46
Brodmann area 10
Brodmann area 44
Brodmann area 45
Brodmann area 11
Brodmann area 47
Brodmann area 43
Brodmann area 38
Brodmann area 52
Brodmann area 21
Brodmann area 20
Brodmann area 31
Brodmann area 23
Brodmann area 30
Brodmann area 36
Brodmann area 27
Brodmann area 35
Brodmann area 3
Brodmann area 5
Brodmann area 1
Brodmann area 7
Brodmann area 2
Brodmann area 19
Brodmann area 40
Brodmann area 39
Brodmann area 17
Brodmann area 18
Brodmann area 41
Brodmann area 37
Brodmann area 42
Brodmann area 22
Brodmann area 24
Brodmann area 33
Brodmann area 32
Brodmann area 25
Brodmann area 34
Brodmann area 28
KEN HUB
© www.kenhub.com

Free App –Brain Tutor 3D

https://www.brainvoyager.com/Mobile/BrainTutor3D_iOS.html



https://www.kenhub.com/en/library/anatomy/brodmann-areas

Brodmann Areas	
1, 2, 3	Primary somatosensory cortex (postcentral gyrus)
4	Primary motor cortex (precentral gyrus)
5, 7	Somatosensory association cortex
6	Premotor and supplementary motor cortex
8	Includes Frontal eye fields
9	Dorsolateral/anterior prefrontal cortex (motor planning, and organization)
10	Anterior prefrontal cortex (memory retrieval)
11	Orbitofrontal area
12	Orbitofrontal area
13	Insular cortex
14	Insular cortex
15	Anterior Temporal Lobe
16	Insular cortex

https://www.kenhub.com/en/library/anatomy/brodmann-areas

Brodmann Areas	
17	Primary visual cortex (V1)
18	Secondary visual cortex (V2)
19	Associative visual cortex (V3,V4,V5)
20	Inferior temporal gyrus
21	Middle temporal gyrus
22	Superior temporal gyrus, Primary auditory cortex
23	Ventral posterior cingulate cortex
24	Ventral anterior cingulate cortex
25	Subgenual area (part of the Ventromedial prefrontal cortex)[4]
26	Ectosplenial portion of the retrosplenial region of the cerebral cortex
27	Piriform cortex
28	Ventral entorhinal cortex
29	Retrosplenial cingulate cortex

Brodmann Areas	https://www.kenhub.com/en/library/anatomy/brodmann-areas
30	Part of cingulate cortex
31	Dorsal Posterior cingulate cortex
32	Dorsal anterior cingulate cortex
33	Part of anterior cingulate cortex
34	Dorsal entorhinal cortex (on the Parahippocampal gyrus)
35	Perirhinal cortex (in the rhinal sulcus)
36	Ectorhinal area, now part of the perirhinal cortex (in the rhinal sulcus)
37	Fusiform gyrus, Occipitotemporal (fusiform) gyrus
38	Temporopolar area (most rostral part of the superior and middle temporal gyri)
22, 39, 40	Wernicke's area (language comprehension)
41	Auditory cortex
42	Auditory cortex
43	Primary gustatory cortex
44	Pars opercularis, Broca's area (motor speech programming)
45	Pars triangularis, Broca's area (motor speech programming)

https://www.kenhub.com/en/library/anatomy/brodmann-areas

Brodmann Areas	
46	Dorsolateral prefrontal cortex
47	Pars orbitalis, part of the inferior frontal gyrus
48	Retrosubicular area (a small part of the medial surface of the temporal lobe)
49	Parasubicular area in a rodent
52	Parainsular area (at the junction of the temporal lobe and the insula)