

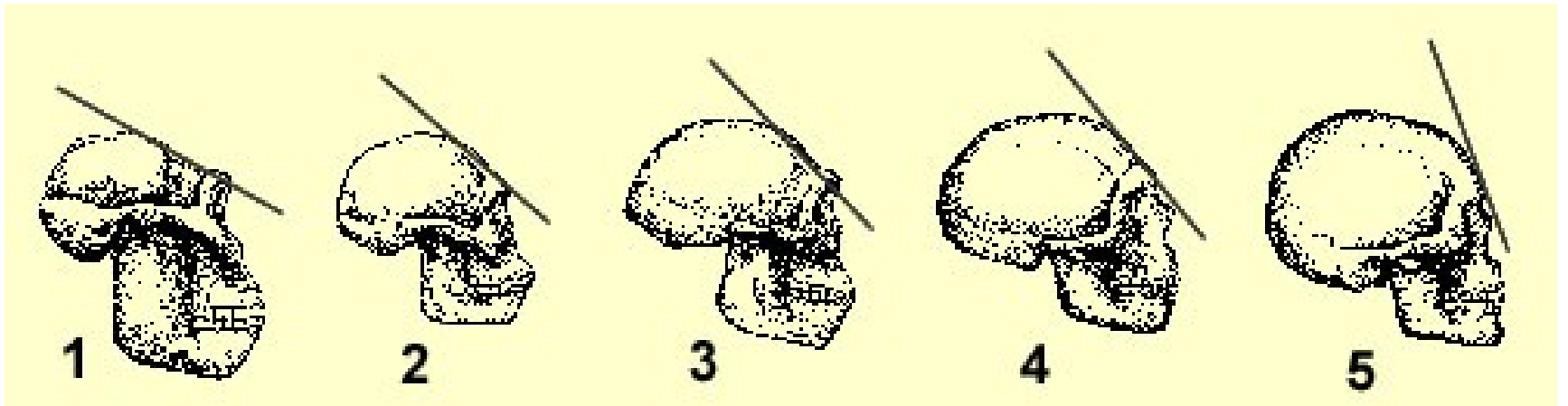
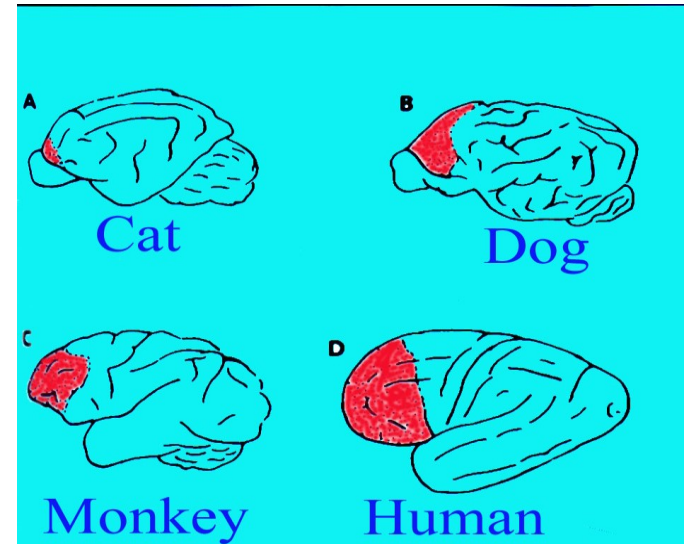
17 The Highest Functions of Nervous System

Psychological and Social Aspects of Brain Activity

I

Frontal association area

- Executive function
 - Motor / behavioral
 - Cognitive
- Mostly developed in human



1. *Australopithecus robustus*
2. *Homo habilis*
3. *Homo erectus*
4. *Homo sapiens neanderthalensis*
5. *Homo sapiens sapiens*

Functions of frontal association area

- Motor/non-motor planning/organization - strategy - anticipation
- Thinking – mental models processing

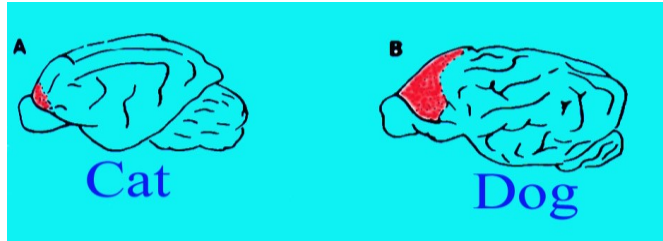
- Attention – „information filtering“

- Behavioral control
 - Facilitation of „wanted“
 - Inhibition of „unwanted“

Social brain may be considered as an anticipation in social context



Socialization



<http://www.slideshare.net/drpsdeb/presentation>



<https://wallhere.com/cs/wallpaper/1065382>

- ✓ Socialization is an evolutionary strategy of „weak/less skilfull“
- ✓ Socialization allows its members to be „weak/less sklifull“
- ✓ The social group brings its members benefits which could not be achieved on an individual basis
- ✓ Society
 - Collaboration
 - Categorization of duties and responsibilities
 - Hierearchy



https://en.wikipedia.org/wiki/Society#/media/File:Canis_lupus_pack_surrounding_Bison.jpg

Society



<https://cdn.nexternal.com/tjb/images/FC-11.jpg>

<https://s-media-cache-ak0.pinimg.com/564x/9a/86/da/9a86da32052973bb085dc1511d4b7102.jpg>
<http://previews.123rf.com/images/dja65/dja651107/dja65110700341/10025966-Stone-age-axe-Stock-Photo-tools-ancient-stone.jpg>

[http://www.thebushcraftstore.co.uk/ekmps/shops/bduimportsltd/images/condor-greenland-pattern-axe-\[2\]-12105-p.jpg](http://www.thebushcraftstore.co.uk/ekmps/shops/bduimportsltd/images/condor-greenland-pattern-axe-[2]-12105-p.jpg)

Society



Culture
– the sum of knowledge
✓ Material
✓ Spiritual

<https://cdn.nexternal.com/tjb/images/FC-11.jpg>

<https://s-media-cache-ak0.pinimg.com/564x/9a/86/da/9a86da32052973bb085dc1511d4b7102.jpg>
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[http://www.thebushcraftstore.co.uk/ekmps/shops/bduimportsltd/images/condor-greenland-pattern-axe-\[2\]-12105-p.jpg](http://www.thebushcraftstore.co.uk/ekmps/shops/bduimportsltd/images/condor-greenland-pattern-axe-[2]-12105-p.jpg)

Three States of Knowledge and Cognition

Philosophy : Mind behind Mind



PS Deb

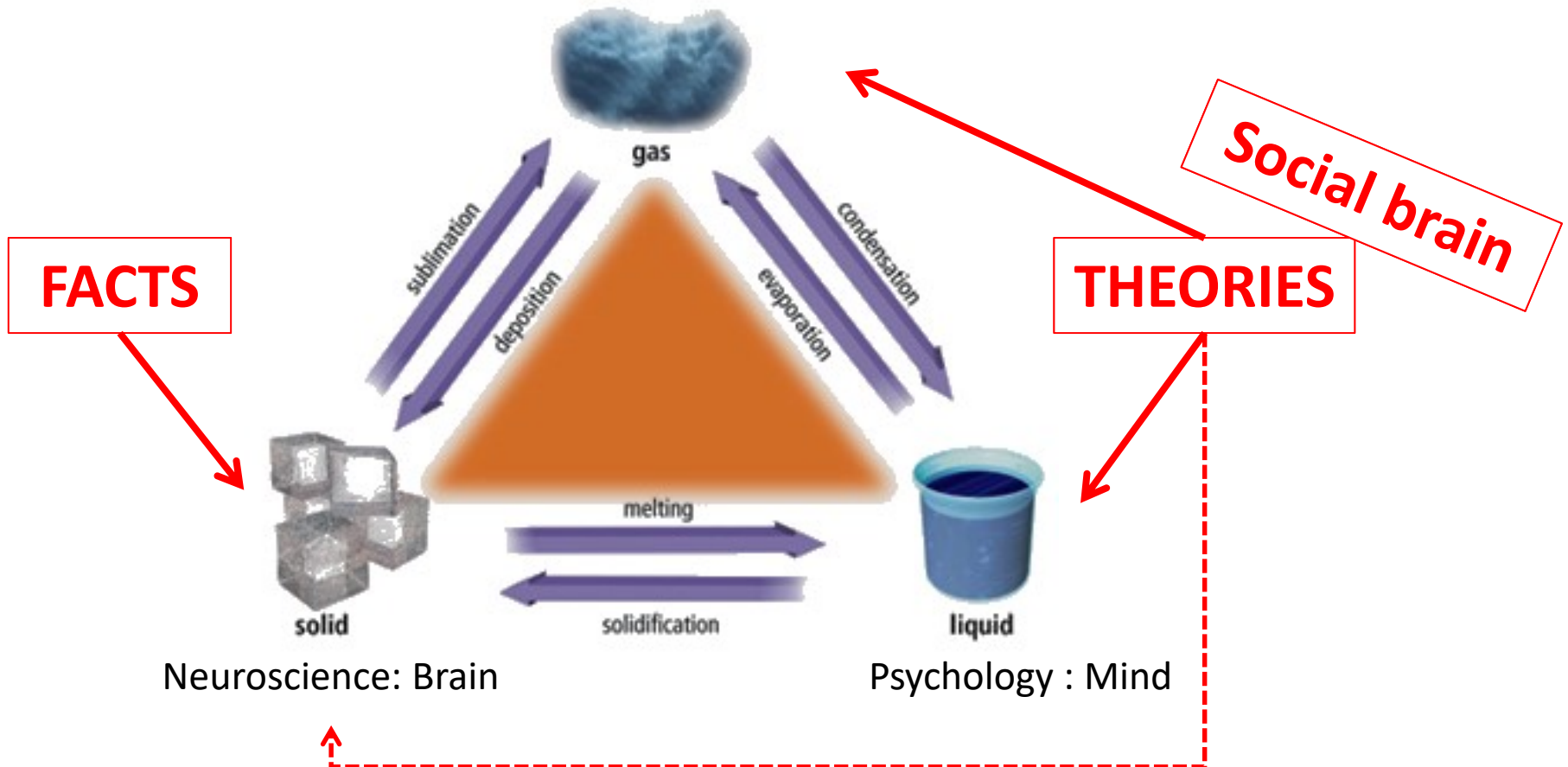


Neuroscience: Brain

Psychology : Mind

Three States of Knowledge and Cognition

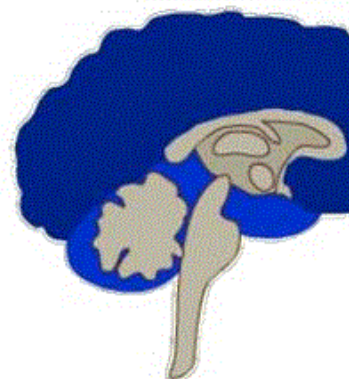
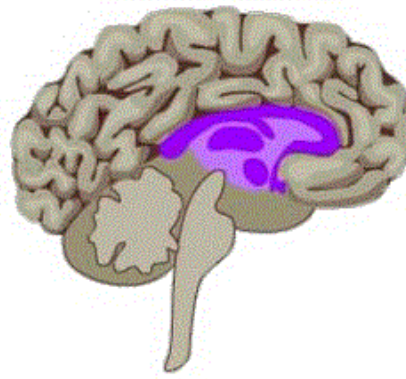
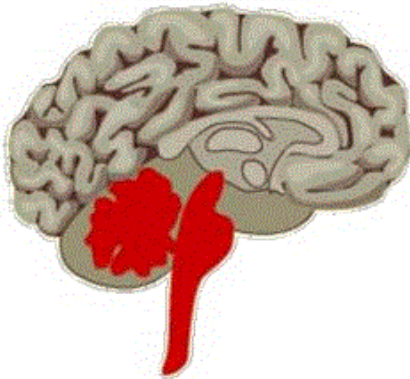
Philosophy : Mind behind Mind



Triune Brain Theory

Lizard Brain	Mammal Brain	Human Brain
Brain stem & cerebellum	Limbic System	Neocortex
Fight or flight	Emotions, memories, habits	Language, abstract thought, imagination, consciousness
Autopilot	Decisions	Reasons, rationalizes

1960



The Triune Brain in Evolution, Paul MacLean, 1960

<https://s-media-cache-ak0.pinimg.com/originals/2f/60/99/2f609962e23fdce7a008fb224d316256.gif>

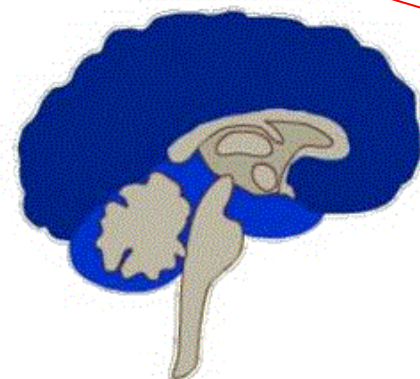
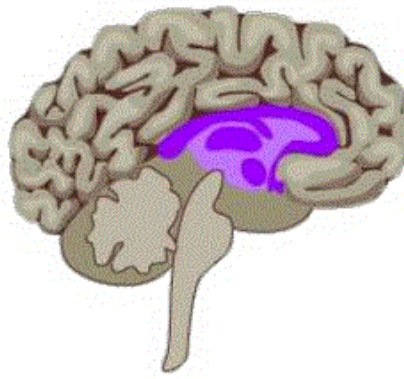
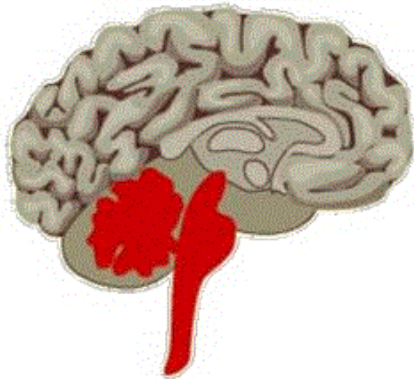
https://upload.wikimedia.org/wikipedia/commons/thumb/d/d4/Paul_D_MacLean.jpg/220px-Paul_D_MacLean.jpg

Triune Brain Theory

Lizard Brain	Mammal Brain	Human Brain
Brain stem & cerebellum	Limbic System	Neocortex
Fixed programs	Emotions, memories, habits	Learning, adaptation
Uniform ACTION	Decisions	Performance
Economy		

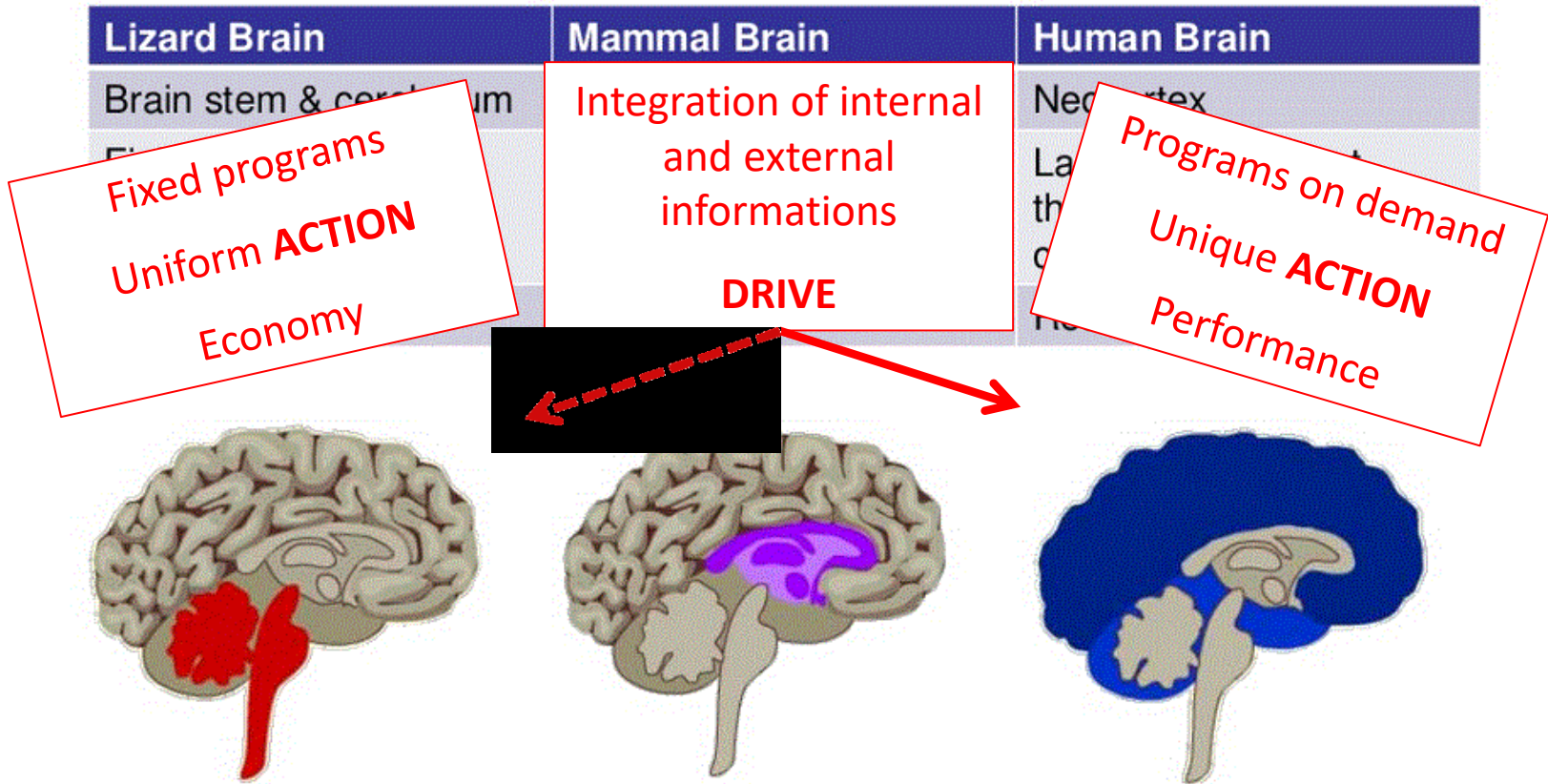
Fixed programs
Uniform **ACTION**
Economy

Programs on demand
Unique **ACTION**
Performance



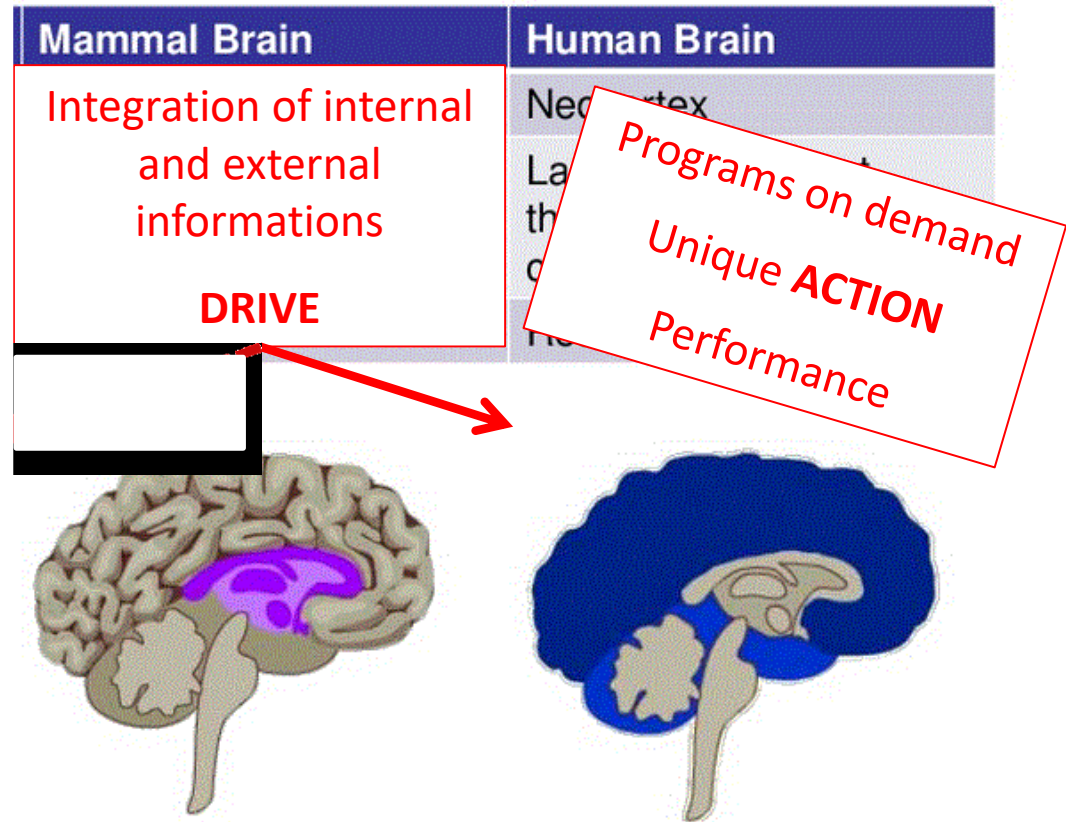
The Triune Brain in Evolution, Paul MacLean, 1960

Triune Brain Theory



The Triune Brain in Evolution, Paul MacLean, 1960

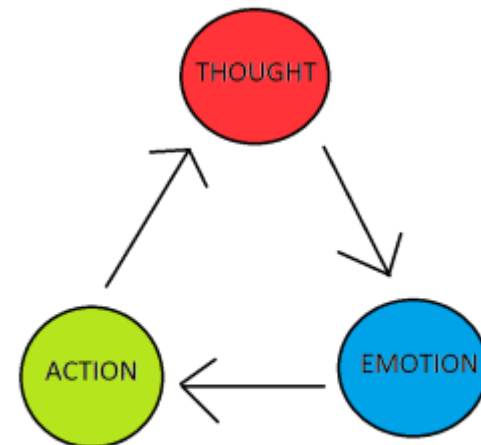
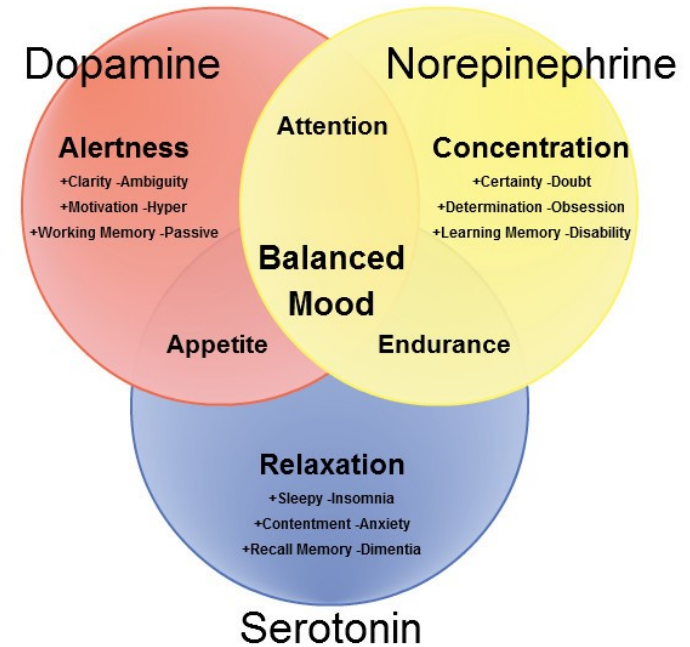
Triune Brain Theory



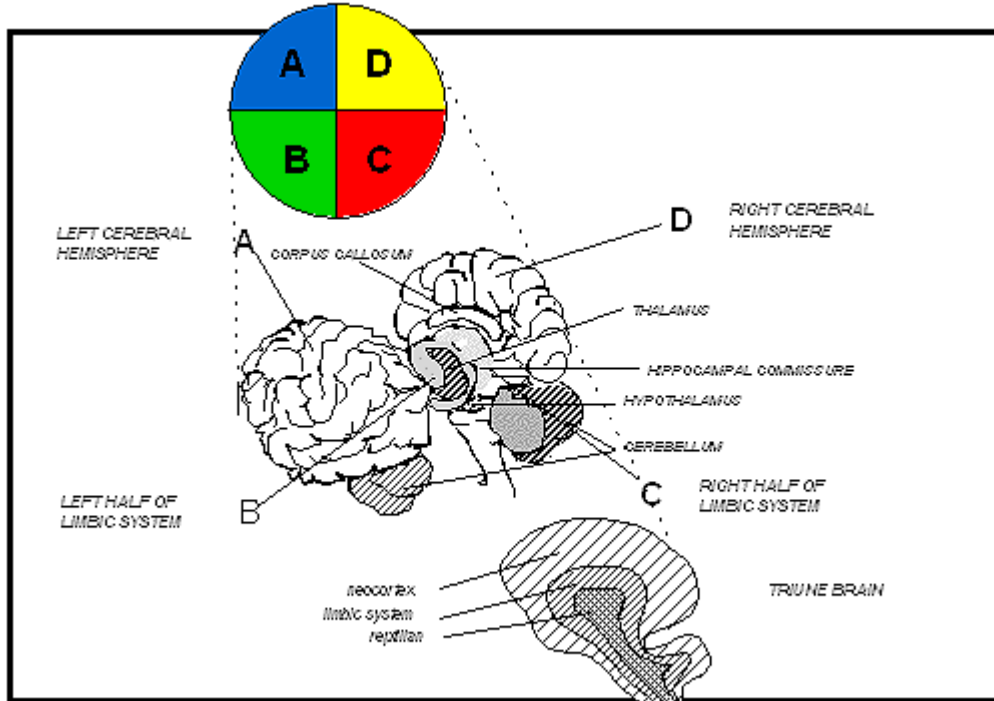
The Triune Brain in Evolution, Paul MacLean, 1960

Influence of hypothalamus on neocortex

- (Papez circuit)
- Via neuromodulating systems
 - Consciousness
 - Mood
- Via thalamus
 - Via nucleus mediodorsalis to orbitofrontal cortex (influence on decision making)
 - Influence gating function of other thalamic nuclei



Whole brain model



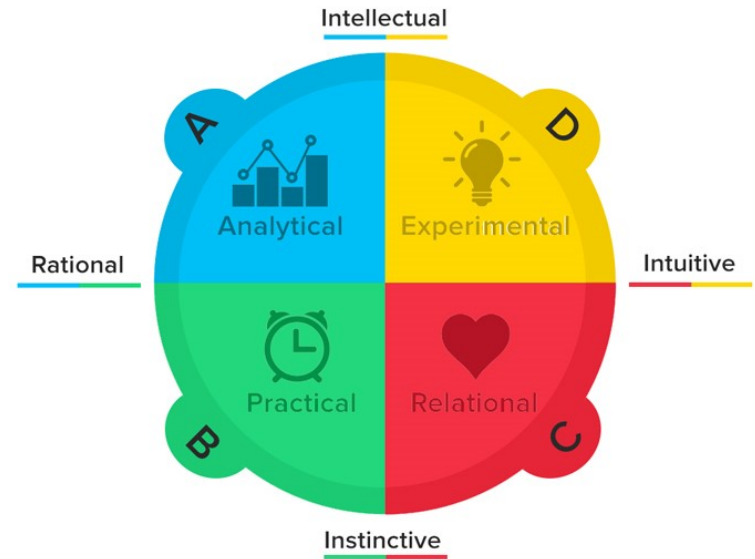
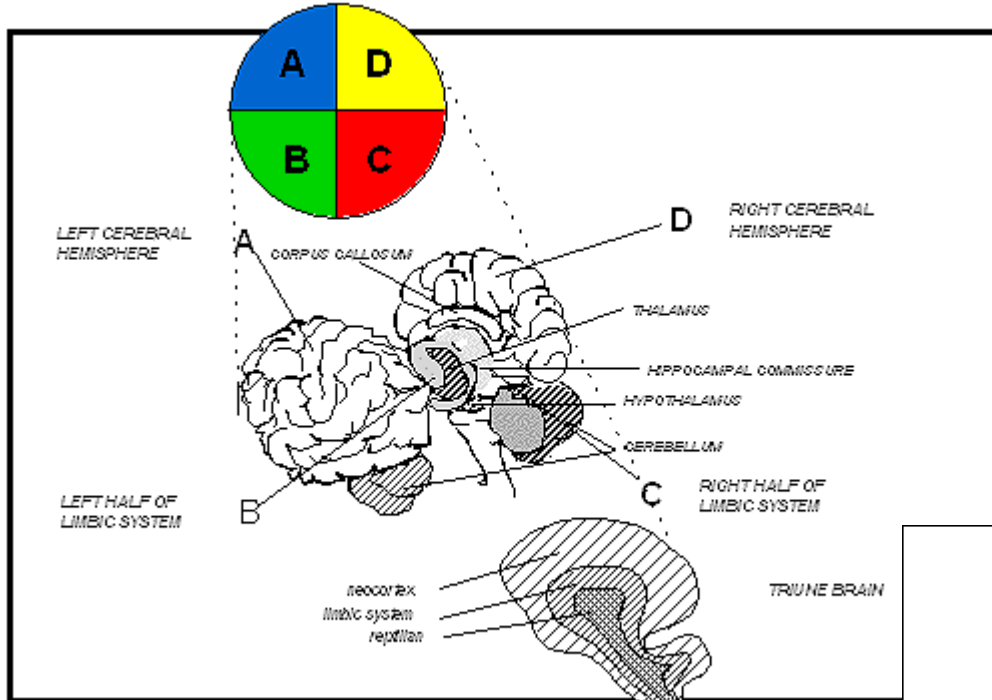
<http://www.sacsa.sa.edu.au/ATT/%7BA2B8C52-92B6-4C17-AEEB-3A9D4F9AE8DE%7D/images/BackgrounddInfo/images/image8.gif>



1978

http://rolandspinola.de/herrmann_international_deutschland.html

Whole brain model



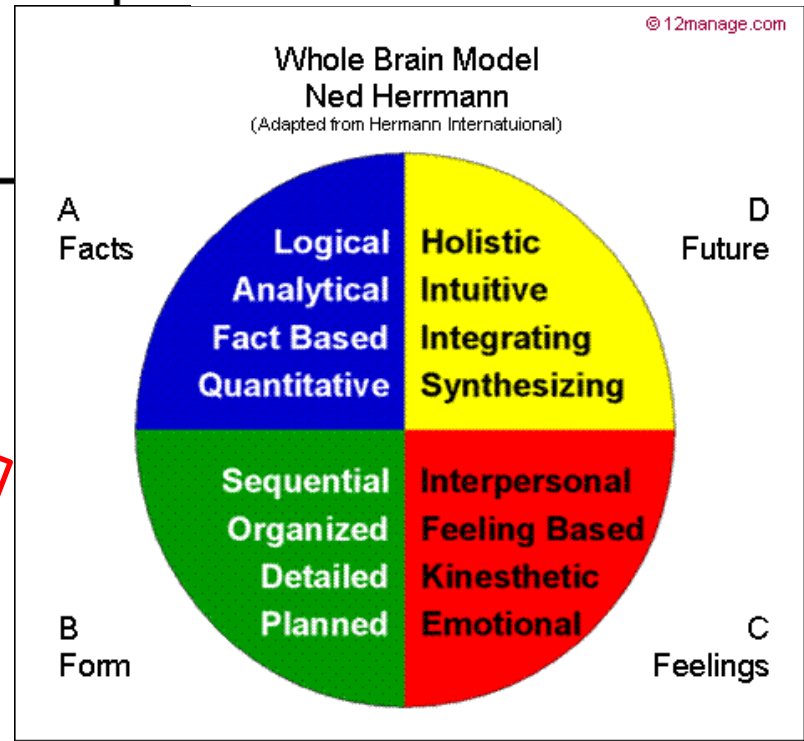
The four-color, four-quadrant graphic and Whole Brain® are registered trademarks of Herrmann Global, LLC. © 2016 Herrmann Global, LLC



<http://www.sacsa.sa.edu.au/ATT/%7BA2B8C52-92B6-4C17-AEEB-3A9D4F9AE8DE%7D/images/BackgrounddInfo/images/image8.gif>

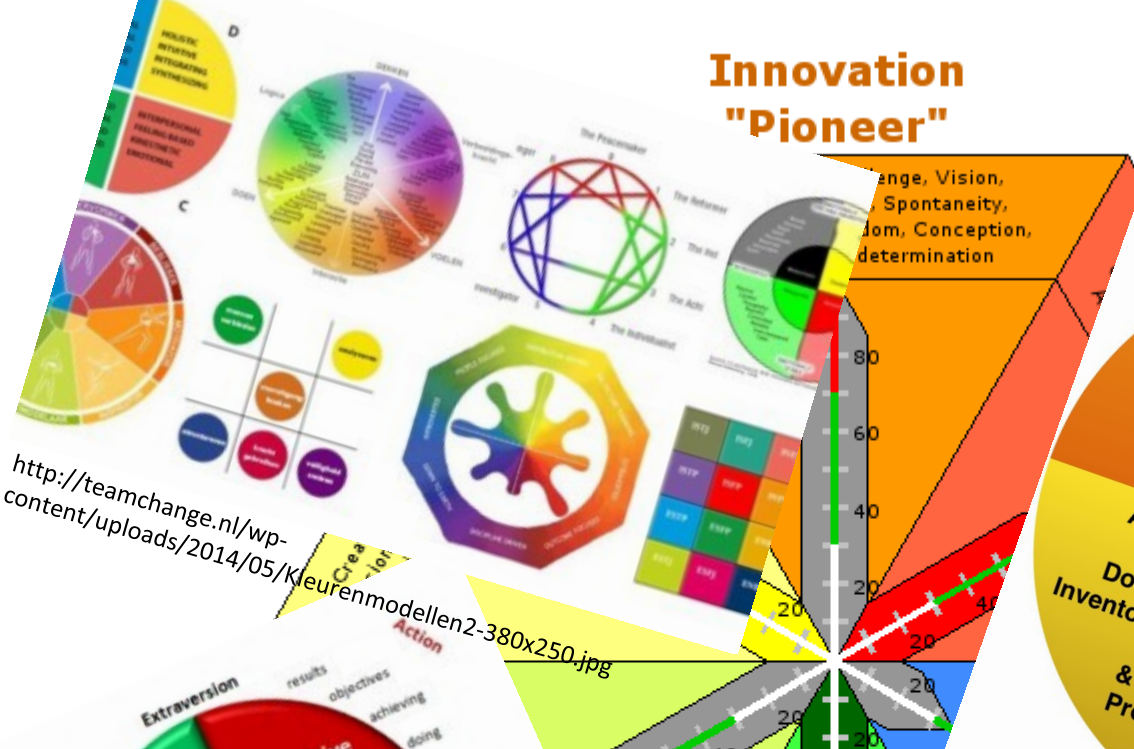
1978

http://rolandspinola.de/herrmann_international_deutschland.html



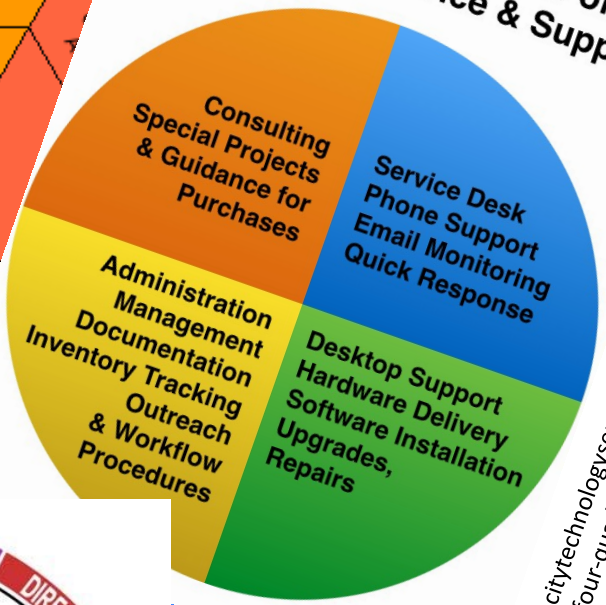
http://www.12manage.com/images/picture_herrmann_whole_brain_model.gif

Innovation "Pioneer"



<http://teamchange.nl/wp-content/uploads/2014/05/Kleurenmodellen2-380x250.jpg>

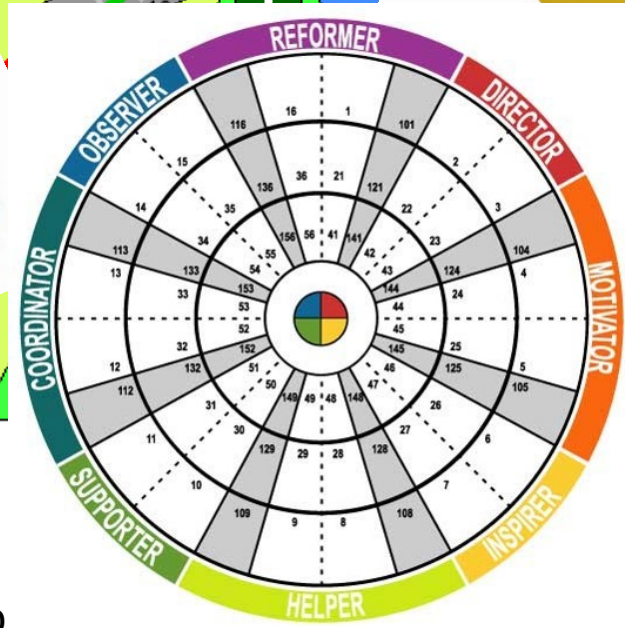
The Four Quadrants of Technology Service & Support



<https://lowacitytechnologyservices.files.wordpress.com/2015/10/2015-10-15th0132-four-quadrants-of-technology-service-and-support-chart.jpg>



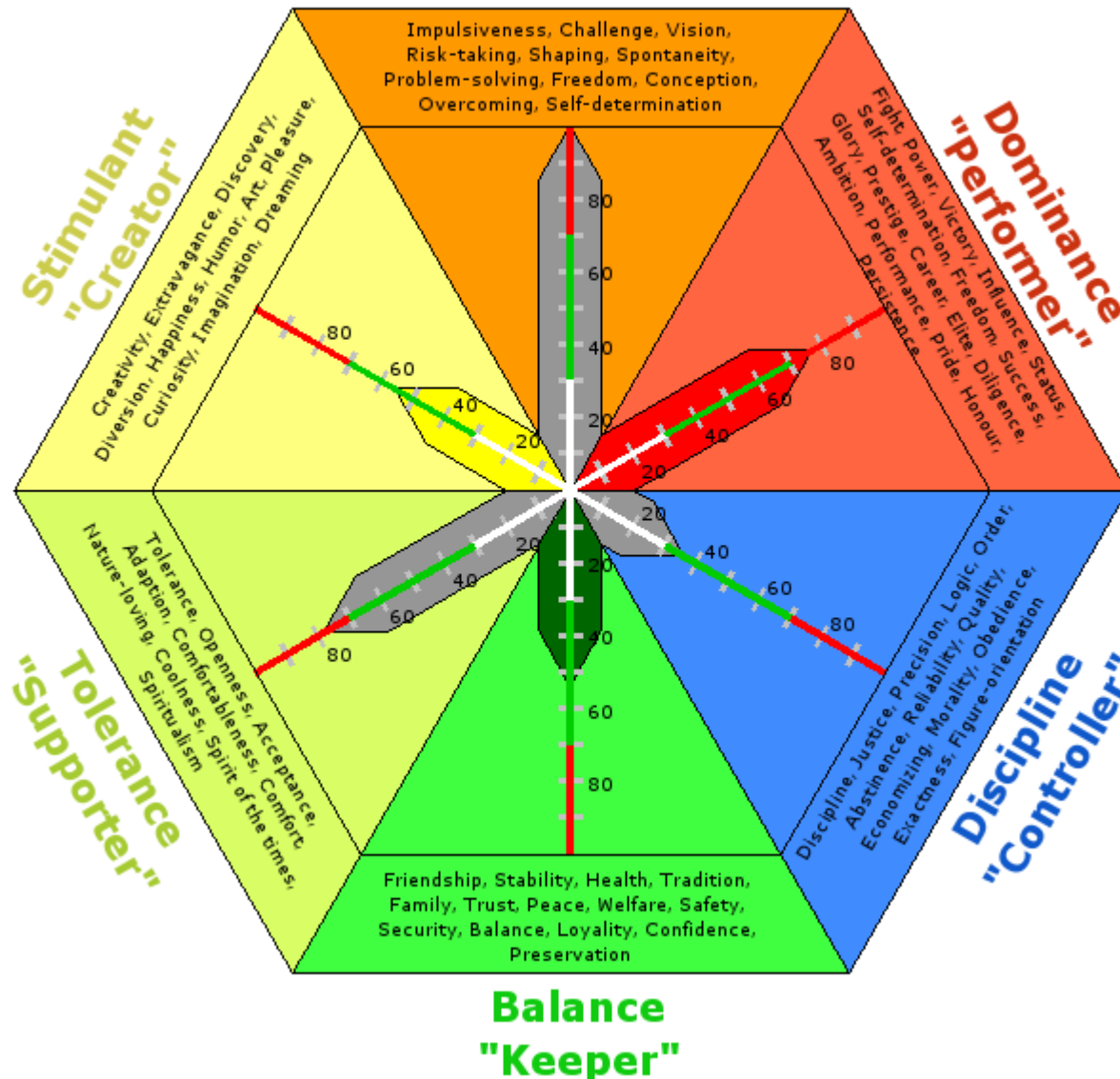
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<http://scottschwefel.com/wp-content/uploads/2016/01/smart-skills.jpg>

Discipli
"Control"

Innovation "Pioneer"

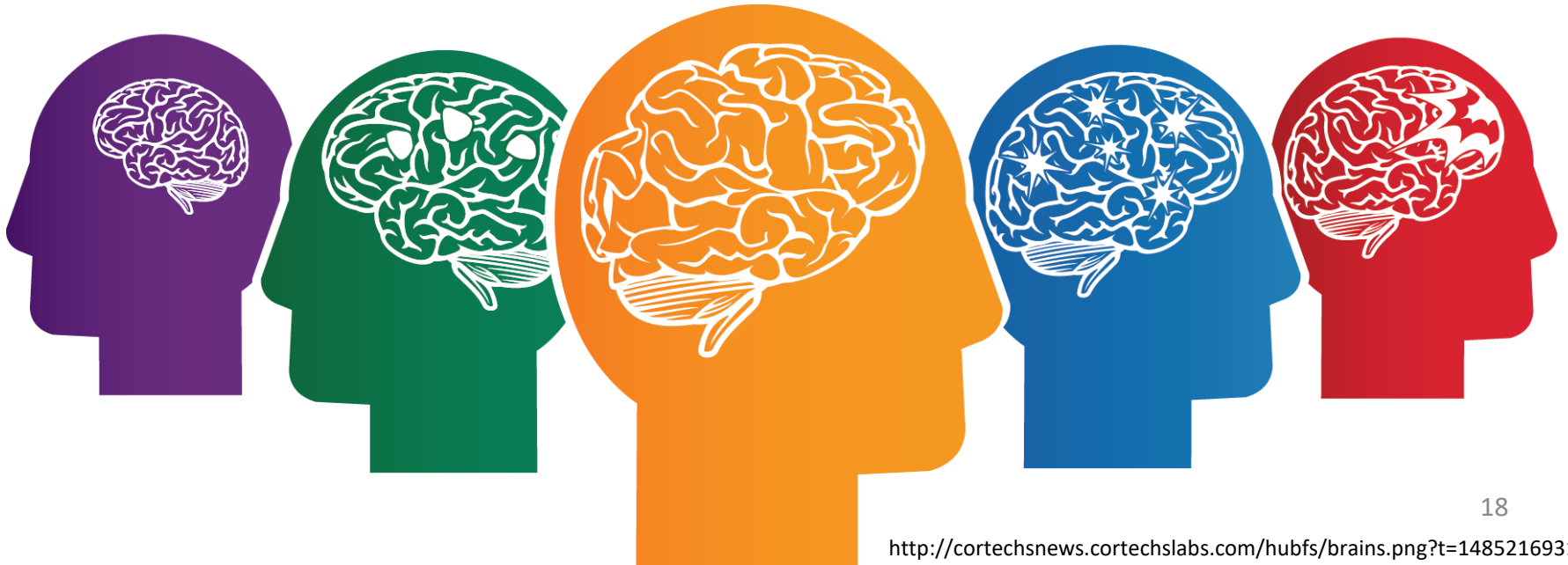


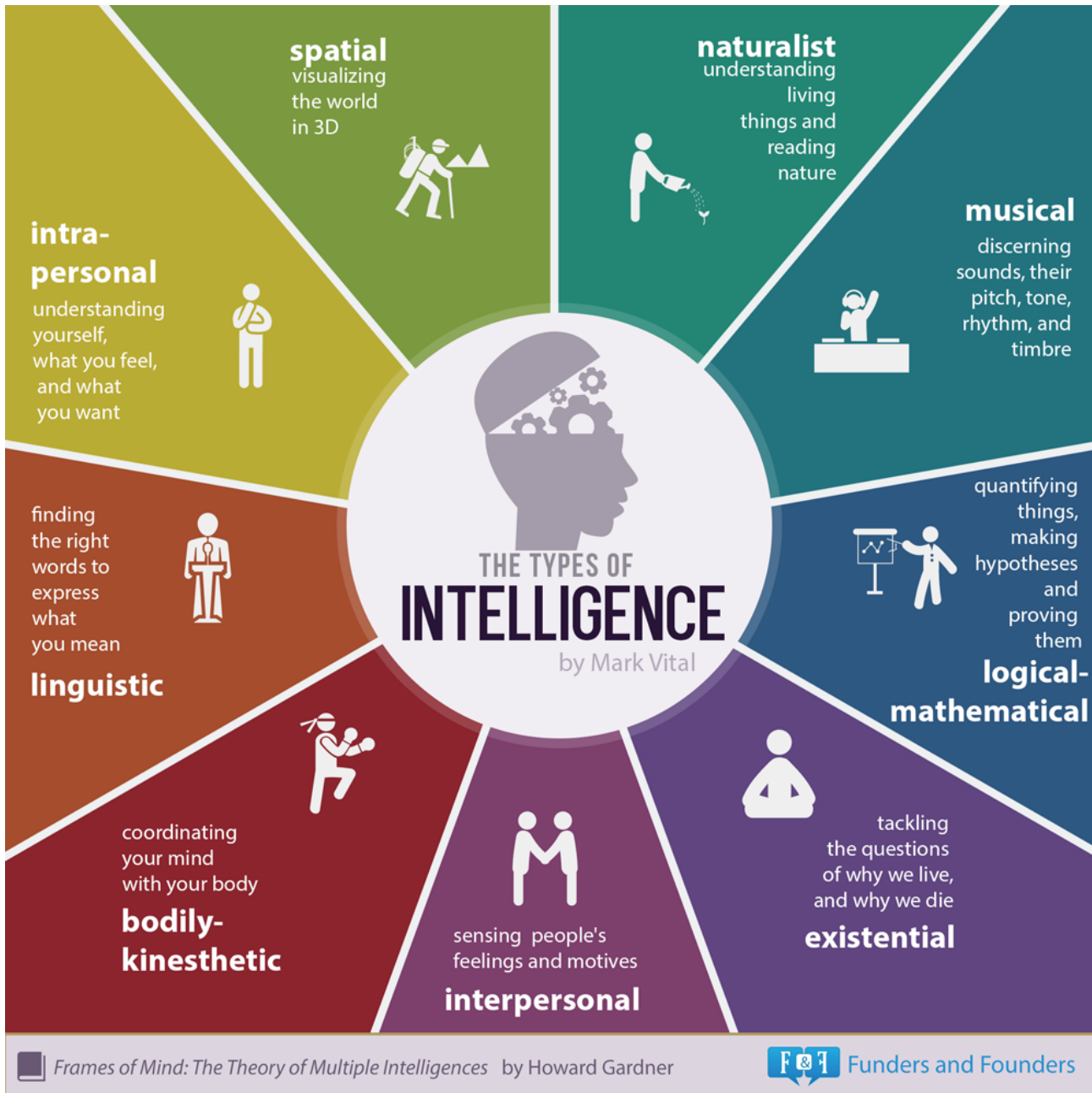
<https://web.limbic-personality.com/files/CjvXQ2.bmp>

Every brain is unique

- Emotionally
 - Limbic system
- Rationally
 - Neocortex

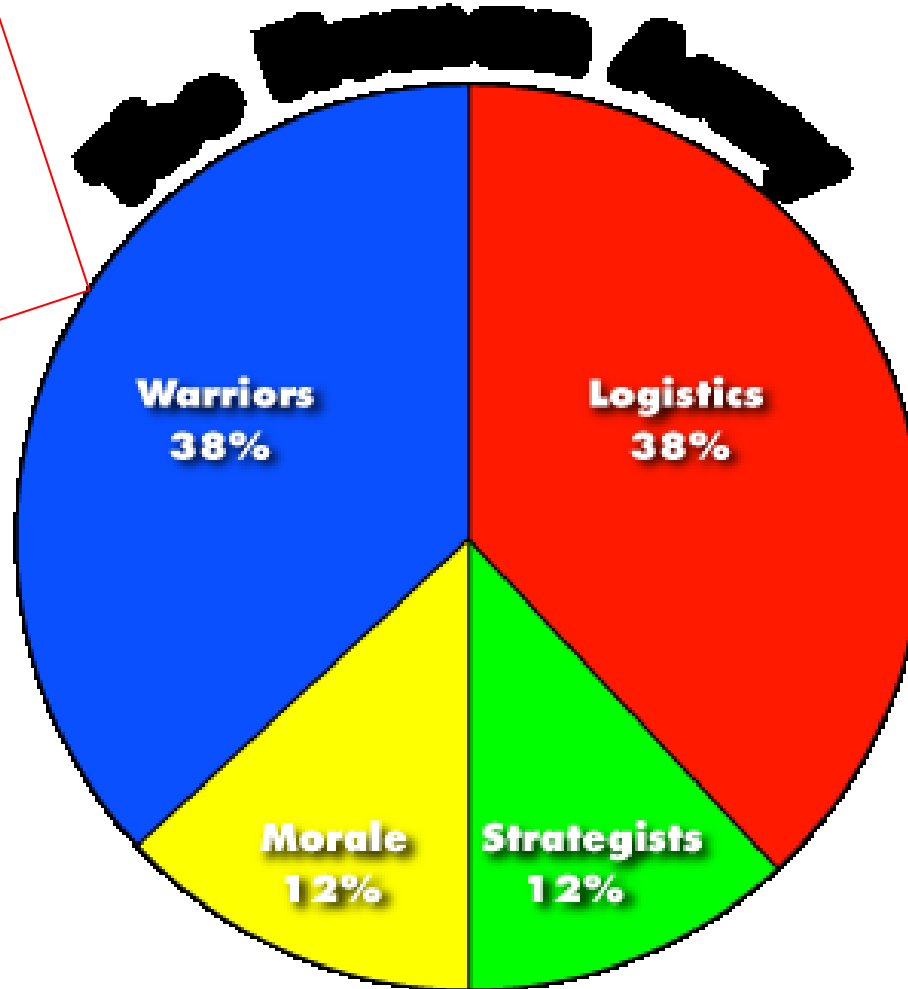
✓ Genetics
✓ Environment





Society

- ✓ Collaboration
- ✓ Categorization of duties and responsibilities
- ✓ Hierarchical

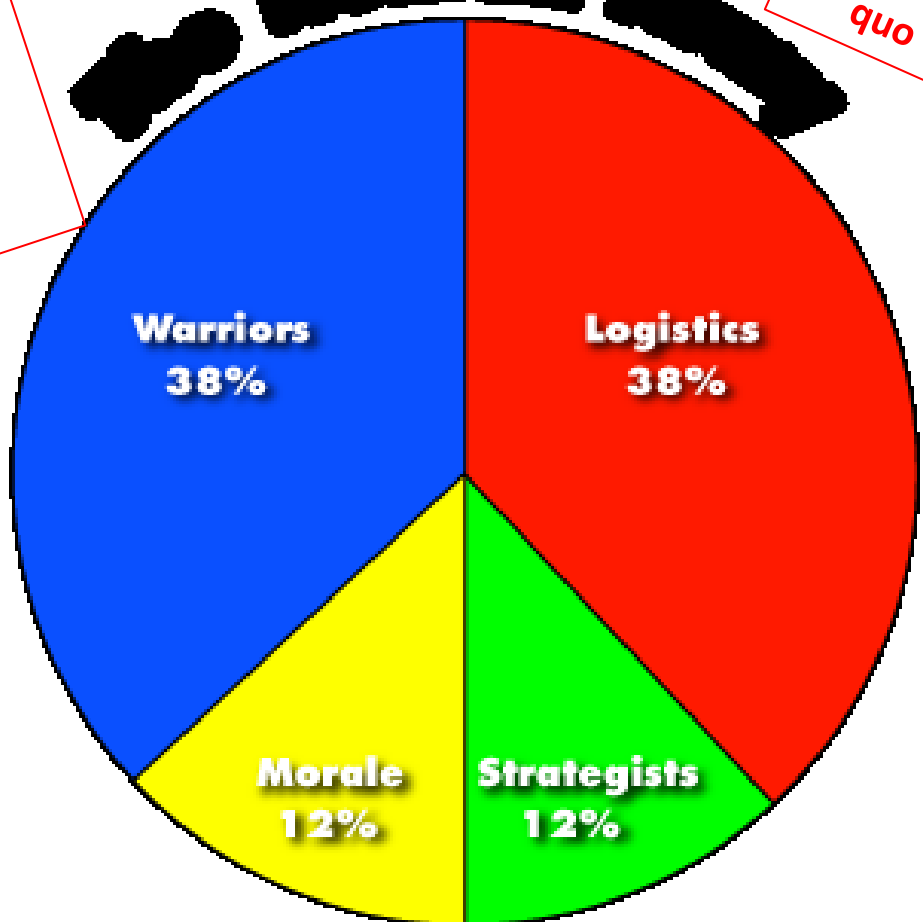


The 4 Personality Types In The Human Race

©2011 Personality Marketing LLC

<http://customersecrets.com/wp-content/uploads/2011/09/Army-Personality-Types.png>

PERSONALITY TYPES



Society

- ✓ Collaboration
- ✓ Categorization of duties and responsibilities
- ✓ Hierarchical

Potential conflict

- I do not respect the status quo
- We do not respect the status quo

- Me versus society
- We versus other society (societies)

The 4 Personality Types In The Human Race

©2011 Personality Marketing LLC

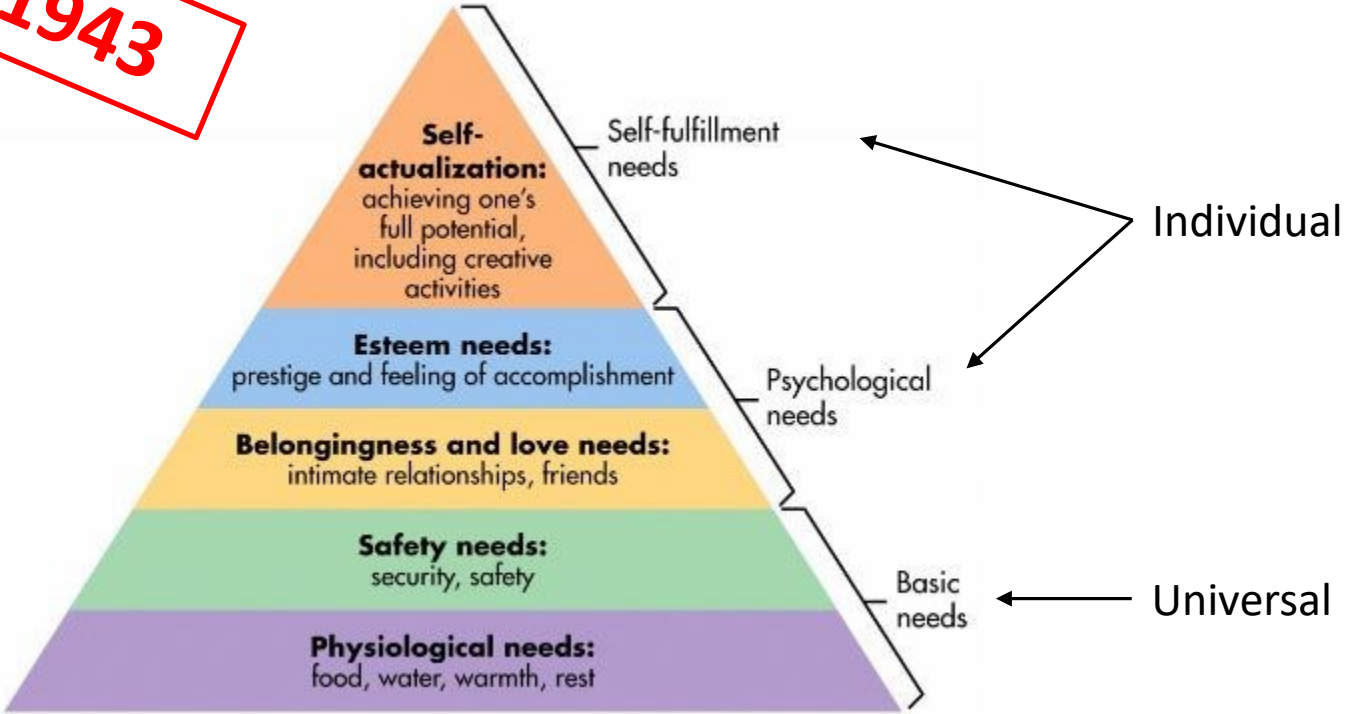
<http://customersecrets.com/wp-content/uploads/2011/09/Army-Personality-Types.png>

Hierarchy of Needs by Abraham Maslow

1943

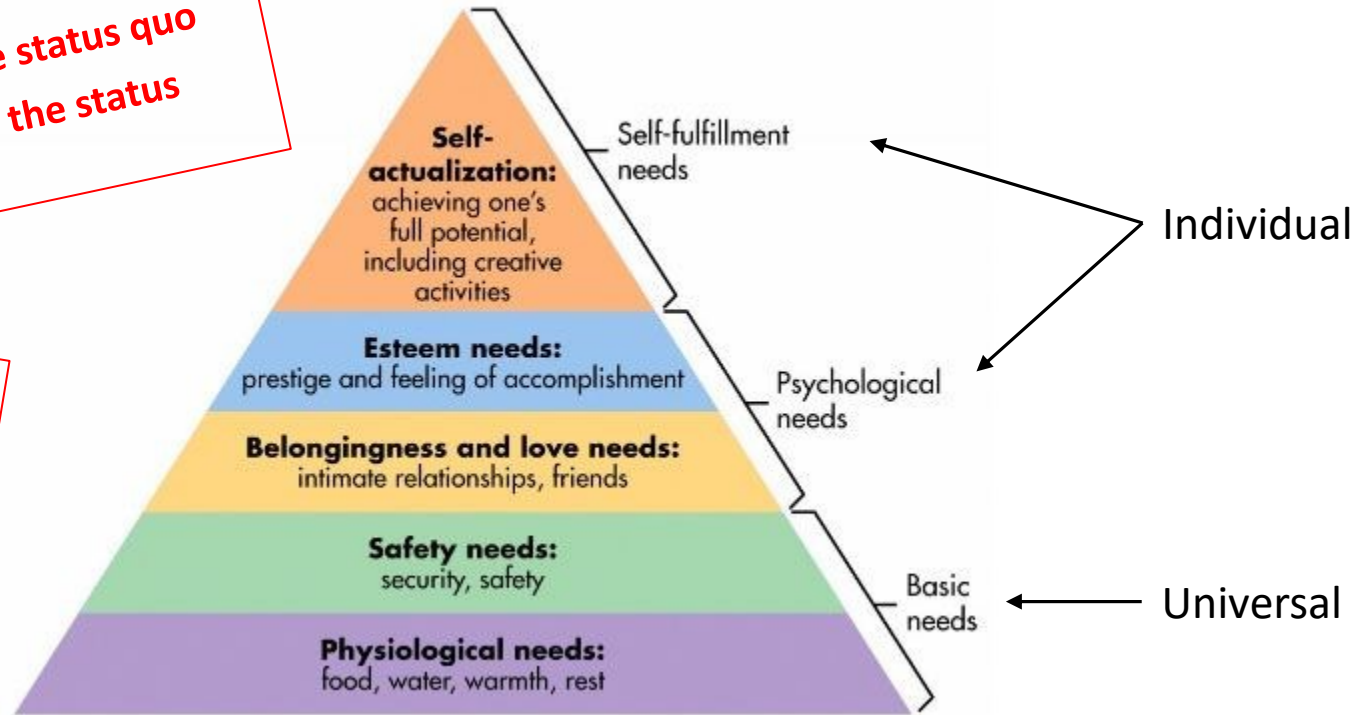


https://en.wikipedia.org/wiki/Abraham_Maslow#/media/File:Abraham_Maslow.jpg



<http://www.simplypsychology.org/maslow-pyramid.jpg>

Hierarchy of Needs by Abraham Maslow



Potential conflict

- I do not respect the status quo
- We do not respect the status quo

➤ **The hunter brain**
Versus
➤ **The Social brain**

➤ **EGOISM**
Versus
➤ **ALTRUISM**

<http://www.simplypsychology.org/maslow-pyramid.jpg>

Social brain or asocial brain?



Social brain or asocial brain?



FORMER FRENCH BATTLESHIP STRASBOURG AND CRUISER.

US AAF PHOTO 225-8

Social brain or asocial brain?

Nick Ut, Trang Bang 1972



Social brain

„The first sign of civilization was a femur that had been broken and then healed... Helping someone else through difficulty is where civilization starts“

Margaret Mead

http://anthropology.si.edu/writteninbone/images/G0500_large.jpg



<http://www.ancient.eu/uploads/images/display-1166.jpg>

Mentalization

- the ability to understand the mental state, of oneself or others, that underlies the behavior
- Rationally
- Emotionally



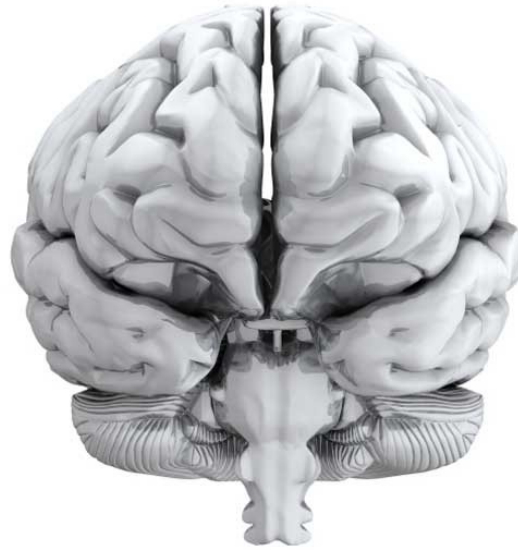
Mentalization

- the ability to understand the mental state, of oneself or others, that underlies the behavior
- Rationally
- Emotionally

Empathy – „mentalization in a positive sense“



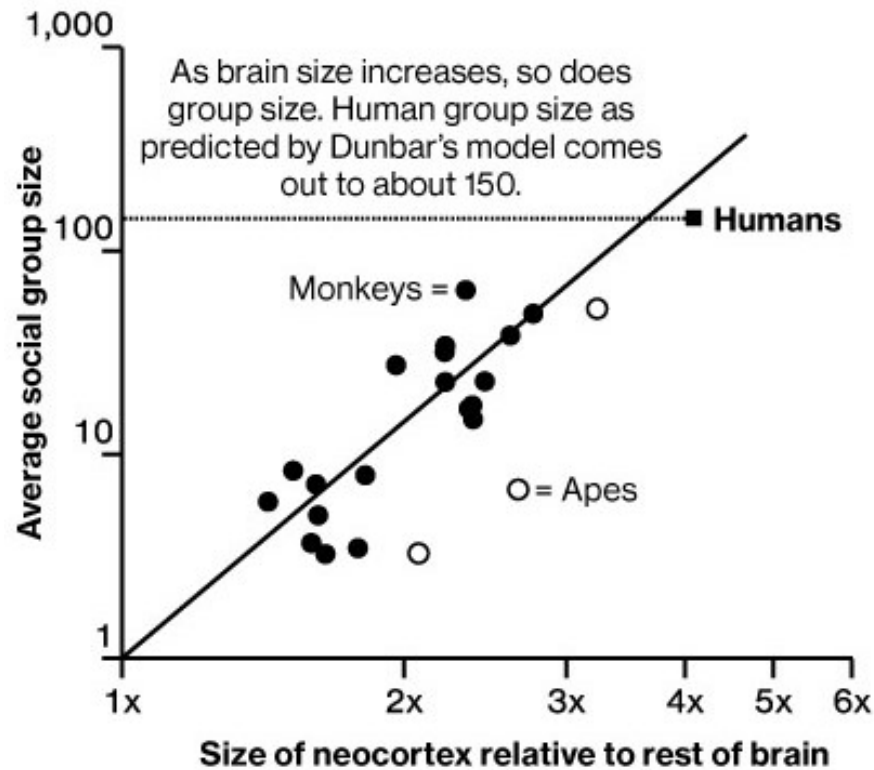
Social brain



Social brain

1998

The Social Cortex



DATA: THE SOCIAL BRAIN HYPOTHESIS, DUNBAR 1998

<http://assets.bwbx.io/images/users/iqjWHBFdfxIU/ibn8LbKHvbxI/v1/-1x-1.jpg>

Robin Dunbar

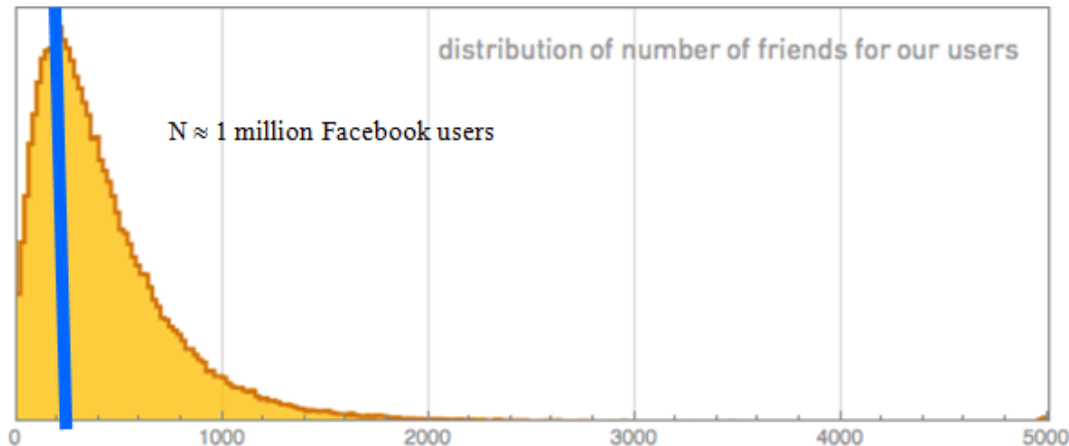


https://en.wikipedia.org/wiki/Robin_Dunbar

Social brain

Has Facebook Really Widened Your Social World?

- It seems not....
- Modal number of 'friends' on Facebook = 150-250
- You may list 100s of friends, but you only talk to a handful



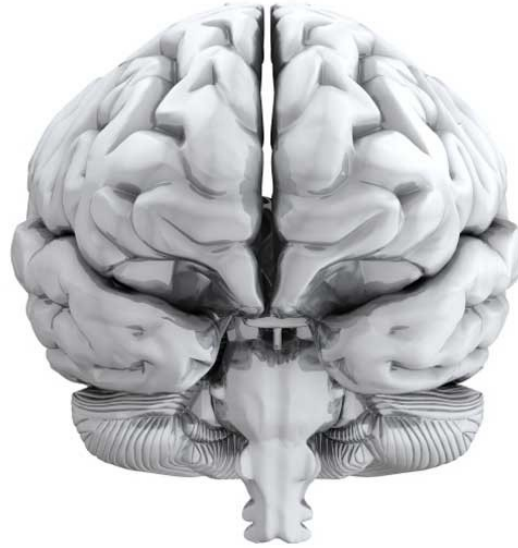
Robin Dunbar



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

Every brain is a powerful machine...

... which is hard to control



- ✓ The conflict between the limbic system and the neocortex
- ✓ The problem with effective control of the neocortex



The conflict between the limbic system and the neocortex



Limbic system and neocortex



Why = The Purpose

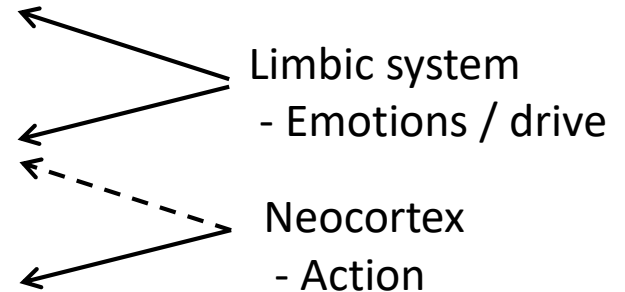
What is your cause? What do you believe?

How = The Process

Specific actions taken to realize the Why.

What = The Result

What do you do? The result of Why. Proof.



<https://s-media-cache-ak0.pinimg.com/originals/84/34/b1/8434b124c9fc92003051c56b088906a5.jpg>

Limbic system and neocortex



Why = The Purpose

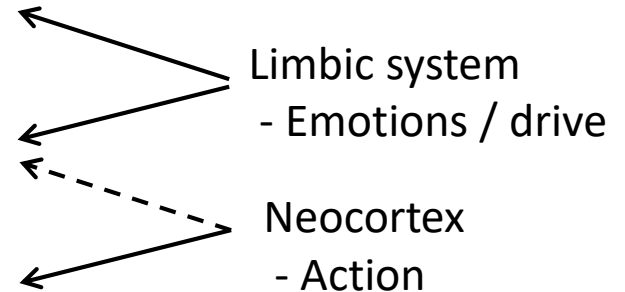
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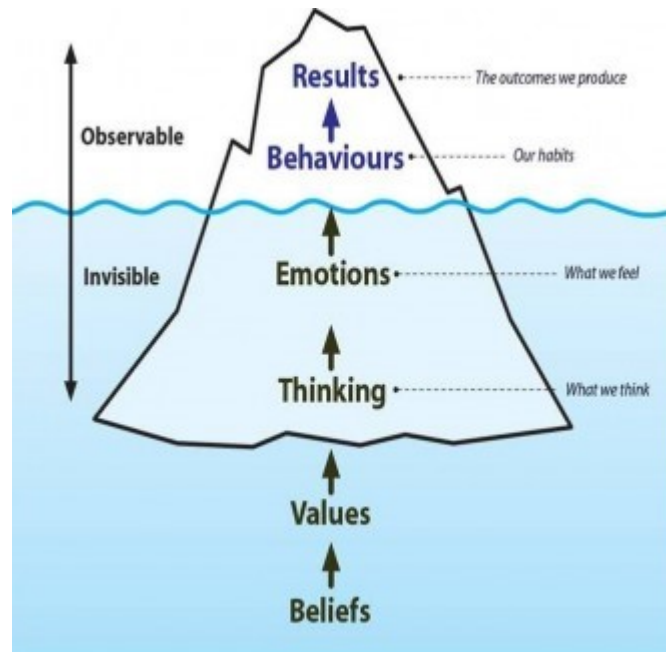
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What = The Result

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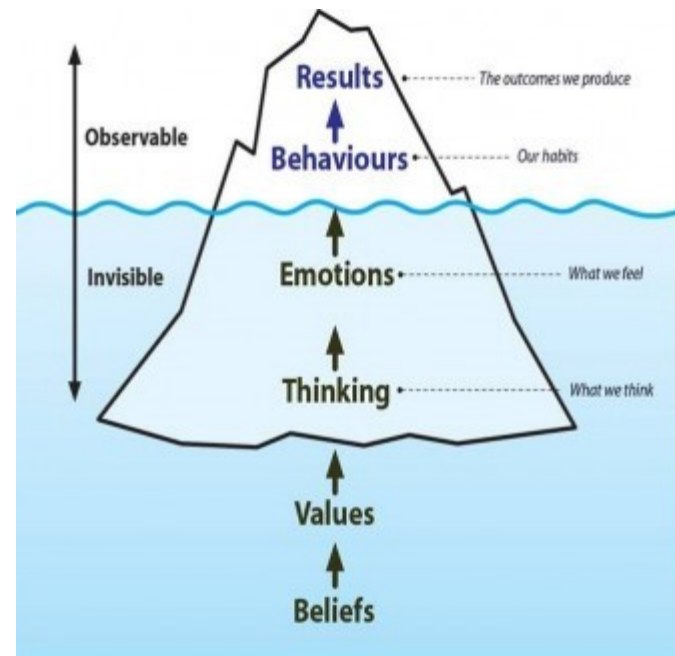


<http://www.coaching.net.nz/wp-content/uploads/2013/06/iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Instinctive behavior

- Limbic system
- ✓ I see a nice thing, so why not to steal it?



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

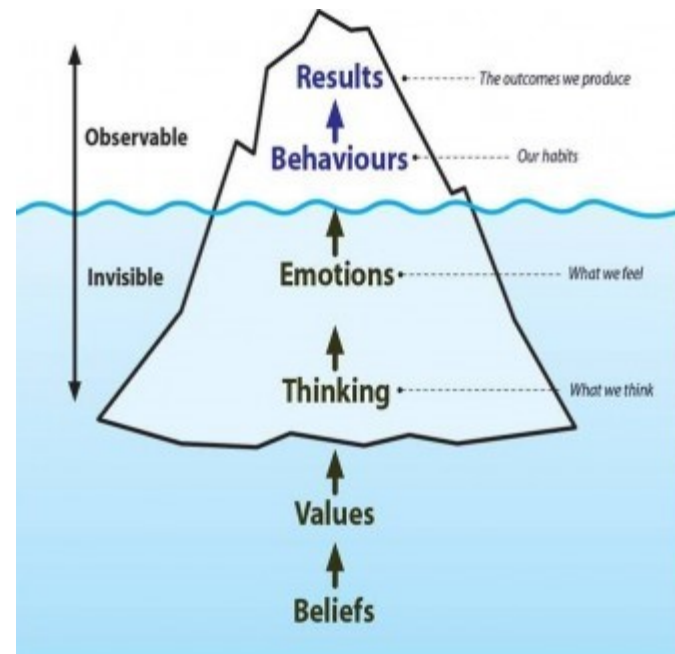
Limbic system and neocortex

Instinctive behavior

- Limbic system
- ✓ I see a nice thing, so why not to steal it?

Socially enforced behavior

- Legal behavior
- Neocortex – limbic system
- ✓ Theft is a crime, and punishment may come



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Instinctive behavior

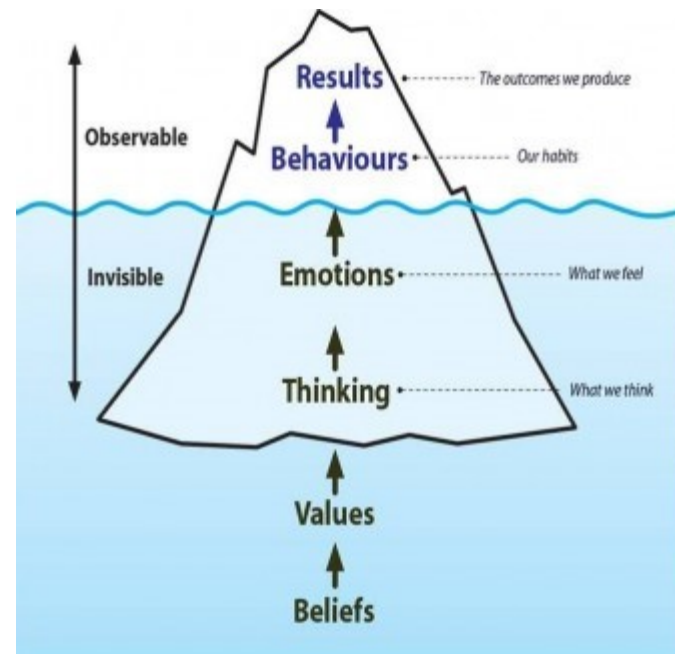
- Limbic system
- ✓ I see a nice thing, so why not to steal it?

Socially enforced behavior

- Legal behavior
- Neocortex – limbic system
- ✓ Theft is a crime, and punishment may come

Moral behavior

- Legitimate behavior
- Limbic system
- ✓ Stealing is a bad thing



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Instinctive behavior

- Limbic system
- ✓ I see a nice thing, so why not to steal it?

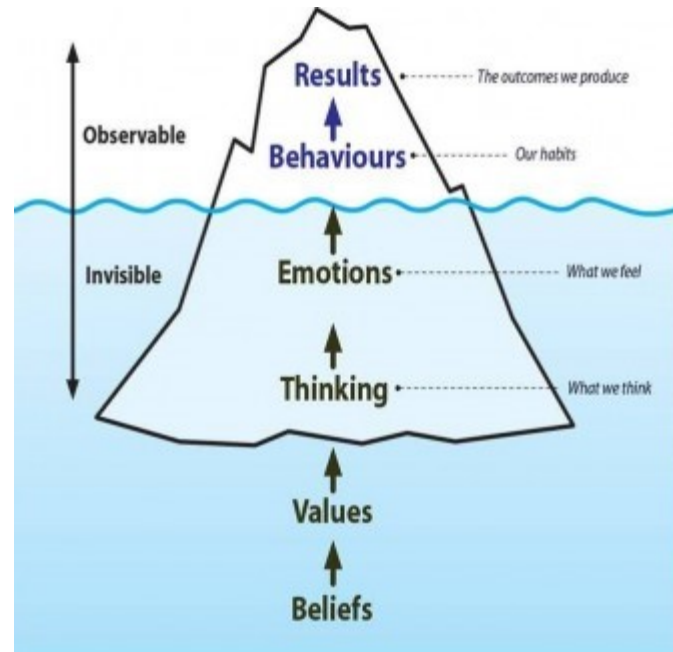
Socially enforced behavior

- Legal behavior
- Moral system
- ✓ Punishment, and punishment may come

Fear of punishment

Moral behavior

- Legitimate
- Moral stance
- Moral stance is a bad thing



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Information

NEOCORTEX

VS

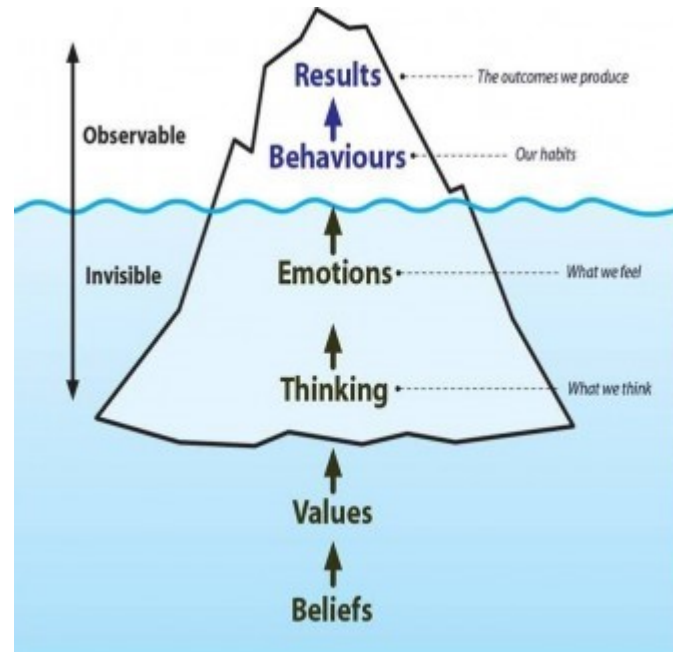
Complex information

NEOCORTEX/limbic system

VS

Values/Philosophy/Faith

Neocortex/LIMBIC SYSTEM



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Information

NEOCORTEX

VS

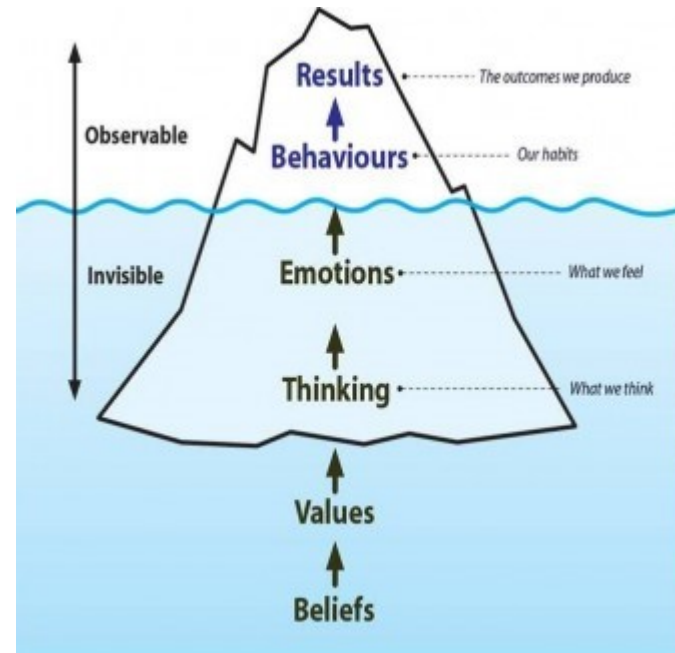
Complex information

NEOCORTEX/limbic system

VS

Values/Philosophy/Faith

Neocortex/LIMBIC SYSTEM



<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

„ The whole is greater than the sum of its parts“

Aristoteles

Limbic system and neocortex

Information

NEOCORTEX

VS

Complex

Brain activity
✓ Highly individual
✓ Very subjective

the outcomes we produce

Our habits

What we feel

we think

<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

“... is more than the sum of its parts“

Aristoteles

Limbic system and neocortex

Information

NEOCORTEX

VS

Complex

Brain activity

- ✓ Highly individual
- ✓ Very subjective
- ✓ Values/philosophy/faith enable coexistence within the larger group/society

“... is more than the sum of its parts”

Aristoteles

the outcomes we produce

Our habits

What we feel

we think

<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Limbic system and neocortex

Information

NEOCORTEX

VS

Complex

Brain activity

- ✓ Highly individual
- ✓ Very subjective
- ✓ Values/philosophy/faith enable coexistence within the larger group/society
- ✓ These systems represent **RULES**

“... is the sum of its parts”

Aristoteles

the outcomes we produce

Our habits

What we feel

we think

<http://www.coaching.net.nz/wp-content/uploads/2013/06/Iceberg-for-blog-from-J-e1371521135440.jpg>

Individual / subjective character of brain activity

LIMBIC SYSTEM – IRRATIONAL

- Irrational preferences
- Irrational fear
- Phobia
 - Panic (extreme) irrational fear
 - Specific
 - Social
- <http://www.fearof.net/>



https://images.sciencedaily.com/2008/03/080320132646_1_900x600.jpg

Individual / subjective character of brain activity

LIMBIC SYSTEM

Top 100 Phobia List

These are the top 100 phobias in the world, with the most common ones listed from the top. You can click on each phobia to learn about causes, symptoms and treatments.

1. Arachnophobia – The fear of spiders affects women four times more (48% women and 12% men).
2. Ophidiophobia – The fear of snakes. Phobics avoid certain cities because they have more snakes.
3. Acrophobia – The fear of heights. Five percent of the general population suffer from this phobia.
4. Agoraphobia – The fear of open or crowded spaces. People with this fear often wont leave home.
5. Cynophobia – The fear of dogs. This includes everything from small Poodles to large Great Danes.
6. Astraphobia – The fear of thunder/lightning AKA Brontophobia, Tonitrophobia, Ceraunophobia.
7. Claustrophobia – The fear of small spaces like elevators, small rooms and other enclosed spaces.
8. Mysophobia – The fear of germs. It is also rightly termed as Germophobia or Bacteriophobia.
9. Aerophobia – The fear of flying. 25 million Americans share a fear of flying.
10. Trypophobia – The fear of holes is an unusual but pretty common phobia.

<http://www.fearof.net/>

https://images.sciencedaily.com/2008/03/080320132646_1_900x600.jpg

Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- (Pseudo)rational preferences
- Imagination



Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- Imagine red car...

Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- Imagine red car...



https://www.google.cz/search?q=red+car&biw=1150&bih=492&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjBupCC_5PSAhVDbBoKHe53B98QsAQIGA#tbn=isch&q=red+car+white+background

Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- Imagine red Ferrari...



https://www.google.cz/search?q=red+car&biw=1150&bih=492&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjBupCC_5PSAhVDbBoKHe53B98QsAQIGA#tbn=isch&q=red+ferrari+white+background

Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- Imagine red Ferrari 458 from the side...



https://www.google.cz/search?q=red+car&biw=1150&bih=492&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKewjBupCC_5PSAhVDbBoKHe53B98QsAQIGA#tbn=isch&q=red+ferrari+458+from+side+white+background

Individual / subjective character of brain activity

NEOCORTEX – RATIONAL

- Imagine red Ferrari 458 from the side...



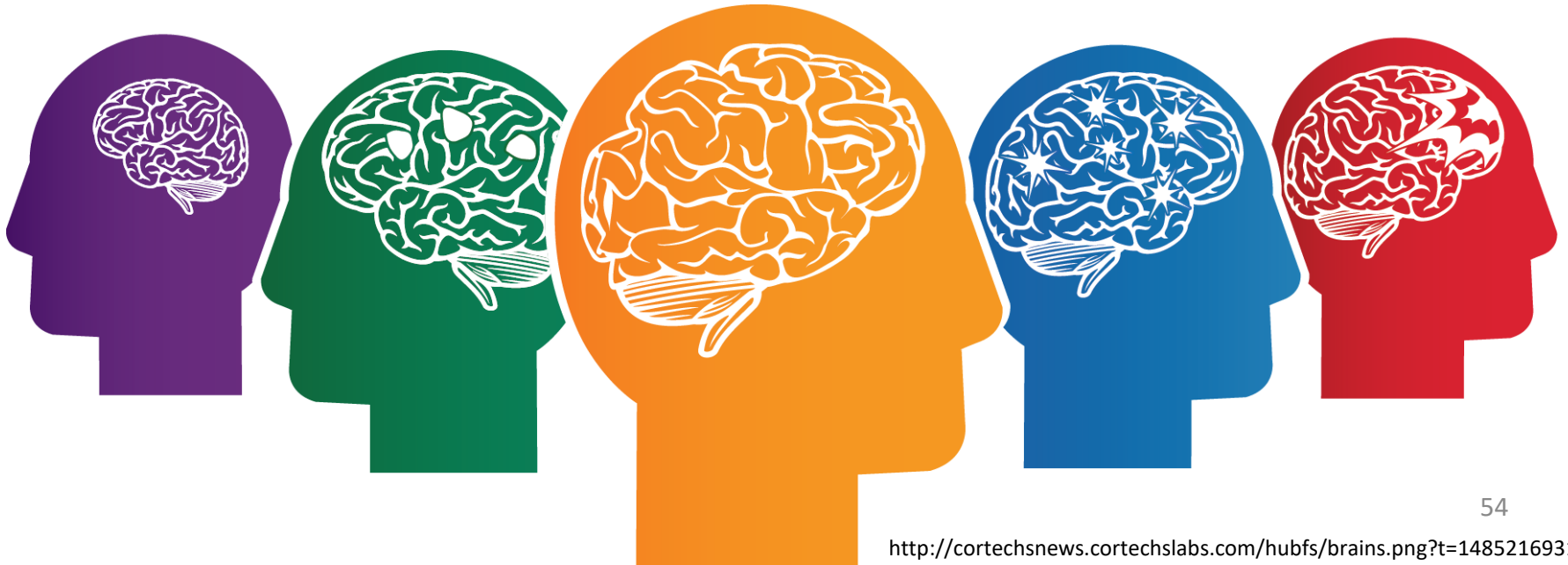
https://www.google.cz/search?q=red+car&biw=1150&bih=492&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjBupCC_5PSAhVDbBoKHe53B98QsAQIGA#tbm=isch&q=red+ferrari+458+from+side+white+background

- Closer specification (more conditions) leads us to a more consistent output, but increases the likelihood of errors
 - ✓ Random – some specifications are randomly overlooked
 - ✓ System – some specification is unknown (How does Ferrari 458 look like?)

Every brain is unique

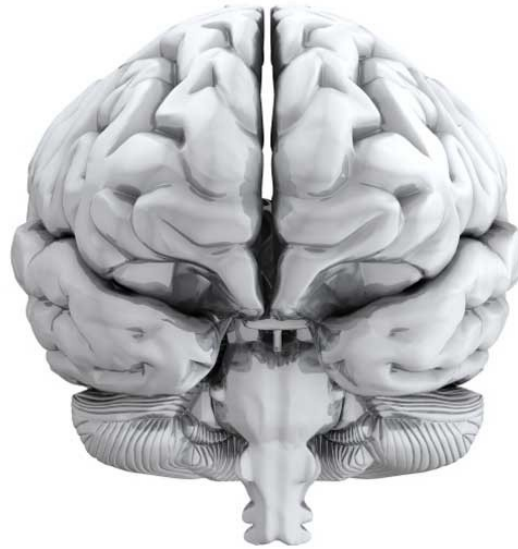
- Emotionally
 - Limbic system
- Rationally
 - Neocortex

✓ Genetics
✓ Environment



Every brain is a powerful machine...

... which is hard to control



- ✓ The conflict between the limbic system and the neocortex
- ✓ The problem with effective control of the neocortex

