

The rainbow

hypothesis

An interdisciplinary approach to
personality

By Bodil Nissen
January 2020 ©

We are the most clever, specialized and successful
mammal that has ever lived on Earth ...
Mammal man

Our species has populated
every inhabitable corner of the Earth.



... our numbers
increasing six-fold
in just 200 years!



But our success as a species is on
the verge of endangering our own existence on Earth.

We know that
we are extremely adaptable and
have exceptionally well-developed fine motor skills,
language and writing
making it possible to pass on experience and knowledge
regardless of time and space,
from one generation to another.

And as a mammal
we possess an extraordinary
variety of individual skills.

But what is the foundation of this diversity?

What motivates us to pursue this or that?

Why are there left and right wings
across the globe?

And why, on average, are women more left wing?

What shapes our personalities,
and in the end, the Earth?

Personality has been perceived as

split by moral and desire.

As with an angel in one ear and a devil in the other.

But biology simply provides us with the best possible tools for survival as a species, and both morality and desire appear to play an essential role.



1923

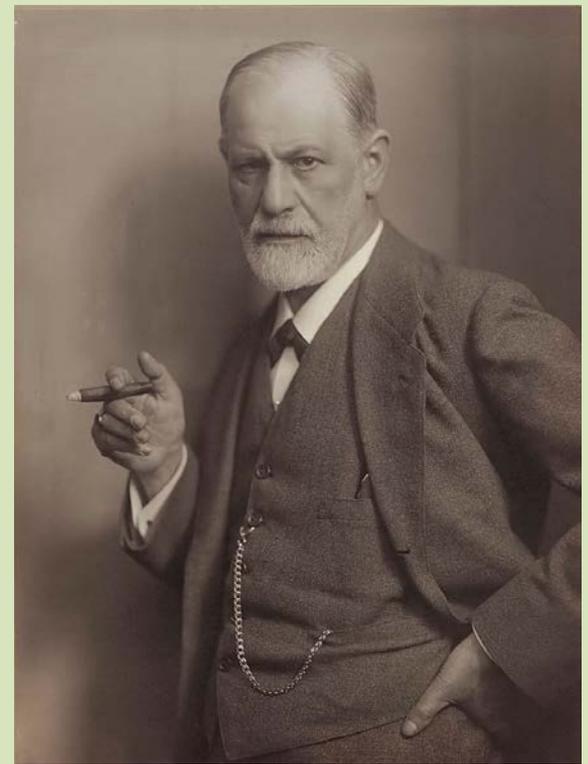
Sigmund Freud

An Austrian neurologist and the founder of **psychoanalysis** publishes “The Ego and the Id”, a book in which he describes our conscious **Ego** as caught between the unconscious:

Id – our instinct to pursue pleasure

and the unconscious:

Super Ego – the conscience, norms and ideals we learned from our parents



1921



Carl Gustav Jung

A Swiss psychiatrist, pupil of Freud and the founder of **depth psychology** publishes:

“Psychological Types”

“the fruit of nearly twenty years' work in the domain of practical psychology,” in which he describes eight separate personality types based on his own observations as a psychiatrist.

Jung introduces three dimensions to personality

- | | | |
|------------------------------|--------------------|----------------------|
| 1. The perceiving function : | Sensing (S) | Intuition (N) |
| 2. The judging function: | Feeling (F) | Thinking (T) |

Jung believes that people can take in stimuli through sensing or intuition and that they can reach decisions based on feeling or thinking. Everybody uses all functions but one of them habitually predominates.

Jung also believes that people are introverted or extraverted, depending on whether they find energy in and prefer to focus on the inner or outer world:

- | | | |
|-------------|-------------------------|-------------------------|
| 3. Attitude | Introversion (I) | Extraversion (E) |
|-------------|-------------------------|-------------------------|

Hence, the four psychological functions are either internally (introverted) or externally (extraverted) focused, making eight different personality types in total.

1943

Katharine Cook Briggs and Isabel Briggs Myers

The mother and daughter team from America take up Jung's work and create the:

Myers Briggs Type Indicator (MBTI)

Today, a widely used personality assessment tool.

They add a fourth dimension

Perceiving (P)

Judging (J)

as additional ways to distinguish whether people are more prone to keep on taking in and considering possibilities until “the last minute” (P) or more prone to “planning and making decisions” (J). This results in 16 personality types when combined with Jung’s 8.

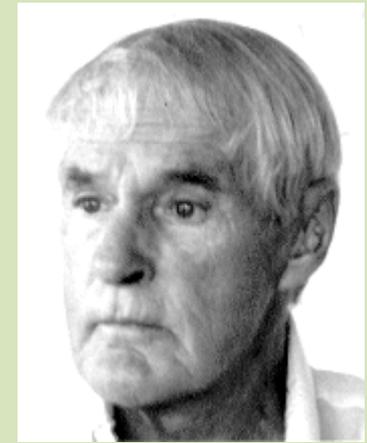
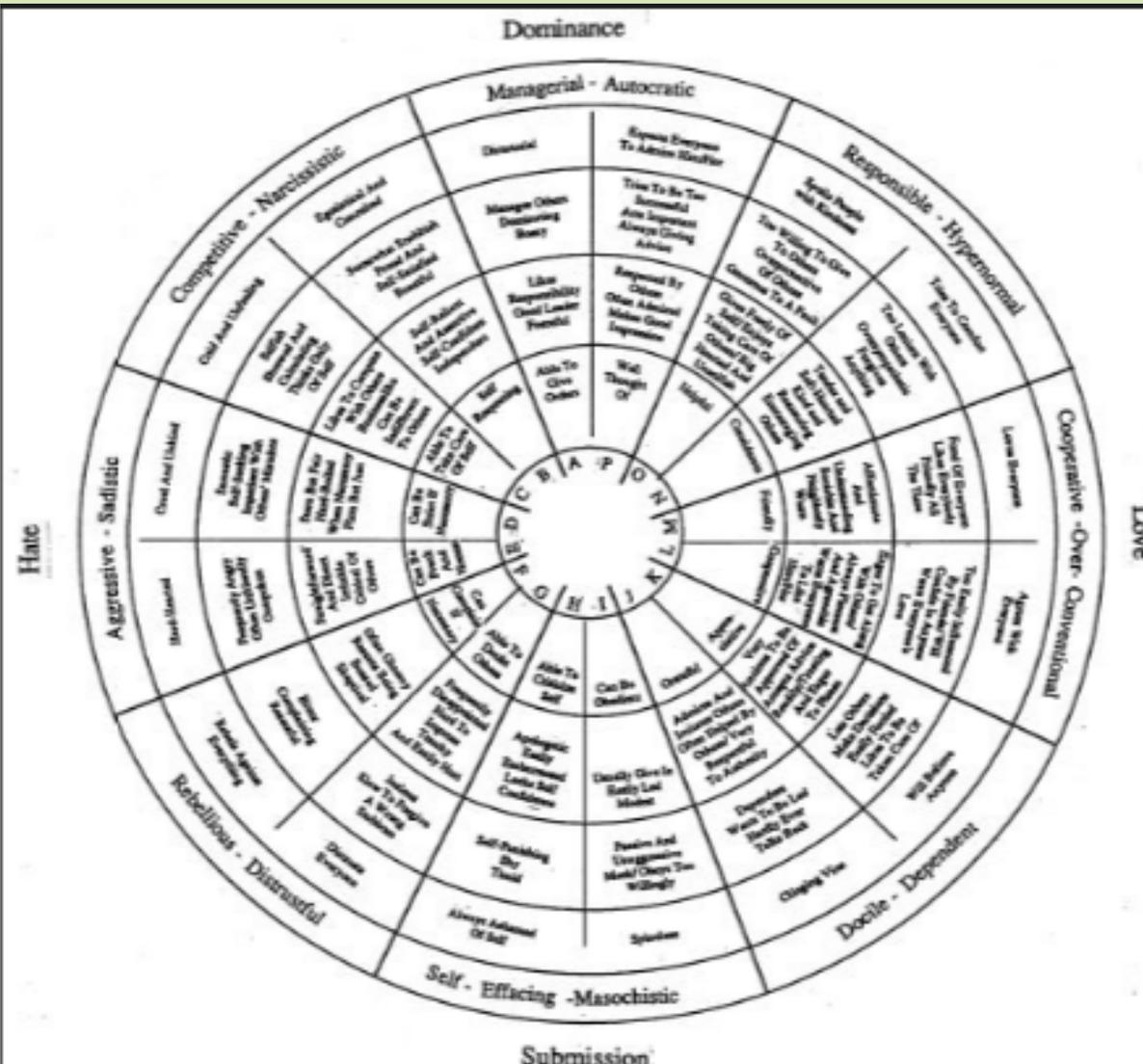
Their aim is for people to get to know themselves and to become the best version of themselves, allowing them to choose good careers and live fulfilling lives.

Myers and Briggs emphasize that each personality type has its own gifts and challenges, strengths and weaknesses.



Research shows that the four functions in the Myers Briggs Type Indicator are not true dichotomies.

But research also shows that sensing, intuition, thinking, feeling, perceiving, judging, introversion and extroversion do indeed describe personality traits as defined in the five-factor model - a taxonomy widely used today by psychological researchers.



1950

Timothy F. Leary

An american psychologist develops the

interpersonal circumplex, a circular continuum of personality containing all existing personalities formed from the intersection of two axes: 1) hate–love and 2) submission–dominance.

1997

Henrik Dahl

A danish Sociologist at ACNielsen AIM introduces the **Minerva model**, which initially divides the Danish population into four different lifestyle segments based on the responses of a representative sample of 2,500 Danes to questions on consumption, values and political observation. The Mineva model is inspired by Pierre Bordieu's field theory and the value survey RISC.



TABLE 1
Major Dimensions in Different Value Systems

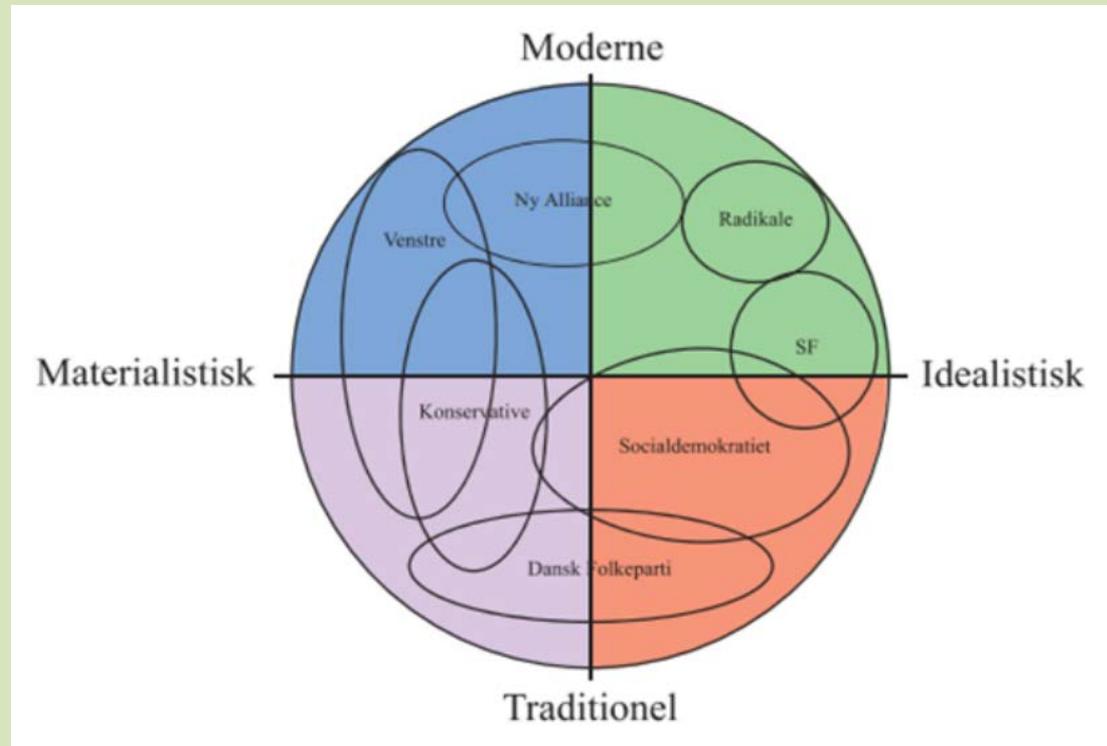
	1. Dimension	2. Dimension
VALS	Modern/Traditional	Action-oriented/Principle-oriented
RISC	Openness/Resistance to change	Ethics/Hedonism
CCA	Change/Stability	Material/"Spiritual" works
Grunert/Schwartz	Openness to change/Conservation	Self-enhancement/Self-transcendence
Valuescope	Change to Modernity/Stability	Pragmatism/Loyalty Materialism/Humanism
Kompas	Modern/Traditional	Individually-oriented/Socially-oriented
Danish attitudes	Modern/Traditional	Individuality/Collectivity
Minerva	Modern/Traditional	Social/Individual

Source: Flemming Hansen et al., 1998

Various models from different parts of the world also describe lifestyle segments as based on two major dimensions. They share striking similarities. Like by Cambridge Analytica the models are used to analyze populations lifestyles for marketing purposes.

The Minerva model and other lifestyle models

Using the models, political parties can be categorised based on their values. The figure below, based on the Minerva model, is an attempt to illustrate where the seven biggest parties in Denmark lie after the 2007 elections. Studies show that there continues to be a growing majority of women in left wing parties in Denmark.



Question

Could there be a biological explanation for the observations and hypotheses presented by Freud, Jung, Myers, Briggs, Leary, Bordieu, Dahl and others?

Indeed,
there could be!

The dopamine system and the oxytocin system

These two important hormonal systems deeply affect human motivation, aversion, reinforcement learning, memory and decision-making.

As part of our brain's reward system they work together and with other hormones in the body. Their impact depends on, e.g. polymorphism in the expression and distribution of receptors, genetically and epigenetically/culturally caused variations in hormone production, as well as their release, inhibition and (re)uptake throughout the body, even in the gut microbiome.

Dopamine

This neurotransmitter helps us focus our senses on the physical world and helps us make impersonal, logical assessments: Can I benefit from this?

It controls motivated behaviour based on past experience.

It plays a role in our olfactory sense and enhances our perception of colours and contrast in daylight.

Dopamine makes us excited and focuses our attention when we spot (new) opportunities involving control, food, resources, power, sex, status and dominance.

It also stimulates purposeful movement that involve, for example, practising skills, playing and wrestling.

It acts on the sympathetic nervous system, in other words, it is a call to action and enhances survival using the fight-flight-freeze response.

It affects our level of alertness and controls our motor function and **use of energy**.

Is dopamine also underpinning our subjective instinct for pleasure and our logic?

Oxytocin

This neuropeptide helps us focus our senses on people's reactions and make person-centred assessments: Do my parents/does my tribe approve of this? Believed to enhance social motivation for vocal learning, it also plays a role in our olfactory sense and our sense of hearing.

Oxytocin is secreted when we meet friends and receive recognition or a gentle touch from others.

It enhances socialisation by helping us to learn to obey and cherish the rules of the family/culture and to adapt to them.

It leads to acceptance, trust and love and signals rest and digest.

It acts on the parasympathetic nervous system – the body's brakes.

It enhances survival by promoting the tend and befriend response.

It affects smooth muscles and promotes relaxation, restitution and **mass building** (storing of energy).

Does oxytocin also affect our objective mirroring of our selves in others and serve as the source of our conscience?

We are shaped by both nature and nurture

Biological success is when a species stays alive long enough to pass on its genes and secure its offspring, generation after generation.

This is promoted when the maturing brain of a new generation learns from good and bad experiences in its physical environment and the culture it is born into.

Biological success depends on the total population's ability to survive under and exploit various circumstances throughout history. Broad variation in the gene pool - between the individuals in a population - can ensure exactly that.

Dopamine - our “competition drive” to survive

Dopamine makes us focus on objects, helping us to interact physically with them. Newbornes will automatically focus on and reach out for things, putting them in their mouths to investigate their smell, taste, texture and shape. Babies are motivated by dopamine to move their arms, legs and body until able to move towards objects to study them and build up experience: Can this be eaten or otherwise used? Is it unpleasant?

Later, children also start to play, wrestle and compete with others to build up even more experience, strength and skills. By using trial and error, mammals become stronger and more logical.

Humankind – like other animals – is born with instincts and reflexes that enhance these behaviours, which are in turn reinforced and refined through experience, knowledge and memory during one’s lifetime. The motivation that dopamine is part of has been called physiological or organic motivation, but here it’s preferred to call it “competition drive”, since competition is both an important goal and means. It makes us put in an effort, practice, expend energy, work hard, take risks or even fight to gain even more energy, material goods, money or a better appearance and status in our quest for food, shelter, security, tools and, later - sexual partners and self actualisation. Dopamine, so to speak, helps us to fight for our place in the social hierarchy and for our self-fulfilment.

But another aspect also begins to play a role at birth - culture.

Oxytocin - our “community drive” to survive

Oxytocin initially causes newborns to focus on other people’s eyes and faces and, later, on recognising and remembering members of the family or tribe.

The parent, typically the mother, automatically starts talking with her child, putting words and facial expressions on both things and feelings. Whenever the child gets things right, the reward is a smiling face, hugs and kisses. Later, the child’s upbringing includes establishing moral guidelines by saying no, for example: "OUCH, don't bite me – that hurts" and "NO, you can't have that toy - it's Carl's", followed by dissatisfied facial expression. Depending on where the child is born, nurturing installs a brake that cultivates consideration for others’ feelings and boundaries. Born with reflexes that cause the child to copy facial expressions and the sounds of others, the child eventually learns to master the language and culture.

The motivation that oxytocin is part of has been called social motivation, but here it’s preferred to call it “community drive”, since community is both an important goal and means. It makes it possible for us to socialise, cooperate and survive as a group and to protect and nurture our fragile offspring. As the origin of our empathy and moral judgement, it makes it possible for us to put aside our own interests for the benefit of others.

So when we discuss whether personalities are formed by
nature or nurture...

The answer is certainly:

Both are significantly important!

Even though we have no recollection
of the first years of our lives both good and bad physical and social
experiences have shaped our brains.

We all have different natural genetic predispositions.

But positive or negative nurturing, and traumatic or
beneficial events in life, can alter our brains and determine
whether we reach our potential
or maybe develop mental health issues.

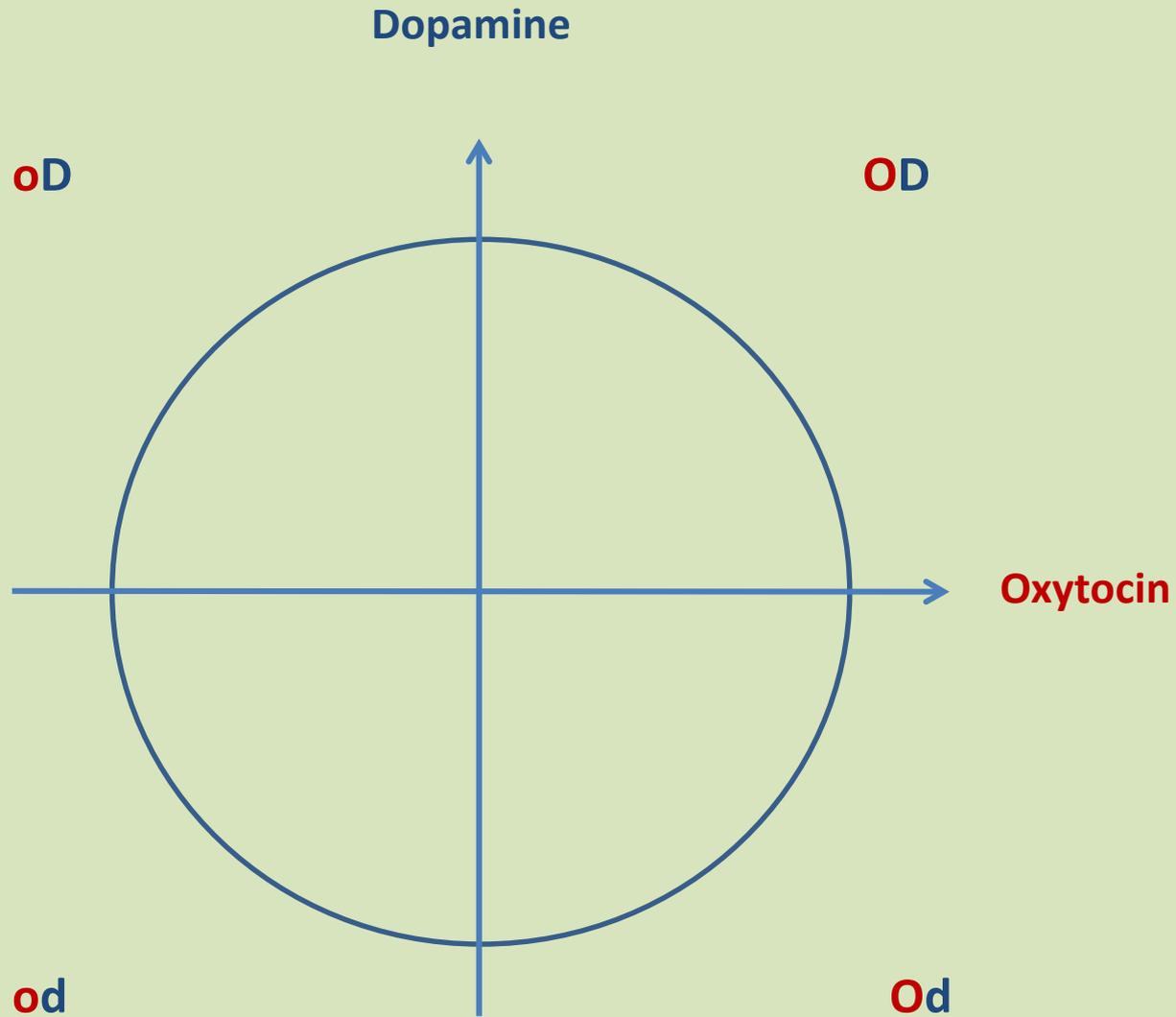
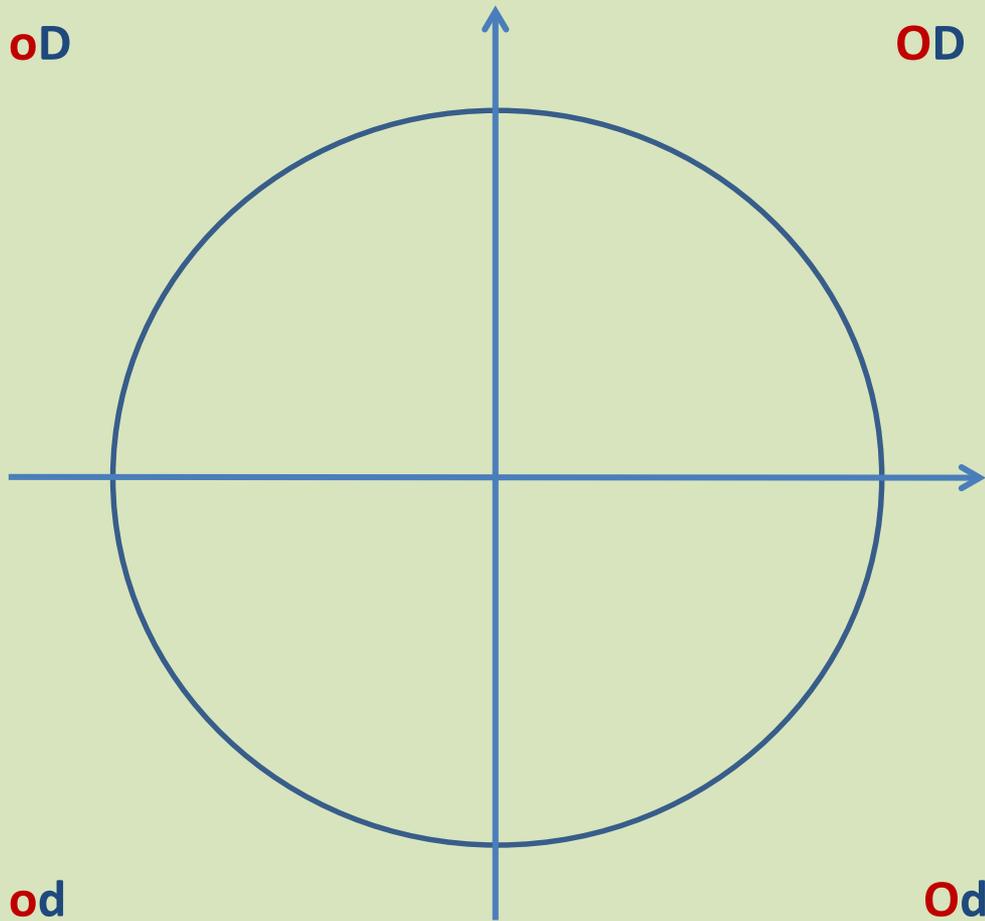


Figure 1. If two normal distributions of low to high oxytocin and low to high dopamine are projected as two dimensions the four quadrants are: low oxytocin/high dopamine (oD), high oxytocin and high dopamine (OD), low oxytocin and low dopamine (od) and high oxytocin and low dopamine (Od)

Dopamine



Blue segment

High education
High prestige
High income
Private sector
Results-orientated

Green segment

High education
High prestige
Middle income
Public sector
and education
Inner values

Violet segment

Low education
Middle prestige
High income
Primary industry,
Craft business

Rose segment

Low education
Low prestige
Low income
Family, local area,
Care work
Inner values

Figure 2. The four segments, oD, OD, od and Od correspond well with the Minerva model and similar models

Figure 3. MBTI identifies four functions and distinguishes between 16 personality types

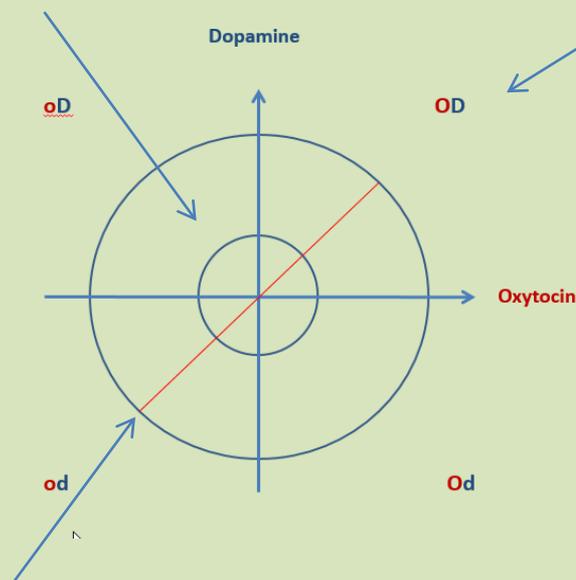
Introversion – extroversion

What if introversion means you need the time and space to make up your mind because you are close to the centre, at the top of the Gauss curve, where things are visible from more perspectives.

Typical extraverts act introvertedly if they are surrounded by experts in a field unfamiliar to them.

Perceiving – judging

What if perceiving is a question of assessing more possibilities before deciding as result of being close to the dividing line between dopamine and oxytocin?



Sensing – intuition

We all use our senses but what if intuition is a matter of having both high dopamine and high oxytocin (OD) and sensing is the opposite (od)?

Thinking – feeling

What if Thinking and Feeling are determined by respectively most dopamine (oD) or most oxytocin (Od)?

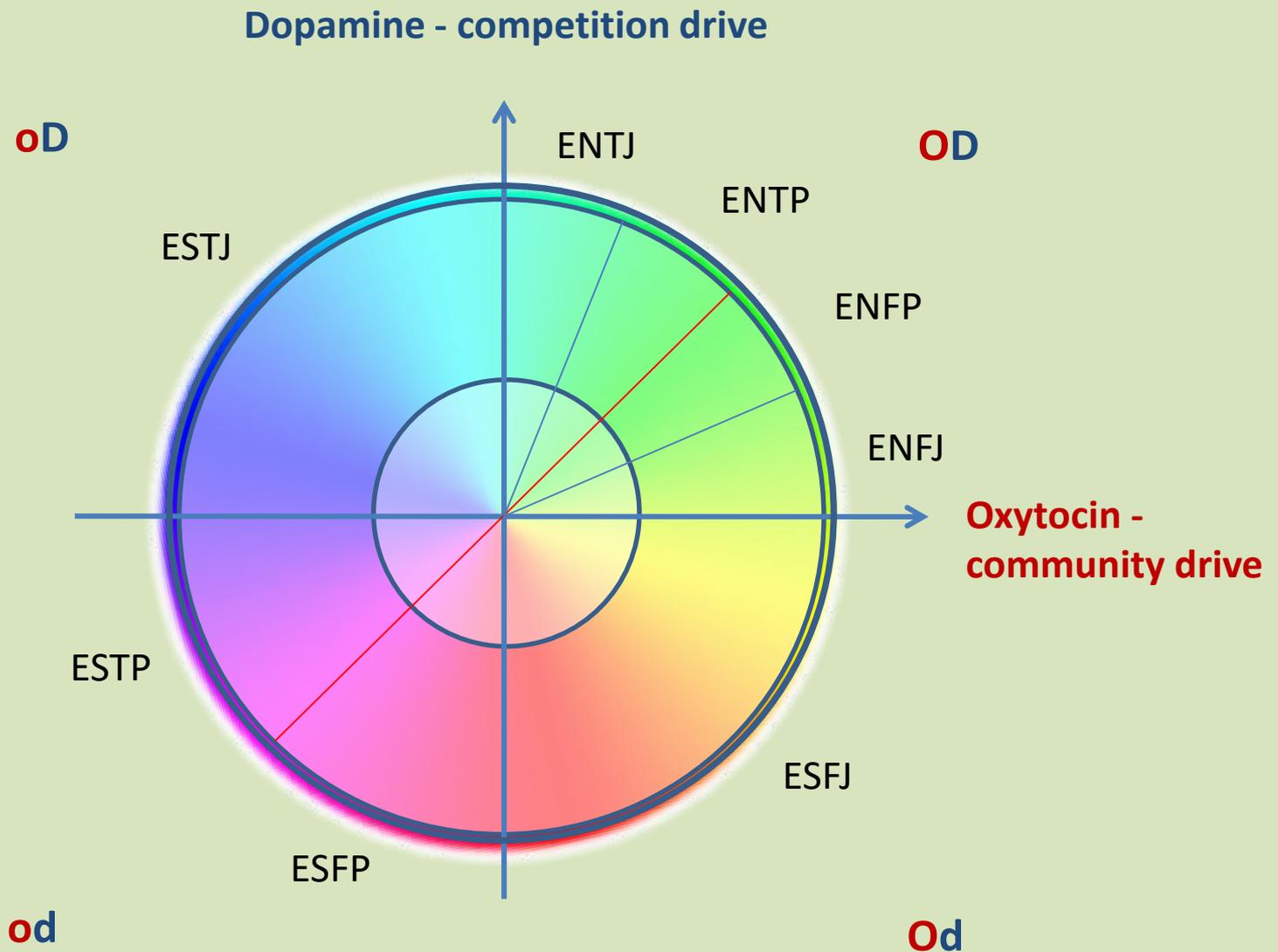


Figure 4. Proposed correlation between oxytocin/dopamine and MBTI in the rainbow hypothesis

Extravert: outer circle (50% of total). Introvert: inner circle (50% of total). The figure is made up by the projection of two normal distributions – hence there is a higher density of people at the centre/the top of the Gauss Curves. There is no limit but rather a continuum between the 16 types, as well as between extroversion and introversion, based on this hypothesis.

Dopamine - competition drive

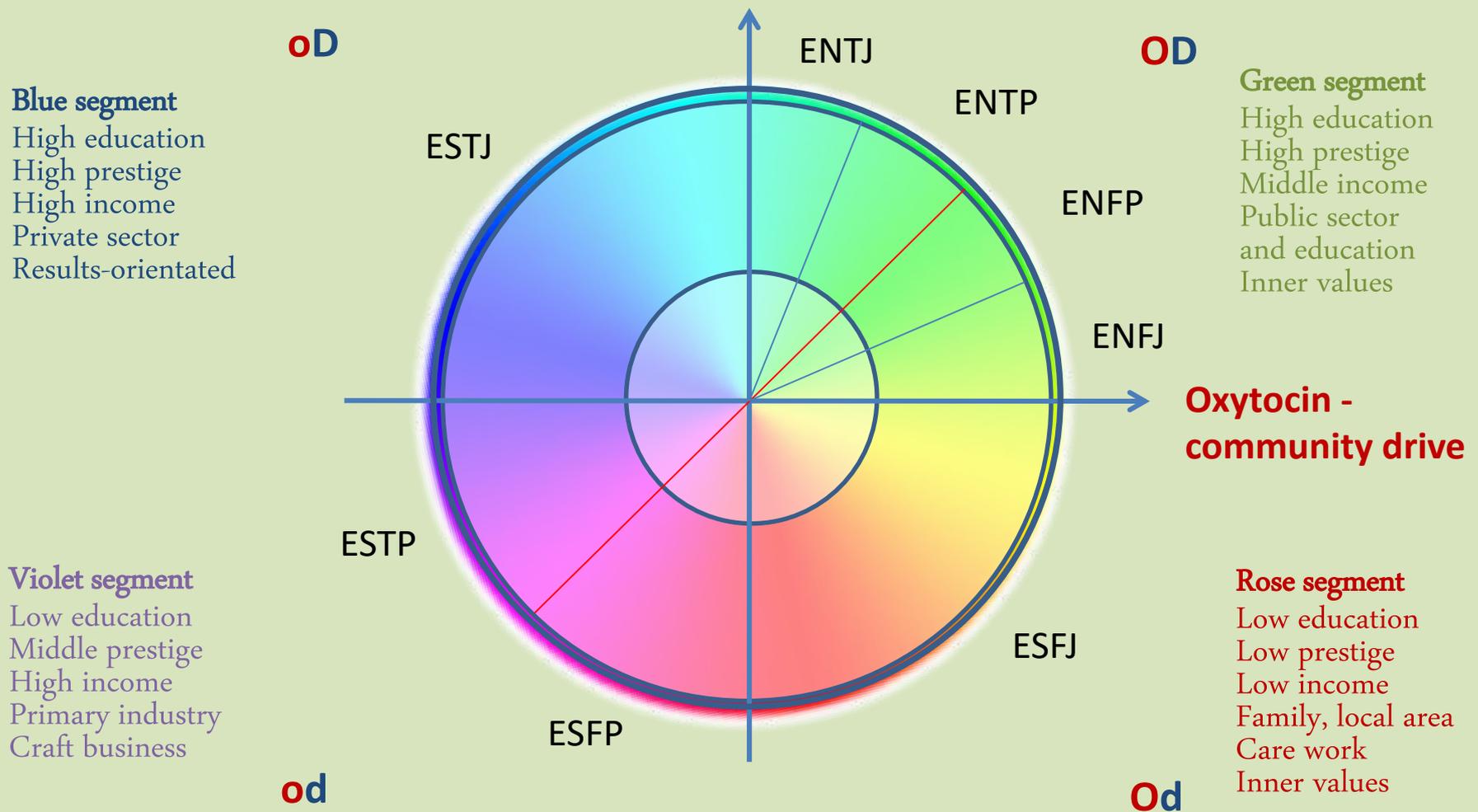


Figure 5. Biology underlying our personalities ... is linked to our political viewpoints

Proposed correlation between oxytocin/dopamine, Minerva Segmentation and the Myers Briggs

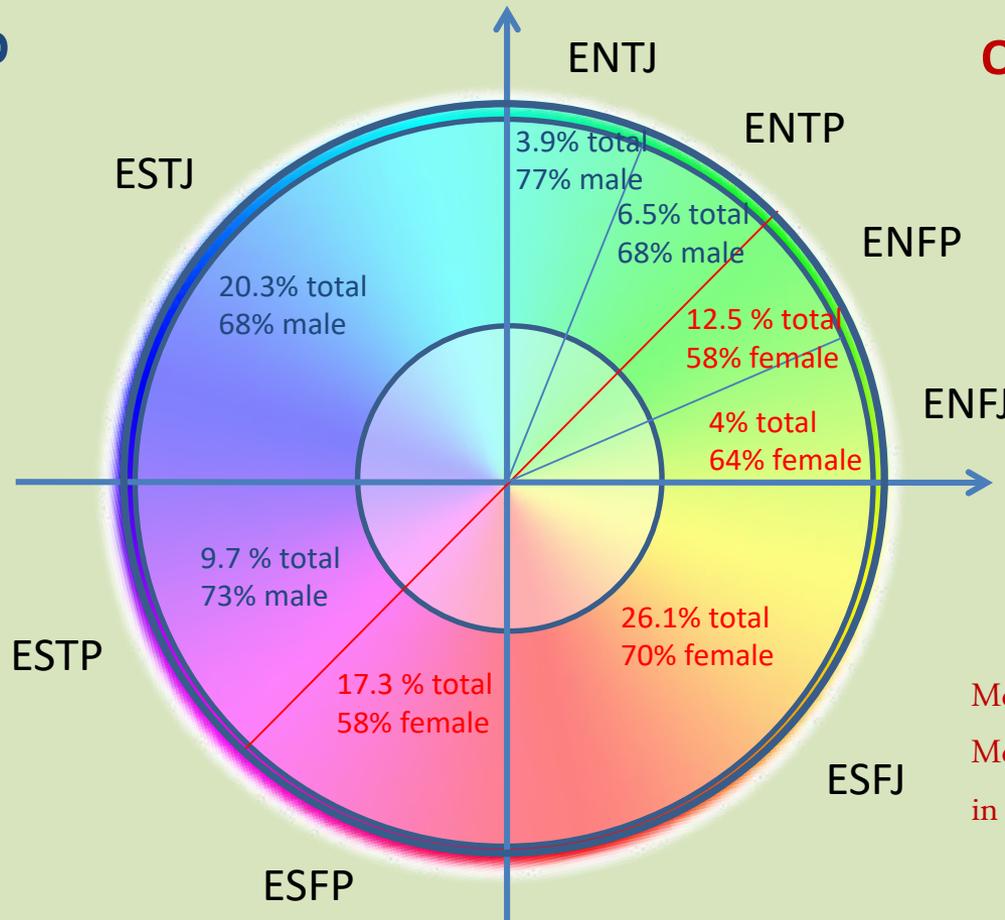
Type Indicator (MBTI) in the rainbow hypothesis. Introvert inner circle (50 % of total) . Extrovert outer circle (50 % of total)

Dopamine - competition drive

Blue segment **oD**

OD Green segment

More men
More right wing
in this hemisphere



Oxytocin - community drive

More women
More left wing
in this hemisphere

Violet segment **od**

Od Rose segment

Figure 6. MBTI types by percentage. Female dominance is found where the left wing parties are dominant

Introverts plus extroverts, American distribution of those who have taken the test (may not be representative).

Source: Careerplanner.com

Figure 7. Everything comes with a price

Being able to make quick assessments and decisions as an individual and as a group has been crucial to survival throughout history.

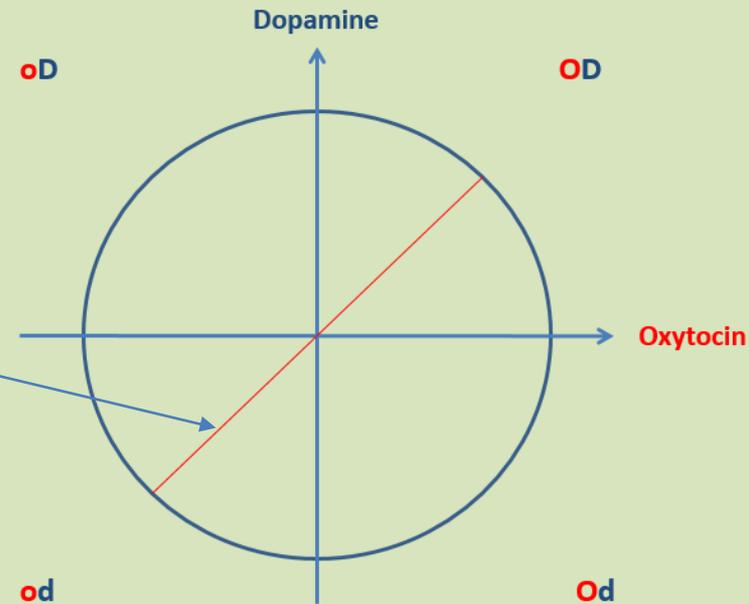
This is deeply embedded in our DNA.

Are some psychiatric disorders perhaps the price humankind must pay for broad cultural and genetic variation?

What if being on the red line in the figure - right in the middle between the influence of dopamine and oxytocin - makes it difficult to make decisions?

Maybe opposing voices are heard in the head as the mind tries to make sense of opposing impulses?

And maybe the person even becomes catatonic/freeze?



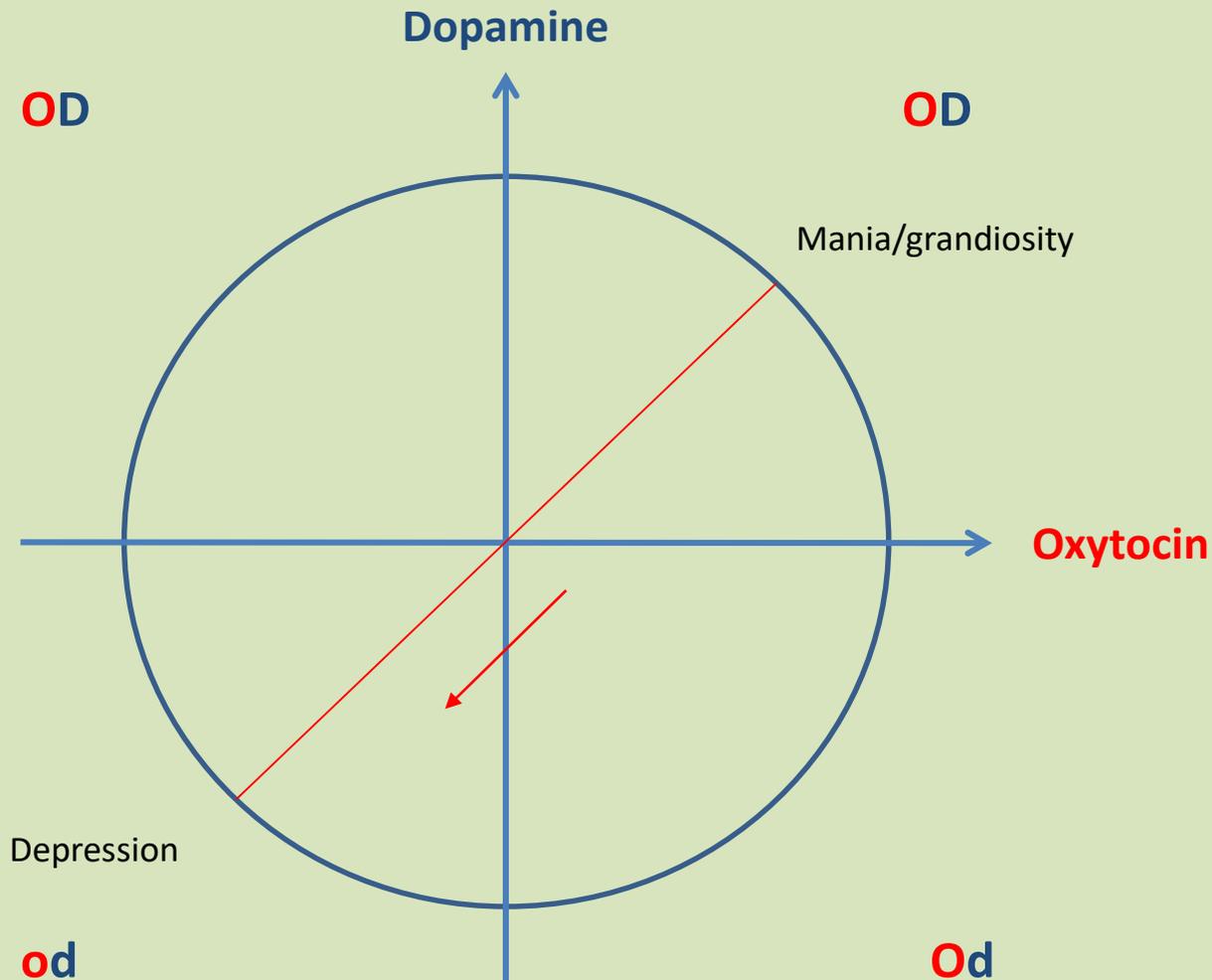


Figure 8 . Vulnerability to depression and mania

Is depression and mania some of the vulnerabilities associated with the extremes of the outer circle, in contrast to what Leary proposes (see figure 9 on the next slide)?

And could a relative decline in both oxytocin and dopamine explain some cases of depression?

Does a key to understanding the changing personalities of bipolar disorders lie here? [The rainbow hypothesis, Nissen 2020 ©](#)

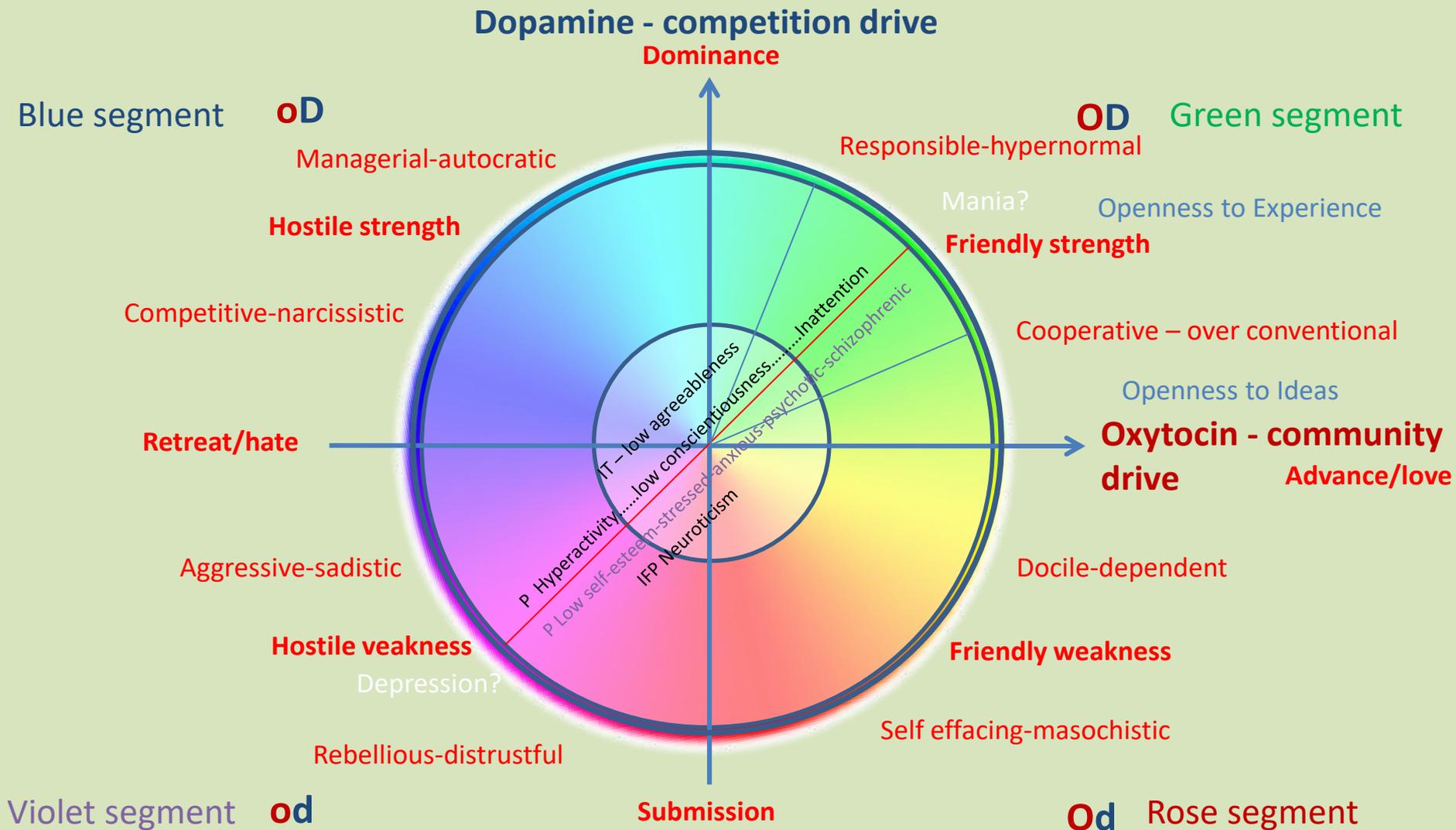


Figure 9. Vulnerability to psychiatric disorders – Leary, five-factor model, MBTI and the rainbow hypothesis

Vulnerable extremes: Outer edge, violet segment, centre (strong introversion) and od-OD centreline

Blue text: Five-factor model Red text: Leary's interpersonal circumplex Black text: MBTI (I: introvert, F: feeling, T: thinking, P: perceiving)

Important source: Reinterpreting the Meyers-Briggs Type Indicator from the perspective of the five-factor model of personality

A few perspectives

If we are concerned about the future...

we need to understand our own strengths and weaknesses better than
autocrats and marketing bureaus
who are harvesting our personality types
from our digital profiles

And if we consider the ongoing:

- Pollution and climate change
- Declining biodiversity
- Continued population growth
- Scarcity of food and drinking water
- Degradation of nature and fertile soil
- Evolution of antibiotic resistance
- Conflict and migration

... finding sustainable solutions to humanity's challenges

- in time -

depends on our ability to make optimal use of the diversity of mammal man.

We need to use all our various skills
and our ability to form stellar teams and harvest synergy
when we cooperate.

This requires insightful leaders
who know how to nurture everyone's
potential to advance toward a sustainable future



Thank **YOU** for reading!

And my deepest thanks to everyone
who has helped me in the process
of developing and communicating
this hypothesis.

Postscript – Please note

No two people are alike, but many people share similar traits. Please note that the segments in the Minerva model and the 16 Myers-Briggs personality types are statistical types that can be separated from each other by empirical data. They are not statistical segments or types that describe all individuals in the group, which is why the hypothesis presented here is called the **rainbow hypothesis**. The circle with all the colours of the rainbow represents humanity, and people can belong anywhere in the circle, i.e. in the middle, along a dividing line, and possess traits more or less close to the segments or personality types.

The **rainbow hypothesis** is based on empirical data from various disciplines and on studies showing that dopamine and oxytocin both play an important role in personality type. Analysing the data based on gender would likely improve the correlations between data, since it's known that oxytocin/vasopressin, dopamine and sex hormones act differently in men and women.

Dividing the data based on age, i.e. taking brain development into consideration, would also be relevant. Personality is believed to be relatively stable once people reach adulthood. But we need to take into account that the brain has more plasticity than previously believed, and training can change the brain to some extent. Personality can also change due to mental illness or post-traumatic stress.

Interesting fields for further study

The field of genetics supports Jung, who said that “a child is not born Tabula Rasa”. Is competition drive perhaps Jung’s animus, and community drive his anima?

Was Soren Kierkegaard an INFP personality? And both an introvert and close to the centre line between competition drive and community drive? Is this the reason why it was hard for him to make decisions? The reason why he was haunted by doubt, anxiety, despair and depression? Was his personality type the reason why he spent so much time trying to find the answer to becoming oneself as he wrote “Either Or”, “Fear and Trembling” and “The Concept of Anxiety?”

What is the association between competition drive and community drive and Gardener’s multiple intelligences and learning styles

- De Bono’s thinking hats
- The caste system in India
- The yin & yang philosophy
- Inhabitants in different parts of the world?

Continues on next slide.

Is personality less stable than previously believed?

New evidence shows that omega-3 deficiency and an unbalanced microbiome are associated with anxiety, autism, ADHD, schizophrenia and depression and that the microbiome plays an important role in a large array of modern, autoimmune, lifestyle-dependent diseases.

How do nutrition, the microbiome and (epi)genetics jointly play a role in personality development and in psychiatric disorders?

Is there a correlation between the lateralisation and specialisation of the brain and the functions of oxytocin and dopamine?

If left or right wing preferences, motivation and skills are part of our nature, how can democracy best support both political wings?

People with extremely low oxytocin lack empathy and therefore only consider their own interests ; they are called psychopaths and sociopaths.

Poorly educated sociopaths often end up in jail and have a long criminal record. Well-educated psychopaths often make their way into influential positions, where they destroy working environments, steal public money and even lead sects or countries to war. Psychopaths are often hard to spot since they appear to be ambitious, charming and convincing, and because they easily lie without blinking an eye. They are extremely dangerous, however, to the people around them and costly for society.

Is there way society, workplaces and people in general can protect themselves, children and youngsters against?

These are just of few of the questions that can be proposed.

Brief selection of interesting literature

- Divided into four subjects and listed chronologically

Oxytocin

- Neurobiological Aspects of Face Recognition: The Role of Oxytocin, NCBI, OL Lopatina - 2018
- A hypothesis on a role of oxytocin in the social mechanisms of speech and vocal learning, NCBI, C Theofanopoulou - 2017
- Oxytocin Receptor Polymorphisms Are Differentially Associated with Social Abilities across Neurodevelopmental Disorders, Researchgate.net, DA Baribeau - 2017
- Oxytocin for the treatment of drug and alcohol use disorders, Behavioural Pharmacology, MR Lee - 2016
- The role of the oxytocin-neurophysin I gene in contributing to human personality traits promoting sociality and plasma immunogenic oxytocin levels, NCBI, A Chong – 2017
- Variation in the oxytocin receptor gene (OXTR) is associated with differences in moral judgement, NCBI, RM Bernhard - 2016
- Oxytocin and emotion processing. NCBI, M Di Simplicio - 2016
- Oxytocin-Induced Changes in Monoamine Level in Symmetric Brain Structures of Isolated Aggressive C57BI/6 Mice Bulletin of Experimental Biology and Medicine, IV Carpova – 2016
- Commentary: Oxytocin Enables Maternal Behavior by Balancing Cortical inhibition, Frontiers in Behavioral Science, T Yuan - 2015
- Oxytocin Affects the Connectivity of the Precuneus and the Amygdala, NCBI, J Kumar - 2015
- Oxytocin's fingerprint in personality traits and regional brain volume. NCBI, E Andari - 2014
- Oxytocin, Motivation and the Role of Dopamine, NCBI, TM Love - 2014

- Polymorphisms in the oxytocin receptor gene are associated with the development of psychopathy, Cambridge.org, MR Dadds - 2013
- The Neurobiology of Collective Action, Frontiers in Neuroscience, P Zak - 2013
- The role of the striatum in social behavior, NCBI, RB Mendoza - 2013
- Sex, receptors, and attachment: A review of individual factors influencing response to oxytocin, Frontiers in Neuroscience, KS McDonald - 2013
- Social reward requires coordinated activity of accumbens oxytocin and 5HT, NCBI, G Dölen - 2013
- Oxytocin receptor gene (OXTR) is related to psychological resources, NCBI, S Sapphire-Birnstein – 2011
- Associations between the oxytocin receptor gene (OXTR) and affect, loneliness and intelligence in normal subjects, NCBI, MJ Lucht - 2009
- Evolutionary and Biochemical Explanations for a Unique Female Stress Response: Tend-and-Befriend Personalityresearch.org, LA McCarthy - 2005
- Oxytocin receptor/Polymorphism, Wikipedia

Dopamine

- A Neural Circuit Mechanism for Encoding Aversive Stimuli in the Mesolimbic Dopamine System, NCBI, JW de Jong - 2018
- A neurochemical hypothesis for the origin of hominids, PNAS, MA Raghanti - 2018
- Dynamic Nigrostriatal Dopamine Biases Action Selection, NCBI, CD Howard – 2017
- The dopaminergic reward system underpins gender differences in social preferences, Researchgate.net, A Soutschek - 2017
- Exploring personality traits related to dopamine D2/3 receptor availability in striatal subregions of humans, European Neuropsychopharmacology, F Caravaggio - 2016
- Mesolimbic dopamine signals the value of work, NCBI, AA Hamid – 2016
- Neuronal Reward and Decision Signals: From Theories to Data, Physiol Rev, W. Schultz – 2015
- Oxytocin, Motivation and the Role of Dopamine, NCBI, TM Love, 2014
- The Mysterious Motivational Functions of Mesolimbic Dopamine, NCBI, JD Salamone – 2012
- Dopamine, the Left Brain, Women, and Men, Psychology Today, E Deans - 2011
- Genius and Madness – Dopamine and the extremes of human thought, Psychology Today, E Deans - 2011
- Natural Rewards, Neuroplasticity, and Non-Drug Addictions, NCBI, CM Olsen - 2011
- Predicting sensation seeking from dopamine genes: A candidate system approach 2010, NCBI, Derringer -2010
- Variation in dopamine genes influence responsivity of the human reward system. PNAS, Dreher - 2009
- Relationship between dopamine system genes and extraversion and novelty seeking, NCBI, VE Golimbet – 2007
- D2 and D4 Dopamine Receptor Polymorphisms and Personality, American Journal of Medical Genetics, EP Noble - 1998
- Dopamine Receptor, Wikipedia

Personality and social segmentation

- Does the Myers-Briggs Type Indicator Measure Anything Beyond the NEO Five Factor Inventory?, W Renner - 2014
- An assessment of personality traits and their implication for creativity amongst innovation design engineering masters students, Research Online, Y Yanliuxing – 2013
- Age and Gender Differences in Motivational Manifestations of the Big Five From Age 16 to 60. American Psychological Association, R Lehmann – 2012
- Myers-Briggs and Four-Type Structure: A principal components and equimax study of the four dimensions of the Myers-Briggs Type Indicator, Researchgate.net, J Larson 2005
- Hormones, Sex and Personality Type, Bulletin of Psychological Type, Dario Nardi - 2003
- The relationship between the revised Neo-personality Inventory and the Myers-Briggs Type Indicator, Society for Personality research, A Furnham – 2003
- Minerva – det præcise billede af din målgruppe, ACNielsen AIM, 2002
- From life style to value system to simplicity, The Copenhagen Business School and Gallup A/S, F Hansen - 1998
- Nogle erfaringer med at operationalisere Bordieu, Tidsskriftet Mediekultur vol. 24, H Dahl -1996
- Reinterpreting the Myers-Briggs Type Indicator From the Perspective of the Five-Factor Model of Personality, Journal of Personality 57, Robert R. McCrae – 1989
- Myers-Briggs Type Indicator, Wikipedia - January 2019
- Biological basis of personality, Wikipedia – January 2019

Other

- The gut microbiome composition associates with bipolar disorder and illness severity, Journal of Psychiatric Research, SJ Evans - 2017
- Maternal dietary patterns during pregnancy and intelligence quotients in the offspring at 8 years of age: Findings from the ALSPAC cohort, onlinelibrarywiley.com, AA Freitas-Vilela – 2017
- You are what you eat: diet shapes body composition, personality and behavioural stability, NCBI, CS Han - 2016
- Gut microbiota depletion from early adolescence in mice: Implications for brain and behaviour. NCBI, L Desbonnet - 2015
- Sex differences in the structural connectome of the human brain, PNAS, M Ingalhalikar - 2014
- Is bipolar disorder more common in highly intelligent people? A cohort study of a million men, NCBI, CR Gale - 2012
- Biology, ideology, and epistemology: how do we know political attitudes are inherited and why should we care? American Journal of Political Science, K Smith – 2011
- Sex differences in human neonatal social perception, Elsevier, J Connellan – 2000