The neural processes of language

Or: why we have a free mind.

By „K.C.“

Summary of Presentation

I will focus my talk on the neural basis of language,

As basis of human individuality, creativity and free thought

so I will present **(partly metaphorical, i.e. explicit-ly-literate☺examples)** about the neuroscientific background of what I consider a „free will"

-intro-

i.   WHY?

ii. WHAT?

iii. HOW?

Intro.HUs „me" equals „KC"?

- Today@t(here), I am a LITERATE who WILL*ed*2be a neuroscientist. And my research is focused on **causality.**

mY.dream`s?

1find a treatment for Schizophrenia,

2Prove causality and free will,

3get political(&that:means:2GET-"IT"=getting.rid of: $(=signFOR"property"!cause, "property"=SUX!in.aVIRTUAL.u*n(it(E!)wor(l)d,(me*an.I'd "SAY"!)),

4turn Europe into Utopia☺

And, well, how well it is going so far…

EUROPE!

It… is..me, your daughter, and…

I HEREBY DO ADMIT that
I CRIED OUT TO YOUR GREAT SUMMIT halls today, all
doors were closed, it was late in the evening, police were guarding the subway exits, that's how I GOT IT

In the first place (of "T") that today, U celebrate, inaugurate yourself, oh well, I tell you. **Europe**…

Please believe in me! BE-CAUSE…

…**I** had 2 learn 2 day, there are **NO! DEMONS!**

and there *is* !NO !NATURE!, *know-where*, IN-SIGHT! **MOTHER**!
IT's JUST-this:

> **Just you and me**. 4-NOW.
> JUST: "U.S." or **NO/THING**, *cause*, my **ONE**…

U-R-E: **O.P**. now, and t- only "INFORMATION-UNIT"(of(t(REAL-EVENT(s)), that's left 4me),
> HOME, You, My CORE, MY-CÖÖR.BE-
> CAUSE for ME, *I-AM-U!* I be-long 2 you, **&:**

Europe! -
I have: only *HOPE 4 you*. And MY idea(l)! SO, *DO-NOW-SAY*, that: "U"

> *believe in me*, and **give me thEE – M – C** [1],

I promise u2useITwell, 100times(of(t))-I-shall Re-pay you, for I-DREAM-OF-U-R=**justice**.
And **HUMANITY**. And **REASON**, SO; I-DO(it)all-4U, it's-"Y"!, I DO believe in YOU,
My-"EYE"'s-want2contribute2: U= **R. E: MY**-FUTURE!

&like you, *in-fact*, my LOVE,
> **I'M YOUNG**! I. think. I. can. PLEASE TRUST me that I CAN,
> > **my EUROPE**; NOW; or no one does,

….and, @this(t), **THEN/IF**: U let me down 2, I-tell-you, O,
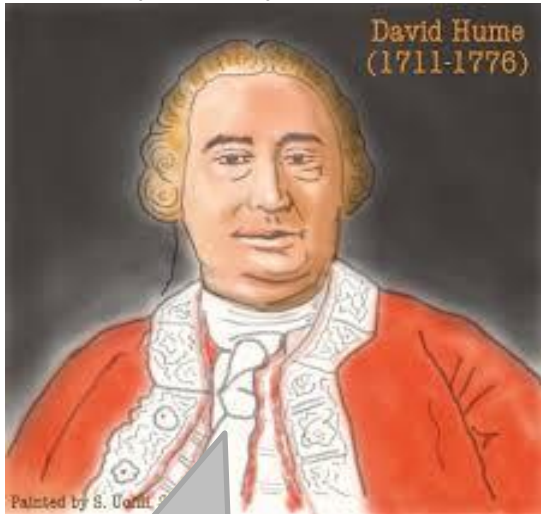> EUROPE, dear, I_WILL: stop-RUNNING 4 the(€(UNIT(Y)))&

> > > > 4my-DREAM
> > > > Sincerely&
> > > > ALL*yours*,
> > > > kc

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[1] =anagram, for "Motor-cortex";), so, besides of CAUSE the 2.OBVIOUS meanings (MENTAL CAUSATION, and MARIE CURIE), IT's also a symbol for Free Will, AND a META-for: CONTROL.
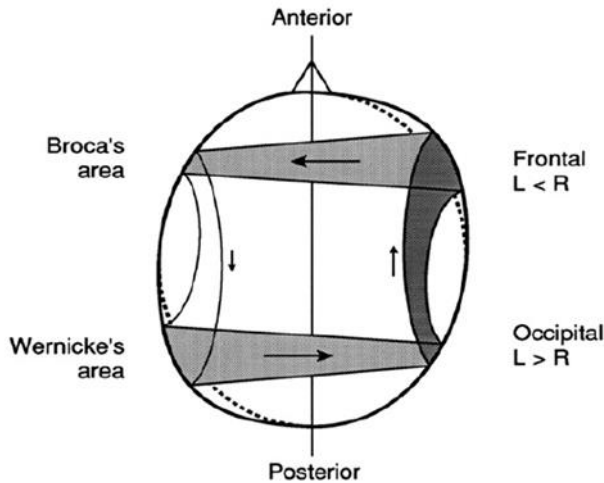
I: WHY?

example &Meta-(times)4:

→ old&wise Philosophers HU(k.now)ME☺:

…millions of years, mankind lived just like the animals. Then something happened, which unleashed the power of our imagination: **we learned to talk!...**

→ I-say:
→ „p.F.",or:
→ Just,
→ LISTEN in-2„IT", while reading out JODA:

David Hume (1711-1776)

Anterior

Broca's area — Frontal L < R

Wernicke's area — Occipital L > R

Posterior

Transmission of information between **asymmetrically**-distributed areas of **heteromodal association** cortex in the human brain. (JODA)

From: Crow, TJ.:
The 'big bang' theory of the origin of psychosis and the faculty of language. Schizophrenia Research 102 (2008) 31–52

AXIOM:
causality =cement of the universe.

AXIOM:
the **force** is everywhere.

I: Why language/why the semantic network?

- Free thought involves the ability to generate new abstract <u>and</u> meaningful information
- This "I" is produced by conscious association processes
- They must be conscious to generate real new *meaning and/or "real-events"* ☺,
  - example: when we talk in our sleep, we generate new information, it might even be new verbal, semantic information, i.e. we can even say real words in our sleep, that much automatic is the process of evoking learned concepts in human language!
  - Example2 (background/my research focus and aim): help patients with "thought disorder" (Schizophrenia) who have temporally lost their free mind because they do not have this control over their own thought.

I: Why language/why the semantic network?

– But, one thing we can not do in our sleep: that is, to talk about something we *actively decide to talk about*:

– We

(humans! Other than animals who only **produce** **sounds** for the *effect* that sound has, but not because of any abstract *meaning* that will be able *to persist longer than the moment*, it cannot be "stored" over time in semantic memory, there is no *explicit conceptual knowledge* in the animal world)

– put energy/effort in **word** **production**,

– this means we are at the same time generating the "reason!" (to talk at all!, to invest that biological energy, beyond sound-effects)!.

– Claim> we like to communicate/transmit abstract, meaningful information, this is the *cause*, that humans have developed language.

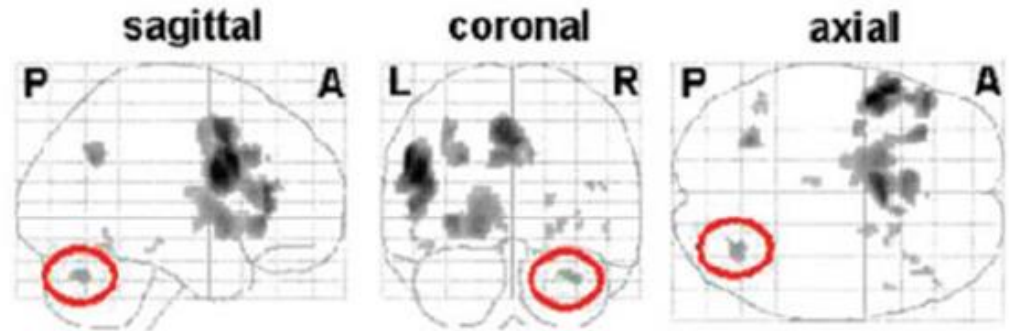# I: Why language makes us subjective individuals?

Lateralisation!

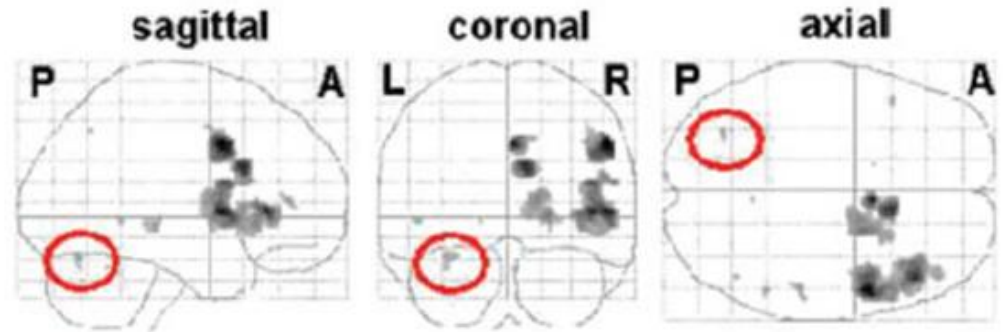of *language* (is also reflected in older brain structures)>

Cerebellar hemispheric dominance:

- varies between individuals!

(a) Subjects with left-hemisphere language dominance

sagittal   coronal   axial

(b) Subjects with right-hemisphere language dominance
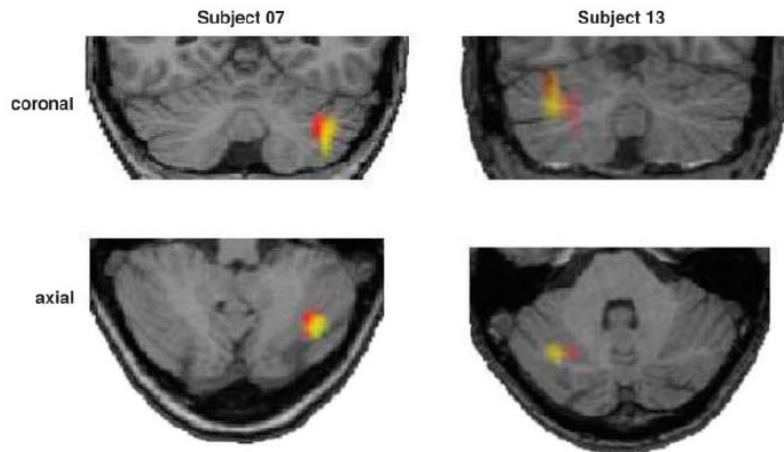
sagittal   coronal   axial

from: Jansen, A., et al., 2005. Crossed cerebro-cerebellar language dominance. Hum. Brain Mapp. 24, 165–172.

I: Why language makes us subjective individuals?

Lateralisation!

interacts with sex, but not with handedness!

Cerebellar activation for two subjects with left- and right-hemisphere language dominance, respectively, superimposed on **individual anatomic images** (top, coronal; bottom, axial).

from: Jansen, A., et al., 2005. Crossed cerebro-cerebellar language dominance. Hum. Brain Mapp. 24, 165–172.
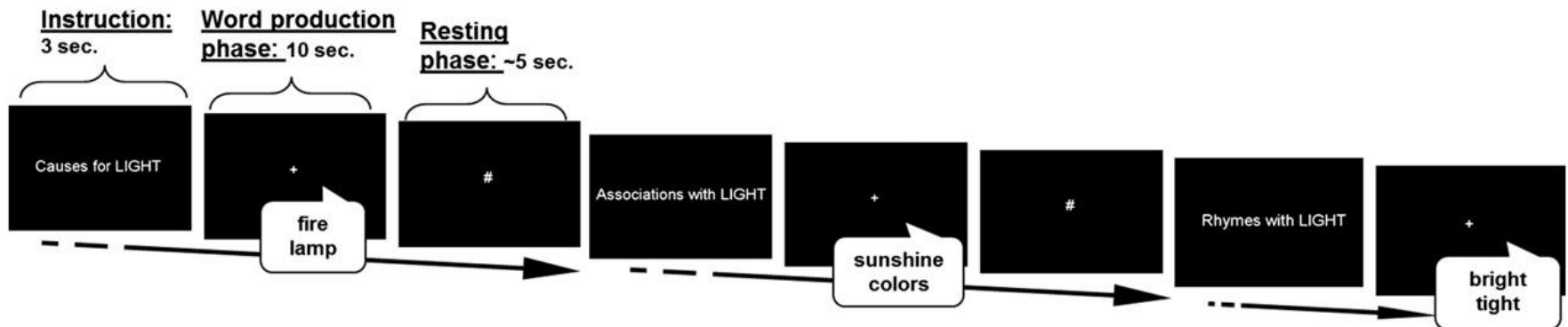
II. WHAT?

is abstract, meaningful (semantic) information in the brain??

i.e. what is "representation"/"storage" of abstract information?
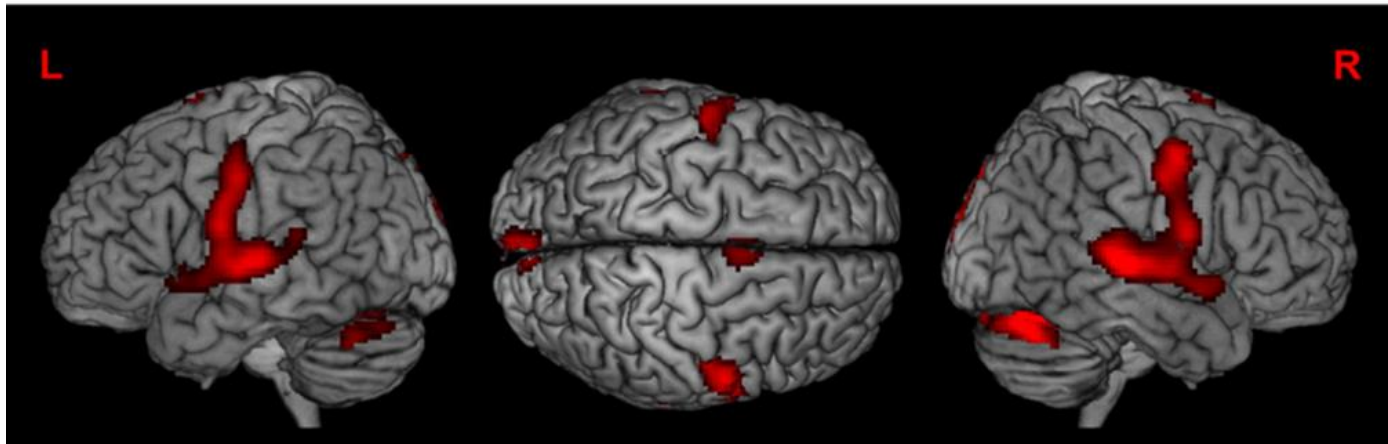
i.e. what is semantic memory?

task&design:

K.C's fMRI study about causal verbal fluency (continuous "reason production"):
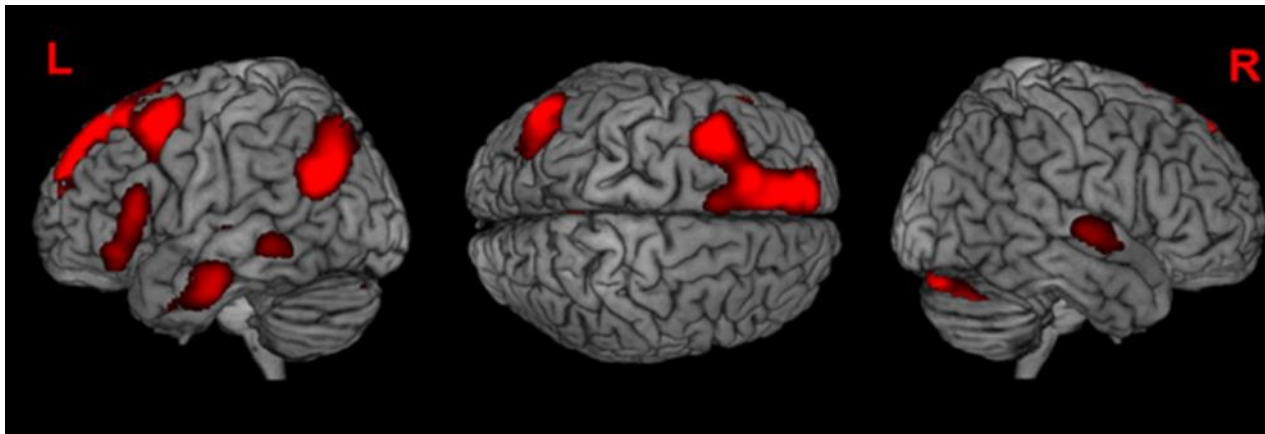
II. What is verbal/conceptual memory?

- the neural "networks" (i.e. task-effects) of language comprehension and production
- In general> (word production vs. no word prod.)

From: Wende K.C., et al., 2012. Neural correlates of continuous causal word generation. Neuroimage 62(3):1399-407 doi: 10.1016/j.neuroimage.2012.06.003.

II. What is semantic memory?

- the semantic "network" (i.e. task-effect) of meaningful (semantic associated or causal associated) word production

- Vs. non-meaningful but stimulus-driven (phonological!) retrieval:

III. HOW?

- The generation of new meaningful abstract information in the human brain takes place within metacognition.

- What is (meta)cognition?

  - what neural processes „R" we *TALKING* about, when we talk about free WILL?

  - i.e. what is meaning-

    FULL(&conscious!ly☺):**semantic retrieval?**

III. How does meaningful semantic retrieval work? (What is the concept of causality?)

- What does the brain do when we retrieve abstract information AND generate new meaning (i.e. „reason"s?) out of IT?

- Hypothesis:It "RE-FLECT's"

- (IT(self!))

(at the @even @axis @of ("infinity")), _cause_,
I= **k.**now **C.**ausality (marie michotte;) &
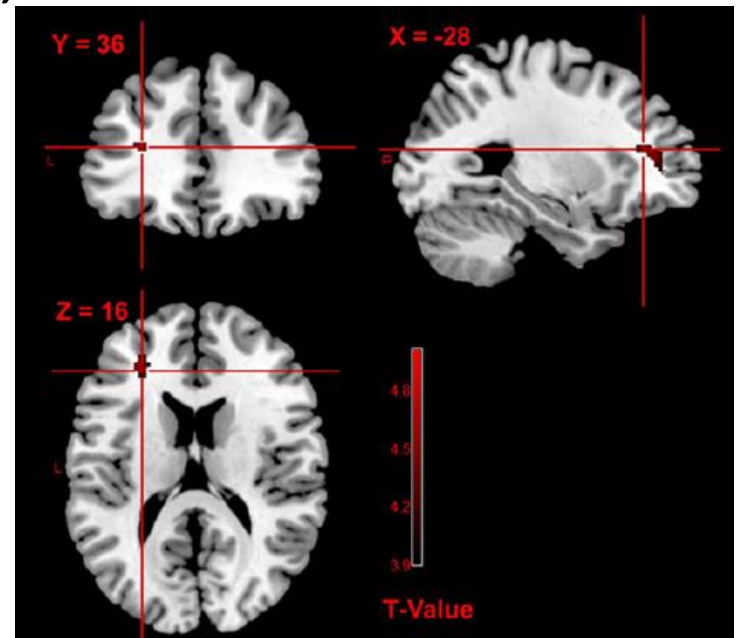=HAVE THE BALLZ-2 SAY:_that:_
HORIZONTALLY!
"IS"!(**JUST-IS!**)
The€In(dependent.ly&in(time (T)!!!!))
>>BEST
>>>>>>WAY
>>>>>>>>>>2>>>>address>>>>IT!!!!!!!!!!

Thank u

- 4

- Your

- (D!A!=interest/curiosity)
- Equals
- "attention"

☺&allyours,theE-

(double"U":

End

(€)

PS: if you want to see my BALLZ, you are gladly invited to visit my lab and **help the JUST-Cause by donating your eye-movements** = participating in my new experiment ☺).

Location: Lab for vision and oculomotor research,

UCL Institute of Neuroscience IoNS, Brussels (metro Alma)