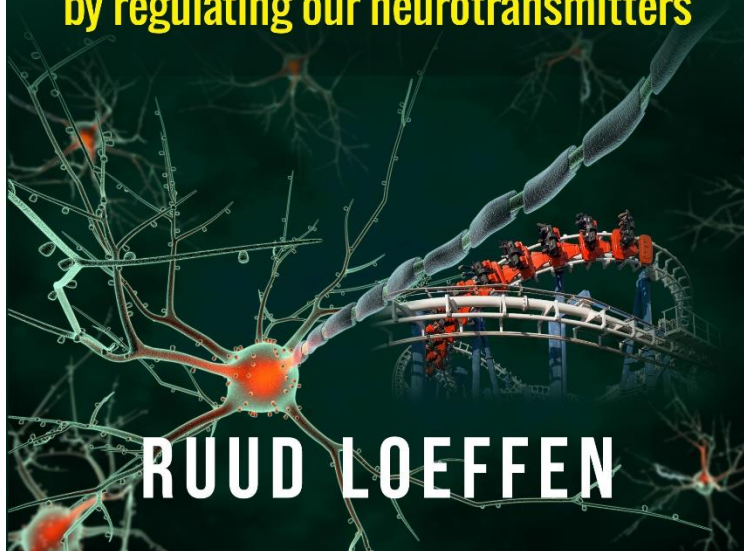


HOW TO CHANGE — OUR — HUMAN NATURE

by regulating our neurotransmitters

RUUD LOEFFEN



How to Change our Human Nature

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Ruud Loeffen

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Book cover design

Pixelstudio, Banjaluka, Bosnia&Herzegovina

Proofreading and editing

Dayna Plummer et al.

Support and feedback

Callisto, Martin Loeffen

www.human-DNA.org

Preface

In the past 10 years, there has been tremendous development in DNA research and knowledge in the field of our biochemical makeup. The field of biological psychology has seen some huge developments, and this knowledge forms the basis of this book and website. Both will explain how the neurotransmitters in your brain cause human behavior, and more importantly, to understand and accept human behavior. Of course, it is very important that you have a clear picture of how people are put together.

You find a summary of the content of this book on our website <http://human-DNA.org> . On this website, you will also find a large number of links to other interesting websites, movies and animations.

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Introduction

If you look at our society you will see a number of social problems that are difficult to change through social work or by politics. Thus, the increasing aggression in our society seems to be unstoppable. Football vandals destroy train after train and senseless violence seems to make sense for some people. In this book you will see that there is an underlying basis to human behavior that is mostly not mentioned. That basis is made up of a number of biological factors. Can more insight into these biological factors lead to a better world? This book and the website aim to provide an answer to that question.

In Chapter 1 you will get a picture of the biological basis of human behavior. That basis is formed by the genetic material, DNA, from generation to generation and is passed through by your parents and ancestors to you. What is passed through? Not just the color of your hair. DNA is also part of the biological basis of human behavior: your biochemical household consisting of hormones and neurotransmitters and the way your brain works.

Chapter 2 is about the relationship between the different stages of life of people and the biological basis. You will see hormonal life stages that often cause violent eruptions and related emotional and behavioral problems. The most famous stage of life in that area would be puberty. In this chapter you will discover the striking differences in biological determinacy of man and woman. The basic differences in biological factors lead to substantial differences that in the past were often belittled. In this chapter, we give additional attention to homosexuality, because the organic factor in the development of sexual identity has led to new insights.

In Chapter 3 you will explore the biological basis under normal behavior. You'll also look at biological factors in derailments in behavior. I hope that it helps you better understand that aggression can be destructive and mean but can also have a good function when somebody attacks you and when you give a useful response to an intolerable environment.

In Chapters 4, 5 and 6 you will see that we can change human behavior if we use our knowledge from Chapters 1, 2 and 3.

This book provides not only basic material for you as a person but may also give support for anyone who has a job in education, welfare or politics.

Who knows, it may help a desperate mother who needs a firm nanny to solve some educational problems.

Part 1 The biological factor: basic information

In education you pay particular attention to the way you can influence behavior and in fact it is the environment that affects that behavior: you as a parent, a teacher, a politician or a social worker are part of that environment. We see a difference between “nature” and “nurture”. With “nurture” we mean all influence through upbringing and education, and through the influence of friends and family. With “nature” we aim at the biological basis of human behavior. In the nature vs nurture debate we find educational sciences and pedagogy on the side of nurture, of course. And that is correct, as you'll see in part 2. In part 1 however, I will explain that human behavior is based on “nature”. Over millions of years, all humans are prepared to defend their territory against foreign invaders. You will discover that this property has a biological basis in the hormone vasopressin. This hormone was developed over millions of years during evolution and passed down through generation to generation: it stimulates the defense of your territory and has a fixed spot in our DNA-profile. In part 1 you will see a number of such hormones and neurotransmitters and I hope and expect that you will gain more insight into human behavior.

1 Statement from the biological basis

Several books have been published in which the relationship between evolution, inheritance, and DNA is convincingly demonstrated. Wilson wrote the book on human nature, in which he indicates that basic biological and biochemical processes form the basis of human action, not only with regard to interaction and behavior, but also with regard to the values and standards that we impose on ourselves. Wilson argued that all kinds of aspects of human behavior, such as aggression, sexual preferences, altruism and xenophobia, are partly innate. This is based on biochemical processes we have inherited through DNA (Wilson, 1979).

Wilson is one of the founders of socio-biology and a great admirer of the work of De Waal, a Dutch ethologist and primatologist in the United States. De Waal wrote *Peacemaking among Primates* (De Waal, 1988). He described the behavior of some species of monkeys including the behavior of bonobos, a species equally related to chimpanzees as to people, and he proved that Bonobos use sexual means to solve their quarrels.

Quite famous is also the book *The Naked Ape* by Morris. In this book he gave a popular presentation on inherited evolutionary behavior (Morris, 1968). In the 1990s a few books in this area have become very popular. For example, the book by Gray, *Men are from Mars and women from Venus*. The surprise of that book was the rediscovery of the differences between men and women (Gray, 2002).

These differences were disparaged in the 1970s and 1980s under the influence of the emancipation of women. Gray simply showed what everyone already knew: men and women are

different. Pease and Pease gave in their book *Why men don't listen, and women can't read maps* further explanation of those differences between men and women. They made a link between the hormonal development of boys and girls and thus the differences between the brains of men and women (Pease & Pease, 1999). These books illustrate that there is a solid step forward on a path where truly new insights could arise: the path of socio-biology and evolutionary psychology. Martine Delfos wrote *Children and Behavioral Problems About Anxiety, Aggression, Depression and ADHD. A Biopsychological Model with Guidelines for Diagnostics and Treatment*.

In *The truth about hormones* Parry makes us understand what happens to us if we fall in love, or feel sad, irritable or downright insufferable (Parry, 2005). All these writers have in common that they have important knowledge regarding the biological factor of human behavior. This biological factor for a long time remained hidden, because we still knew too little of our genetic material, our DNA, and because the theory of evolution was often regarded as a dubious and unscientific theory.

The discussion on the theory of evolution is still not finished. People have different opinions about this subject.

From religions sometimes come forward objections against the theory of evolution. These religious views are based on important writings as the Bible and the Koran. People who do not believe in the theory of evolution are indicated with the term 'creationists'. On the other hand, we speak about 'evolutionists' when people are convinced that the evolution theory of Darwin is true.

It is interesting to follow the debate and think it over. Evolutionary psychology offers many ideas about the behavior of contemporary people. That behavior is inherited through our

DNA and thus gives a picture of our evolutionary history. This DNA has only in the last ten years been completely mapped, while there are still new data from our genetic material emerging daily. Essential to the meaning of the biological factor in social behavior is that there are great similarities between humans and animals, especially between people and apes and other primates. Different life forms share not only large amounts of genetic material, but also everything that is built by that DNA. If you know that chimps have the same genetic material for 98.6% as people, then you also know that an adult man and an adult chimpanzee share the same construction plan. Whether you believe that God or Allah has built these construction plans, or you believe that these plans have arisen by evolution, it makes no difference for the vision of the biological factor in the behavior of people.

It is important to see the scientifically demonstrable similarities in DNA, the biochemical structure and behavior that is derived from that DNA. The biochemical effect of testosterone is alike for humans and animals and causes similar behavior in both. The purpose of this book is that you can learn a lot from that biological factor about human behavior. Using the biological factor, you get more visibility on motives behind human interaction. I hope you will develop more insight into human behavior.

There is still a starting point that is of great importance for the biological factor: knowledge of the way biological properties via our DNA are inherited from our ancestors. During that [complex process of copying genetic codes sometimes arise flaws and failures that can lead to hereditary diseases](#). Not only are the good qualities passed down, but also the bad ones. And that's all part of the biological factor.

1.1 What is the human genome?

The genome is the general term for all human genes. In the nucleus of every human cell is a set of instructions for the construction of that cell. **That information is stored in the DNA.** The DNA consists of 23 chromosome pairs: pair 1 through 22 is for men and women alike, while pair number 23 contains the sex chromosomes and is different for man and woman. If you have 2 x chromosomes, you become a woman, if you have an x and a y chromosome, you become a man. In total, you have about 23,000 genes that contain the basis of all information about your body. Each gene contains a unit of hereditary information. These genes contain very many good qualities: the color of your eyes, the shape of your body, but unfortunately also some bad features and a number of pertinent errors.

DNA develops, through billions of instructions, a biological constitution. Many of these hereditary instructions are millions of years old. They are large and small 'discoveries' that were "invented" long ago by our ancestors. For example, billions of years ago single-cell creatures developed a protein that was sensitive to light. Now we call them "Eyes". Living creatures have eyes that have the most bizarre forms. Yet no matter how different those eyes are, they all make use of that one protein. Thanks to that protein you can now read this text. Some instructions are, however, very recent. Also, topical environmental factors may influence the human genome. That process is called epigenetics (see Chapter 6).

The genetic code, our DNA, is made up of four different chemicals: the bases adenine, guanine, thymine and cytosine, denoted by the abbreviations A, G, T and C.

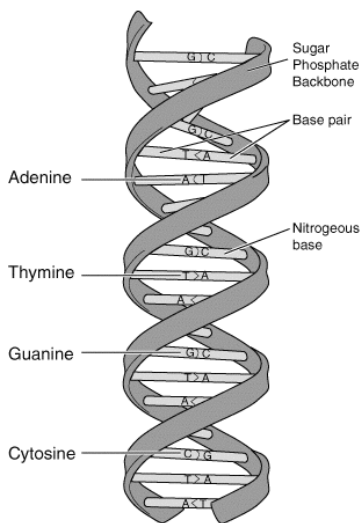


Figure 1.1 The double helix of DNA

You could say that our DNA contains a code book, in which are written down the discoveries during our evolutionary history. Those discoveries together form a diary of a million pages composed of only four letters: A, C, T and G. This genetic code is inherited from generation to generation, and each generation is made up of the codes of an egg and a sperm. Both codes are merged and then a replica is created so that all these cells have the same properties after cell division, also called “mitosis”. Don’t you wonder that, so few mistakes are made? Isn’t it incredible that out of this complex single cell such a huge body has grown (that means you!) and that now you can look around

with the help of that ancient protein and read this text with your eyes? The human genome exists partly of genetic material that is the same for all people. That's the way a human body has to be built. Therefore, we all have two feet and a nose. And we are happy that our nose is not the nose of an elephant, all thanks to our DNA.

But not only is our organic outside the same, but so too the endocrine system that determines the excretion of our hormones. A mutation within these common genes usually means, unfortunately, that there is an error in the genetic code; sometimes insignificant and without consequences, sometimes disastrous and catastrophic. Some of these flaws also have an impact on our social behavior. Thus, it is important to know that Alzheimer's disease has a genetic, biological basis. Knowledge and understanding of the disease process gives you information about what you can change and what you can't change in that disease. This will save you a lot of inefficient and spasmodic attempts to change anything that cannot be changed.

In 1999, chromosome 22 was the first chromosome that was entirely deciphered. Meanwhile, all 23 chromosomes pairs are fully mapped. On chromosome 21 are a number of well-known diseases such as Down's syndrome and Alzheimer's disease. On chromosome 1, dozens of genes that may cause a disease can be found. [Genes on other chromosomes](#) are the cause of occasionally gruesome diseases, such as the Cornelia-the-long syndrome, Charcot-Marie-Tooth neuropathy type 2B and the Von-Hippel-Linday syndrome. Scientific laboratories discover monthly new genetic locations of long-known diseases. Already in 1986, it was discovered that somewhere at the top of chromosome number 4 there can be a mistake that causes Huntington's disease. Currently, hundreds of diseases are known to have

a genetic cause. Also, among them are very well-known diseases, such as diabetes, hemophilia (the bleeding disease), Duchenne's muscular dystrophy and cystic fibrosis. Different types of cancer are hereditary. In addition, there are hereditary diseases that get worse every next generation, such as Treacher Collins. Especially if two people with the same genetic mistake have children then this often leads to a worse disease and premature death, which is reason enough not to marry a member of your own family.

The Human Genome Project aims to map the DNA of all races and ethnic groups. By comparing the DNA of different groups, it is possible to gain more visibility on the diary of evolution and to see where similarities and differences are located.

And also, to see who came first on this earth.

A part of the genome is different from human to human. Those differences define in part how you look, but also what your character is. There are differences in how the endocrine system functions. This leads to differences in our hormonal housekeeping. Hormones regulate our behavior to a large extent, so from your irascible father you can inherit the trait that you too lose your self-control too easily.

1.2 The endocrine system

You will find here a perfect overview of the endocrine system:

<http://www.innerbody.com/image/endoov.html>

If you would like to view the subject more on YouTube you can have a look at:

The Endocrine System

Take a look over there and come back here to read what kind of behavior is caused by:

- The epiphysis or pineal gland: the pineal gland is the heart of psychosomatic control, as suggested by its location in the middle of the brain. The pineal gland also secretes the hormone melatonin. Melatonin is secreted only at night and is what we call the sleep hormone.
- The hypothalamus is involved in the secretion of hormones that take care of the three key behaviors: flight and defense behavior (fight or flight), feeding behavior and reproductive behavior. In the hypothalamus the important hormones vasopressin and oxytocin are produced, playing a key role in love. Vasopressin also provides for the territory and can cause intense feelings.
- The pituitary gland controls the entire endocrine system by separating hormones that control, in turn, other hormones, such as growth hormone.
- The thyroid gland regulates metabolism.
- The adrenal glands produce the well-known adrenaline and lesser-known norepinephrine.
- A woman's body ripens oocytes in the ovaries. The ovaries also produce hormones, such as estrone, estradiol and progesterone, which will prepare her for pregnancy. Progesterone also provides feelings of calm,

love and protection by releasing a couple of relaxing neurotransmitters.

- A maturing man produces several hundred million sperms every day that are stored in the epididymis. The sperms that are not released with ejaculation are reabsorbed into the body.

1.3 The nervous system

Some insight into our nervous system is indispensable for understanding the biological factor.

Neurons and neurotransmitters.

If you put a slice of the brain under an electron microscope you will see a bewildering world of billions of nerve cells. It seems like a huge network where electronic signals move at the speed of light from one part of the brain to another. With an eeg (electroencephalogram) you can uncover these electronic pulses on a computer screen. These pulses regulate whether you're hungry, your emotions, romantic love, mood, concentration, resistance to stress. They also decide if you can learn well, set your memory, rule whether you would like to sleep and produce a number of pleasant and less pleasant sensations. **Neural signals travel along neurons**, which have specialized receptors at their beginning and end. To continue their path, these signals must cross a very small gap between neurons—this junction is known as a synapse.

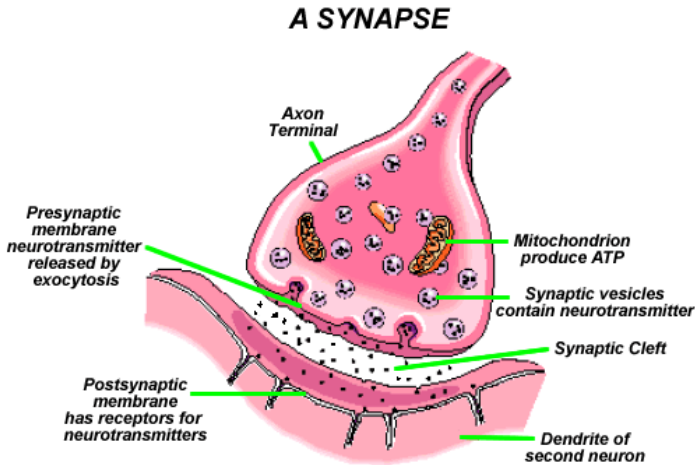


Figure 1.2 The synapse
(this picture is found on several places on the internet)

The synaptic vesicles contain neurotransmitters. These neurotransmitters are released if there are signals sent by the neurons tube and ensure that the signals can quickly cross the synaptic cleft or be blocked. They function as a kind of momentum to the pulses to pass through, or as a dam to stop them. There are over a hundred different neurotransmitters. Every neurotransmitter has its own function. Some hormones also have the function of a neurotransmitter in the brain, which comes down to biochemical substances that you can reproduce artificially. The pharmaceutical and drug industries make extensive use (or misuse) of this phenomenon and have already produced a lot of very exciting and soothing substances. Also, in the medical world, the biochemical knowledge is gratefully exploited by psychotropic drugs that alter brain function. For example, aspirin is based on the inhibition of an important function in the human body because they stimulate the sensory nerve cells if

there are painful stimuli (which means you feel pain). In other words, an aspirin blocks the transmission of pain stimuli. We actually retrieved aspirin from nature two thousand years ago, which is made available in the form of salicylic acid via the Willow bark. Also, the swamp plant “spirea” makes this substance available for free. A German biochemist transferred the rather aggressive salicylic acid into acetylsalicylic acid, which is milder and more tolerable. The A of acetylsalicylic acid and name of spirea supplied the name ‘aspirin’. Yet nature provides hundreds of substances that can mimic the function of the neurotransmitters and act on the receptors of neurons, just as the pharmacy and drugs industry do. Not only has the world of plants provided us with very useful substances, but the animal world is full of them too. Some animals have found that certain biochemical substances can cripple prey. Snakes, spiders and scorpions paralyze not only animal prey, but people often don’t survive their ingenious attack either. The neurotoxins that are produced by these animals all have one goal: disrupting the signal transfer in the neurons and in that way cripple their prey.

Table of biochemicals , neurotransmitters and hormones

Name	Produced by	Function
adrenaline (also called epinephrine)	Is formed by dopamine. Is secreted by the adrenal glands, but also has a function as a neurotransmitter	Is both a hormone and neurotransmitter. Exciting; causes anxiety feeling; accelerates the breathing; increases heart rhythm; dilates pupils; controls the fight or flight response. Too much adrenaline leads to paranoia. Too little can lead to depression.
noradrenaline (also called norepinephrine)	Is formed by dopamine. Is secreted by the adrenal glands, but also has a function as a neurotransmitter	Exciting; causes irritation, hostility; controls the fight or flight response; leads to aggression rather than fear. Too much leads to euphoria. Too little to depression.
serotonin	Pineal gland in the brain	Serotonin acts on appetite, mood, emotions, concentration and stress resistance. At an excess it creates nervousness, dizziness, and less concentration. A shortage of serotonin can cause aggressive and impulsive reactions. In the evening it is converted into melatonin and makes you sleep.
endorphin (encephalin)	Pituitary gland; Midbrain	Plays an important role in the feeling of love. Ensures ruffle-like feelings; with too many endorphins: euphoria; too little can cause fear and hysteria.
phenylethylamine (PEA)	in the brain	Plays an important role in romantic love.

acetylcholine	Among others in the small intestine; working in basal forebrain, Hippocampus and cortex	Promote concentration; encourages interaction between neurons.
Gaba: gamma aminobutyric acid	Ends of certain nerve cells in the brain	In particular, inhibits the action of neurons in the limbic system. It also inhibits the secretion of dopamine, creating a natural blockade against too much euphoria. As Gaba is neutralized by other substances, it can lead to insomnia. Reduced release of Gaba may also lead to epilepsy. As Gaba is strongly activated, it can lead to numbness.
dopamine	Ends of nerve cells in the brain; Hippocampus	Reduces excitement; allows for clear thinking; puts the pituitary gland to produce hormones, which in turn stimulate growth and sex. It stimulates concentration on impending danger and ensures that the adrenaline is used effectively. Dopamine plays an important role in addiction. It ensures, that you are experiencing pleasure, joy and well-being. People with Parkinson's disease have virtually no dopamine anymore. Too much dopamine can play a role in psychoses and schizophrenia.
MAO-A	In the liver and placenta. Works in the brain.	Deactivates the exciting amines and thus ensures calmness. If you have too little you will stay excited. Testosterone breaks down MAO-a and in this way strengthens sexual excitement and feelings of power. Estrogen also breaks down MAO-a and strengthens sexual arousal in women.
MAO-B	in the liver and placenta. Works in the brain	Deactivates the calming amines, so is the opposite from MAO-A.

oxytocin	the hypothalamus	Oxytocin is a hormone that also acts as a neurotransmitter in the brain. It is also called the 'hugdrug': It is important for the initiation of breastfeeding; ensures bonding between mother and child and between partners. It is the love hormone.
vasopressin	the hypothalamus	Vasopressin is a hormone that acts as a neurotransmitter in the brain. It supports the protection of territory and loved ones; regulates the fluid balance (is used as medication to prevent bedwetting).
CRF (Cortical Releasing Factor)	ends of nerve cells in the brain	Causes stress and depression.
CCK (cholecystokinin)	duodenum	Plays a role in the sense of satiety.
phenylalanine	ends of nerve cells in the brain	Necessary for the production of neurotransmitters; stimulates alertness and sexual arousal.
melatonin	from serotonin in the pineal gland	Sleep hormone; can be used as a medication in jet lag.

Table 1.1

Table neurotransmitters

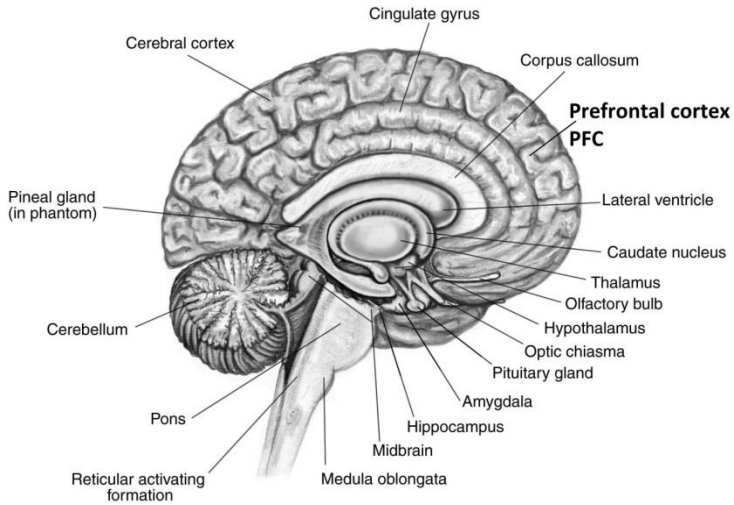


Figure 1.3 SEE: *Diagram of brain functions:* <https://head-injury.com/>

Summary 1

In recent years, scientific discoveries in the field of DNA and biochemistry have laid a new foundation for understanding human behavior. This knowledge is described in many important and ground-breaking books. The beginning of this chapter provides an overview, so the foundation is uncovered and makes it clear how our human history is anchored in contemporary human behavior. Biological properties are passed through by the human genome, including how the endocrine system works and how our brain controls the precarious balance between all kinds of neurotransmitters and hormones. Each neurotransmitter and hormone has its own specific function within human behavior. The main body chemicals are described in this chapter and make clear how concrete human behavior is shaped by the network of neurons and cause feelings and emotions. Thus, in this chapter, we saw among other things, a link between oxytocin and hugging, between vasopressin and territory, between MAO-A and calmness, and between PEA and romantic love.

2 The role of biological determinacy in different stages of life

The fertilized egg unfolds the building plan that is written in the genetic code. The hormones and neurotransmitters that have been discussed in Chapter 1 are part of that building plan and determine to a large extent human behavior. The focus is therefore on how the biological factor in our behavior comes to expression. Part 2 of this book will describe how we can guide this development and how we can regulate or at least influence this biological factor.

2.1 Prenatal period and birth

The production of hormones is part of the building plan from the beginning of pregnancy: the placenta produces a variety of hormones. Progesterone is the best known and increases the temperature of the expectant mother, allowing her to store extra fat and causing her breasts to swell. Also in the development of the baby itself, in its construction plan, hormone glands are created: the baby itself is hormonally active. The baby produces its own hormones for the benefit of its mother, where they are converted to estrogens and stimulate the growth of the uterus and breasts. In fact, the baby itself takes care to ensure that the mother has everything it needs. The baby can produce hormones because it has adrenal glands that are ten times as large as an adult's.

Intuitively, most young mothers strive to be quiet and carefree to experience pregnancy. That is also stimulated by the production of progesterone and oxytocin. As a result, the stress response is tempered, and the mother can remain calm under

almost all circumstances. If the mother, despite all those precautions falls into stress and produces cortisol, it turns out that for the future of the baby this is very injurious. There is a link between these too high cortisol levels and all kinds of diseases, such as heart disease and depression, as the baby grows up. The people around the expectant mother can make an important contribution to the future health of the child by preventing stressors. If you want to remodel your bathroom and kitchen, you'd better not start in the eighth month of pregnancy because just the concern of the possibility that the renovation will perhaps not be ready in time can damage the future of the child.

In addition, the number of hormones has an influence on the sex of the baby. From the fertilization of the egg by the sperm cell, it is decided whether the fertilized egg will develop into a boy or a girl. Twice an x chromosome (xx) is a girl, and an x and y (xy) combination will create a little boy. This is the basis for an important road that DNA will follow. All elements of the DNA that help a baby boy to become a boy or a girl to become a girl will be activated. In particular this will result in the baby developing ovaries or testes. These sex glands (also called gonads) are going to produce hormones that will shape the genus. Quite recently it has been established that there is not only genital development, but that also the brain will develop in different ways for a boy and for a girl. In the book "Sex Differences: Developmental and Evolutionary Strategies" psychologist Mealy explains the biological differences between the sexes. She explains that the difference between men and women are not limited to physique and genitals, but rather the main differences are between the ears: men and women have a different brain (Mealey, 2000). From the eighth week of pregnancy testosterone causes the formation of male sexual characteristics in a boy on the basis of the xy chromosome. The genes without

testosterone will create the clitoris and labia, and with testosterone these genes create the penis and the scrotum. The genetic material, the DNA, provides a certain predisposition to particular developments from that DNA. Such a predisposition means that the gene takes a preferred position that easily causes or might cause certain biological characteristics to develop. The predisposition of the sex to which you belong is such a characteristic. This attribute is dependent on a number of genes that are “set” on or off. The gene “sox9” is activated or disabled by sry (sex determining region y-gene), that forms the seed balls. If in the fetus during the structuring of the brain large amounts of testosterone still circulate, a male brain will develop; otherwise, a female brain will. If testosterone continues to work the gender differences after birth will be more significant. The adrenal glands are at the time of their birth much greater than that of their mother. Additionally, at the time of birth a baby boy has ten times as much testosterone as a girl (Delfos, 2004). See also: [Sexual differentiation of the brain and behavior](#) , Swaab, Dick 2007

2.2 Pre-school and elementary time

All parts of the brain of a toddler are present. The amount of testosterone in the average boy then drops to about the level that is common in girls. A male toddler possesses no fraction of the testosterone of a male fetus. Meanwhile, testosterone has done its job and has resulted in the following:

- The right side of the brain is stimulated at the expense of the left hemisphere. The consequences are: guys have more abstract, technical and spatial awareness. They are more limited in expressing emotions and thoughts.

And look at what is happening when you get a stroke:

[Jill Bolte Taylor: My stroke of insight](#)

- The immune system is less developed in boys than girls, because testosterone slows the development of the thymus gland. The thymus gland provides the human immune system. Result: boys are more susceptible to all sorts of infections than girls. Girls, on the other hand, react faster to diseases related to the immune system and therefore exhibit allergic reactions more frequently than men. They start - so to speak - too fast to defend their body and cannot stop in time.
- With the higher level of testosterone guys are more physically aggressive-oriented, and more focused on competition. Testosterone is not responsible for aggressive behavior. Testosterone leads rather to the need for power, for prevalence. It determines the general male virile behavior and causes them to display macho behavior.
- The higher the level of testosterone in the womb, the better you can think systematically. The lower the level, the better you can [empathize](#) with others (Parry 2005).

A very notable and important phase that happens within the period of one to four years is the negative, stubborn phase. This phase is characterized by violent emotional temper tantrums. In this way, the child tries to retain its own identity in front of the punitive 'do not' of the adults. This is a very precarious stage of development. This process is essential for the development of a child's personality. At the same time, however, the child must learn that independence has limits and that many actions are not allowed. For example, a child may [prick a piece of paper with a needle, but must not insert it into](#) a wall socket. Such restrictions can trigger intense frustration or even anger, and the toddler

must gradually learn to regulate these emotions. In many ways, this is a demanding task for a young child.

In the 1960s, some intellectuals believed that a choice had to be made between self-restraint and self-development. Many parents at that time chose to prioritize self-development and applied this approach consistently. This led to the emergence of anti-authoritarian kindergartens, where children were given a high degree of freedom to make their own decisions. Many of these children grew into responsible adults with strong self-discipline. However, they often experienced frustration later in life when confronted with structured, rule-based societies.

The theory behind anti-authoritarian education assumed that children would naturally develop self-control over time. Today, educators tend to adopt a more balanced view: children should be actively supported in developing self-control rather than being left entirely on their own. It remains important that rules are explained in a way children can understand, so their natural drive for independence is guided rather than suppressed.

In the period from zero to four years there is at least one biological factor that is very clearly visible to everyone - the growth of the body. This growth is driven by growth hormone, which is secreted by the pituitary gland. The pituitary gland usually doesn't produce these hormones continuously. Growth hormone in children is released in four to six pulses per day into the bloodstream. The largest pulse, with the most hormone issued, appears at the beginning of the night, shortly after falling asleep; others come later in the night and a few small ones during the day.

During infancy the upbringing and socialization process is most

important. The brain is extremely sensitive to learning impressions. In this period the child is naturally capable of acquiring one or more languages. “Naturally” means that from the natural development of the brain learning a language is almost spontaneous. The child learns in this period by means of impulses from their immediate vicinity. Those impulses come from parents, relatives, television, computer, school and friends. The environment ensures triggers that provoke development. From the building plan of the DNA a child will develop the right connections between neurons. In the brain a gigantic construction process of billions of neurons is going on. It is remarkable to realize that when your baby is sleeping quietly, there is in fact a complicated process happening; each movement of the body, any exercise, every impulse is perceived by the brain as a signal to extend the network of neurons. If there are little or no signals, there is very little development. The more the environment inspires and challenges, the more the brain develops itself. There are many important connections in the brain. These connections are broken off again when the development is over. As developing cells don’t make contact, they will die off. That process is called apoptosis (Van der Linden, 2006, 91). For example, there is a moment when the child first starts to crawl and later walk: this is initiated by the DNA. If the child does not crawl on time or even if this was made impossible, this may lead to a developmental disorder. Nurture (in particular education) in this period is indispensable to support the biological factor. All biological processes during this period receive a cultural interpretation that depends on the environment in which the child grows up. It makes a lot of difference if you grow up in a suburb of Amsterdam, Baghdad, Hong Kong or Los Angeles.

Pre-Frontal Cortex (PFC)

In the period between four and twelve years the prefrontal cortex will develop. This is the part of the brain that was added later on in evolution, and is the part that is larger in humans than in animals. In a cat, the PFC occupies about 3.5% of the brain; in a dog 12.5%; in a chimpanzee 17%; and in humans about 29%. In animals the prefrontal cortex is already almost finished at birth. The PFC-part of the brain in people grows until the eighteenth year! (Van der Linden, 2006, 92). The prefrontal cortex plays an important role in the following:

- choosing from alternatives;
- combining different possibilities;
- troubleshooting;
- planning actions;
- conscious handling of emotions;
- ability to empathize.

All these options are covered by the heading of creativity. At the same time and equally important these capabilities represent a basic behavioral form: **self-discipline**. The neurons that make this possible take shape in the period between 4 and 12 years. You could say that creativity and self-discipline are two complementary forms of behavior that have developed in the final stages of evolution and that we have to develop our PFC before we are 12 years old.

2.3 Primary school age

The most important period for the development of creativity and self-discipline in people is located in the period of four to twelve

years. Hirschi (1969) is very positive about that. According to him, a lack of self-discipline is based on a genetically determined predisposition that has encountered too little counterweight during education: if a child has not developed self-control before the age of ten, it becomes much more difficult later. Gottfredson and Hirschi (1990) claim in their book *A general theory of crime* that you should lay the basis for self-control in childhood and that the lack of such a base can easily lead to criminal behavior. Gottfredson and Hirschi make bold statements here. In *"Het maakbare brein"* (*the makeable brain*) (2006) Sitskoorn gives another vision. She describes in this book how the neurons' network can also be formed later in life. According to her you can shape your own brain through your behavior. Sitskoorn is an associate professor and head of the Cognitive Neuroscience Unit of the University Medical Center Utrecht. She investigates the relationship between behavior and the plasticity of the human brain. For the time being, you can conclude that learning self-discipline in early life fits within a natural child-rearing pattern and that it is much more difficult to acquire discipline in later life.

Chapter 3 examines Eysenck's personality theory, thereby giving you more insight into the genetic construction of the individual. So, you can inherit a predisposition to certain behavior from your parents, your ancestors. You inherited this predisposition, but education determines how the traits will be formed. 'Like father like son, like mother like daughter' sounds pretty nice, but is only partially true. If in education the construction and revitalization of self-discipline are missing, then you will need a '*super-nanny*'. She can try to help parents to take control in education by encouraging creativity and self-discipline.

Why must self-discipline be developed before the age of ten?

Because the contacts between neurons for the most part are formed in the period up to the tenth year. These neurons determine the limits of the possibilities they create in the prefrontal cortex and then reach their solid form. The neurons in the brain network are going to pass the process of myelinization by completing the process with a protective fatty layer (myelin). This protection is applied every time a particular building process is finished. If a child is born, the process of “hearing” is already largely completed by myelinization of the neurons’ network around hearing. “Sight” (seeing, looking) is still developing, and the fatty protection is finished about the third year of life. (Van der Linden, 2006 p. 90). The development follows a certain natural pattern, so the different phases will be finished in their physical form (neurons and synapse). That process is called *ontogenesis*. It becomes clear that the process of self-control must be established in a network of neurons that connects the primitive brain and the prefrontal cortex. The myelinization follows the track of the evolution: the oldest parts (the limbic system and the primitive reptilian brain) and the last, the prefrontal cortex. After the myelinization will follow the process of synaptogenesis: the synaptic connections are made (see Figure 1.3). That process continues throughout our entire life and ensures that our brain keeps a decent plasticity.

If a child has not learned to control itself, then the brain cannot convert this process to the infrastructure that is necessary for self-control through the prefrontal cortex. Later in life this child will have a lot of trouble with developing self-discipline.

In your brain you have in fact two routes for responding to external stimuli: a fast route and a slow route. The fast route is the most direct and - seen from evolution - also the oldest: they are the direct reflexes to stimuli from the environment, a direct

action on what is happening around you. Is there a sinister and unknown being coming towards you? Fight or flight! This decision is made by the high-speed thalamus-amygdala response and is called the TA-route. It tells you to give him a blow as hard as possible (or run away as fast as you can). The slow route runs from the thalamus, via the prefrontal cortex back to the amygdala, and is sometimes called the Thalamo-Cortico-Amygdala route, in short: TCA route (Van der Linden, 2006, 161). Now it runs this signal (“sinister figure!”) through the prefrontal cortex for a quick check and notes, “Oh, that’s just my own reflection in the mirror.” Don’t flight and definitely don’t fight!

The development process is, in the period to ten years, primarily focused on acquiring skills and knowledge. The organic development follows a process of steady development of the building plan on the basis of the DNA and no striking hormonal changes occur. The basis has been laid and now practice is needed. In fact, the hormonal changes at this stage are consolidated and teach you to play the role that goes with it. From evolutionary psychology and bio-sociology at this stage you also recognize many elementary processes that you can see in monkeys and apes. If you watch the feature-length documentary *People of the forest* (Lawick, 1991) then you will see a whole load of group dynamic processes. If you cover your eyes and just listen to the comments, it seems as if it’s a documentary about a normal family of people. An important principle is the recognition of role behavior. In order to strengthen the feeling of belonging to a group, it helps to designate someone else that doesn’t belong to your group. That can be reached most effectively by some cursing, to bully, to exclude or to emphasize a small characteristic, for example thick, red, long, bare or cross-eyed. The aim is to

obtain a safe place in the group for yourself, preferably at the highest possible position in the group hierarchy. That's why there are so many small and big fights about the hierarchy. In parallel, we see that groups of children are looking for a private territory, e.g. what area belongs to whom and who's the boss. The book *Lord of the flies* (Golding, 1954) gives a particularly clear and fascinating description of this behavior. The boy Piggy, the scapegoat, must literally be killed. Children who are bullied during their school time can develop heavy trauma, which later during puberty and adolescence still causes great uncertainty about their own appearance and dignity. In girls is the cause often called 'girls devil' in which mutual relationships, appearance and exclusion lead to refined and painful power games. In boys bullying often degenerates to physical violence. Boys are, on average, physically stronger due to biological factors. On average guys are just stronger, can run faster and can jump higher. That's why at the Olympics women are regarded as separate groups and why men in almost all sports are the absolute world record holders. Boys often measure strength through playful competition, playing and teasing. If you do not take part in that game, you will soon receive the accusation that you are a 'wimp'. It is not only about being strong though. It is also important to be quick and agile, so you can search for a safe haven in time. It can be very enlightening to spend a few hours watching a colony of chimpanzees at the zoo.

The differences in the behavior of boys and girls on a school playground are very clear. Where guys create safety to be strong and fast, the girls develop rather a strategic cooperation to be able to feel safe. Such cooperation is much less physical and earlier based on emotion, confidence and manipulation. You can see that boys develop a behavior of fight or flight, while

girls a behavior of being nice or playing the victim. (Delfos 2004, p. 116) These differences are strongly based on the differences in neurotransmitters and the structure of the brain. You will see many of these differences pass by in the next chapters.

2.4 Puberty

There are two periods in which the sex differences in the brain develop very quickly: in the fetus and during puberty. The amount of testosterone in boys now rises to record highs. All kinds of male features and preferences will evolve on the basis of the structure of neurons that are laid down in the brain during pregnancy. This applies not only to the need for sex with women, but also, for example, to other characteristics such as mathematical talent. The region for this talent is located in the upper-right side of the brain and the cells in that place are quite sensitive to male hormones. Some young people start to excel in special talents in the beginning of puberty. Also the growth hormones stimulate the growth of the body, but we know about that because it can hardly be overlooked.

What adolescent can still resist the overwhelming overdose of testosterone during puberty, (in boys) and estrogen (in girls)? Who is in control? Violence in human societies is the privilege of boys and young men. All kinds of violence: between individuals, between groups, between hooligans, between religions and states. It seems all to belong to the prestigious 'brave warrior'. Daly and Wilson (1988) called this the 'young male syndrome'. We are so familiar with the idea that violence is mainly associated with boys and men, that you can describe the causes of

violence as the very biological factors. The man is a biological factor, and the violence has quite a lot, if not everything to do with the biochemical processes in the male body. Even the comprehensive *World Report on Violence and Health* (2002) pays no attention to relevant biological factors. As for the personality factors that can contribute to violent behavior in young people only ‘*low heart rate*’ is mentioned (p. 57). A slow heart rate has a positive correlation on the sensation seeking scale. Young people with a slow heart rate have more need for excitement. A fast heart rate means that you are anxious and want to avoid danger quickly. The report extensively names causes of violence and aggression, but in addition to slow heart rate, no other biological risk factors are mentioned, such as serotonin, adrenaline, vasopressin, MAO-A, cortisol and testosterone. Typically, in that report we find an overwhelming amount of violent crimes, which for the most part have been committed by **boys and men**. Nobody seems to notice. It’s too obvious. That’s why I will give a clear view of these items in Chapter 3. Eysenck knows all about it.

There are other hormonal changes during puberty. The hormone melatonin regulates the sleeping pattern. At puberty, the decrease of the amount of melatonin causes less sleep to be required. The decreased level of melatonin makes it harder for them to fall asleep in the evening and not get out of bed in the morning. Result: bad mood, truancy and poor school performance. Adolescents are particularly susceptible and that can lead to verbal abuse and arguing with parents and others. An important hormone for boys is dihydrotestosterone (DHT). The functions of DHT are to make sure:

- that guys get a deep voice,

- that pubic and armpit hair grows,
- that the genitals become larger,
- to make sure that spermatogenesis develops during puberty, so that sperm is created, and
- to increase adrenaline and stimulate libido.

This must be enough to get really confused...

The hormone dehydroepiandrosterone (DHEA) is created in the largest amount around your 20th year and then diminishes. DHEA is also used by bodybuilders and the elderly.

There is another hormone during puberty that you cannot easily neglect: phenyl ethylamine (PEA). It is one of the nicest and most exciting neurotransmitters. It stimulates the production of dopamine. Virtually everyone knows it as the feeling of overwhelming romantic love and it makes you feel intensely happy. Unfortunately, this neurotransmitter also evokes the production of adrenaline. Adrenaline makes you ready for action and in the worst case makes guys ready to fight or flee. In combination with the infatuation it causes stuttering, stammering and bendy knees. Just when you want to stay firm and confident, you stand so to say with trembling legs. Just when you begin to feel you are becoming a man, a brave warrior, and you are going to make yourself count in the big world, you have to show this embarrassing fumbling generated from the neurotransmitters. And then you can still be happy if you don't show too many youth pimples. This makes it understandable that the adrenaline generated at the same time is converted into fighting, a spectacle that you can regularly witness on a beautiful summer evening or in nightlife. Yes, of course: by drinking alcohol you can ease your prefrontal cortex.

In girls PEA generally induces less problems but can be very risky because the generated feelings can be very confusing and predominant. If you are in love, there is not only the PEA in your brain. Dopamine and norepinephrine levels have also been increased, whereby you have enough fitness for long nights without starving. Phenyl ethylamine increases blood pressure and glucose levels in the blood, reduces depression symptoms and improves your mood, just as amphetamine does. A high content of serotonin could try to calm you down in time. Remarkably with enough romantic love your serotonin levels are reduced, whereby the excited feelings of happiness are virtually not being inhibited. This explains the obsessive, extreme thoughts and emotional instability that girls experience which make them feel as if they are in the clouds. Some girls are probably easy prey for lover boys because of these pleasant and innocent neurotransmitters.

Adolescents have a strong need for developing and discovering their own sexual identity. In combination with the need for adrenaline (the kick) and the use of alcohol, there are big risks of unwanted pregnancy, rape and sexually transmitted diseases (STDs). Adolescents often feel that they belong nowhere: they are looking for (often literally) territory for their own group. It seems that also the hormone vasopressin has a large influence in this period. This hormone enhances the demand for own territory. Driven by boredom and curiosity, young people may use alcohol. Through the use of these resources in most cases the prefrontal cortex is numbed, making it sometimes easier to deal with the newly acquired feelings.

The biological storm that afflicts the body of the teenager sometimes leads to a hurricane of uncontrollable behavior. The

prefrontal cortex is not yet fully developed and the impulses that are generated from the limbic system and the primitive brain are not yet under control. It is a period in which many things can go wrong and where solid guidance is needed. Yet this is also a period that should leave enough space for adolescents to experiment with the development of their own identity.

There is one more phenomenon that is important to mention, which is the development of the ability to **empathize**. Empathy means the ability to feel what someone else is experiencing. This is especially important if someone is in pain or in trouble. You need your PFC to obtain this kind of awareness because you need to **realize** what is happening to somebody else. See this interesting animation video on **empathy** (<https://www.youtube.com/watch?v=BG46IwVfSu8>). It seems that so called “mirror neurons” play an important role in this phenomenon. Some people have a lot of empathy, while some people don’t have the ability to empathize. You can imagine that this can lead to big problems. For example, there are cruel murderers who don’t feel the pain they cause to other people. They will never feel sorry.

2.5 Sexual identity

During puberty, the need to form a sexual identity becomes more explicit. The knowledge of the biological factors that determine gender cast a new light on the question of the causes of homosexuality and gender identity. A boy wants a relationship with a girl and girls go looking for guys. This seems explainable from the different operation and influence of the hormones testosterone and estrogen. But how come the sexual preference, the attraction, can also go towards the own sex? Testosterone

launches the development of male behavior and estrogen launches female behavior. Male behavior is often expressed by seeking a female partner and a very strong urge to spread the genetic material to fertilize an egg cell.

Girls bearing that egg cell and driven by the hormone estrogen go looking for a strong partner that is able to satisfy her needs. In many countries and many cultures homosexuality was (and still is) seen as sinful. If you felt homosexual tendencies you ought to banish those thoughts and try to get on the good path through a lot of praying. When religions in the second half of the last century had less power, the society took over the judgement about homosexuals. Their behavior was labeled as criminal. Homosexuals had to be dragged to court and punished. At the same time, scientists developed the idea that homosexuality was no matter of a conscious choice, but that there could be a natural variation in sexual behavior, in sexual attraction. Yet it is not so that homosexual behavior is easily accepted. Even though most people now know that homosexual behavior is no sin or disease, it is still considered a deviating standard and still leads to violent disapproval. Once on the trail of a biological basis for homosexual behavior, there was a choice for a biological and medical solution: until the end of 1970, gay men and lesbians were treated with hormones, neutered, treated with brain surgery, electroshock, therapy and psychoanalysis. But all these different treatments did not help or change. In addition, there were religious sects who claimed that faith would bring 'Healing'.

Overall, you can distinguish three ways in which sexual behavior is studied:

- The neuroanatomy: the study of the structure and functions of the brain and nervous system.

- The psycho-endocrinology, where the effects of the hormones on the psyche are studied.
- Genetics, in which the inherited characteristics are central.

Linda Mealey's vision on the differences between the sexes (Mealey, 2000) fits well with the discoveries of the neuroanatomy: male and female differences are not only realized through organic (physical) characteristics, but also in the differences of the brain. It is best to look at the beginning of this process during pregnancy. In the beginning, during the first months, there are still hardly any differences between a boy and a girl. Even after that, it appears that the similarities in the construction plan are much greater than the differences.

Could it be that fluctuations in the hormone levels of the mother affect the later sexual orientation of the child? A group of women that processed a hormonal abnormality during pregnancy by an overdose of male sex hormones were later found to be 37% lesbian or bisexual, while average population studies indicate a score of 2 to 4 Lesbian women for every 100 women.

From the beginning of conception, xx belongs to a girl, xy to a boy. How does the fetus 'know' which organs need to be developed? There are no hormones needed in girls: development goes completely on the information of the DNA. With boys the DNA must ensure that testosterone is created. Then on the basis of this testosterone the hitherto female organs are urged to produce a boy. Sometimes it happens in girls (xx) that too much testosterone is secreted by a defective hormone. This has dramatic consequences for the girl because thereby a penis is developed, while no testes are made, but labia. In this situation, surgery may help (in terms of appearance!) to make a

choice for either male or female. However, the sexual identity can remain confusing, because the brain was also formed on the basis of male hormones. In particular the hormone explosion in the second half of pregnancy affects the gender nature of the baby. Once you understand how differences between sexes and differences in sexual behavior generate from small biological events, then discrimination based on sexual orientation no longer lurks. This idea is consistent with the research of psychiatrist Green under the name of the 'Sissy Boy Syndrome' and the Development of Homosexuality (Green, 1987).

Green examined whether there are gender aspects in the way children play. According to him, boys generally play with cars and girls with dolls. Sexual orientation has but for a small part to do with the way someone is brought up. Boys are not gay *because* they play with dolls. It is rather the other way around: some guys like to play with dolls because they feel more attracted to play with dolls on account of their hormonal predisposition.

In the second half of the last century, especially feminist groups denied for a long time that girlish and laddish behavior is in-born. They were convinced that behavior was originated by education. So, they claimed that the preference of boys to play with technical toys is based on an educational pattern where boys are encouraged to play with technical toys. After people tried to change such gender-specific behavior for years, it now appears that education and culture have little influence. That is also the case in primates. Alexander and Hines have researched with which toy velvet monkeys prefer to play. The females in the investigation played with dolls and males played with race cars and the like (Alexander & Hines, 2002).

In Chapter 3.1 of this book, you will see that we inherit a predisposition through the DNA of our ancestors. In that predisposition is also indicated how our hormones will start functioning: much of this, little of that or vice versa. Already a failure can arise during pregnancy in the excretion of endocrine glands. Also, the pregnant woman herself produces testosterone. The quantity depends not only on its construction, but also the amount of stress during pregnancy (Dawson, 2004). All these biological factors lead to differences in our hormonal house-keeping. Those biological factors largely determine how male or female you will later be on a large scale of human sexual behavior. A major influence is, of course, how the environment responds to Gender Identity Disorder. In some countries there is a much greater acceptance of sexual behavior that does not comply with the average standard. If there is a greater tolerance for homosexuality, daring men and women find it easier to express their sexual orientation. And the same goes for the reverse (Burr, 1997).

2.6 Adolescence and adulthood

During adolescence, the hormonal changes become stabilized in a new behavioral pattern. This should lead to stable maturity. Just like in the primary school age the newly acquired biological development can relax and now the DNA is working less. It is primarily a period in which the individual is looking for a new steady partner and to spread the genetic material on to live in a new generation. Seeking a life partner often becomes central and usually people like to establish a family with a strong desire to have children now. You could also say that there is an evolutionary struggle to guarantee reproduction to raise your own child, preferably with one's own genes. That struggle is partly, mostly, channeled by marriage or by some form of contract. Some scientists call it a sex contract.

Anthropologist Fisher studied cheating in more than 42 cultures (Fisher, 2004). She wrote about the results in her book *The sex contract*. Her main conclusion is that cheating happens frequently, even in countries where the death penalty is imposed. Baker also states in his book *Sperm Wars* that man is congenital to commit adultery (Baker, 1996). Dawkins went one step further in the 1970s: he developed the concept of selfish genes (Dawkins, 1976). Richard is one of the most important socio biologists and he regarded genetic processes as the most fundamental level on which the survival of the fittest is fought. Adultery can be interpreted as an evolutionary drive, that the genes that are most 'fit' have the best chance of survival.

If you look around, you will see that in our society and constantly a stream of sex signals, 24 hours a day. Of course, in human society sexual behavior is less open than the bonobos'

(De Waal, 1988), but sex is still present everywhere, wherever you look, whatever you are wearing. From a biological perspective, hormonal development has largely stabilized; from nurture we get the shape of our natural, organic constitution. Depending on education, training and circle of friends there is, after the turbulent period of puberty, finally a more or less stable adult arisen, with eased hormones looking for calm family life and housekeeping. That status quo looks for men and women in different cultures very differently because the nurture shapes different forms. For example, a man in Pakistan will treat his wife differently than a man treats his wife in the Netherlands. But in all cultures, it is important to provide a safe and steady place for children to grow up and develop. Mostly that place is a marriage between two persons who take serious care of the children. The DNA has laid the foundation for the same hormonal household, the biological constitution is broadly the same, and yet there are large differences by the design of our culture. Our DNA is 99.9% the same, but the cultural differences are huge. Let's focus on that 99.9%. So, we all need a strong PFC to keep control over our hormones, I believe.

How steady are the differences in cultural design? Do you remember that the network of neurons is largely formed during adolescence and that these forms are difficult to change? This is also true for the prefrontal cortex and the developed self-discipline. But the culture can be changed. From 1968 to 1972 we saw enormous changes in the Catholic Church. This dogmatic, conservative Church changed in a few years into an open, democratic organization. In the priest boarding schools there were bewildering scenes. The main reason was that the leading priest decided to change their education and asked the boys to think for themselves. From one year to the next there were virtually

no more boys who still wanted to become a priest, despite the fact that they had hardly doubted it until then. In fact, the priest boarding school was a very close community until 1968, where the outside world hardly featured. In 1968, literally within a few months, the spiritual leaders of the Catholic Church decided that the boarding schools had to be 'opened'. The next year there was a decrease in the number of boys that went to the seminar after obtaining their final exam high school. In addition, many priests left the Church and started a secular life. Many boys became teachers. About 40 years later it became clear that these boy schools had many problems regarding sexuality: there was much abuse. Thus, you can see that even in these schools, hormonal influences played a leading role but were hidden behind a holy culture pattern.

What about nature and nurture? The Catholic Church kept out everything that had to do with sexuality. Meanwhile, many changes were taking place in society: with the increase in the use of contraceptives sexuality was more independent from reproduction. Flower Power arose in the 1970s, bringing with it the philosophy of free love, make love not war, swingers, appreciation for porn and swinger clubs. Soon, the newly acquired sexual freedom was limited by a very consummate virus: the human immunodeficiency virus (HIV), which was discovered in 1984 for the first time. Within a few years there was an AIDS epidemic. So, once again, we had to rely on our PFC.

The sexually free bonobos don't suffer from HIV, because they possess unique DNA fragments in their DNA code that protect them from this disease. But for humans it was devastating. Without the genetic protection against the virus the bonobos would have been extinct.

In the domain of sexual morality and sexual freedom you can roughly note two very divergent positions: on the one hand, the view that sexual relationships are permitted only under strictly controlled conditions and, on the other hand, the view that sexual stimuli are part of daily life and offer wonderful possibilities for pleasure and love. But both points of view are rooted in the fundamental hormonal, evolutionary power of sexuality. This power was evolutionarily focused on reproduction. It is this force that lives on in every human being and that is regulated by education, school and religion. Let's have a closer look:

Sex hormones

The hormone testosterone plays a role in both men and women. It allows for sexual excitement. In our society you can see all around you that sexual arousal is higher in men than in women. Men's testosterone levels are higher on average; men often emphatically insist on sex, which may include offering money and demanding to have sex immediately as they feel a need to have sex. The latter can sometimes lead to rape. In some countries there are massive protests against the idea that men have a kind of right to rape. For the first time in history, offenders are indicted, convicted and punished. Women also have testosterone and a need for sex, but usually in a much less aggressive way. Estrogen is a female hormone. The progestin is the pregnancy hormone that prepares the uterine lining on a possible implantation of a fertilized egg. The pituitary gland secretes the hormones at the bottom of the brain that works cyclically with women. On the other hand, the pituitary gland of a man continuously secretes testosterone, the male hormone. An ejaculation contains 4 to 5 ml of semen with 50 million sperm per ml. In fact, it's a rather superfluous luxury. The woman is much more

sophisticated in her reproduction system.

Women experience large hormonal fluctuations every month. Men show a more stable hormonal pattern. A few days before menstruation a woman has a deficiency of hormones. These hormone levels need to be restored. This can cause nervousness and irritability. The loss of the hormones after giving birth can also increase irritability and even lead to postpartum depression.

In addition to testosterone, there are two other reproduction hormones that play an important role: *oxytocin* and *vasopressin*. Vasopressin is responsible for territoriality. During adolescence and adulthood this hormone supports the behavior of people to keep others away from an area that they use to protect their own family. As soon as a man has found a more or less permanent sexual partner he wants to create his own territory to provide safety and security for his family. This behavior runs parallel to the behavior of all those animals that fanatically build their nest - from beavers to swallows, from ants to mice, in the most extraordinary ways.

A large number of animals denote their territory by scent based on urine. In order to do this the animal must be able to control its bladder: it has to be only a little bit, because otherwise his territory will be too small. Dogs and cats 'write their name' in this way. Anyone who has walked his dog knows how long that ceremony can last. Vasopressin supports bladder control and is also used for children who suffer from bedwetting. Controlling the bladder is of great importance for the definition of territory. Vasopressin is very likely also the basis for the jealous feeling that men experience when another man moves within the borders of his territory. Also, woman produce vasopressin and

experience the same feelings. However, vasopressin is mostly produced by men and oxytocin mostly by women.

The romantic image of a private house with thorough protection against intrusion is soon threatened by the selfish genes who still seek to strengthen their genetic position.

It's the same phenomenon you can find in the zoo at the primates, especially when it comes to food. *De Waal* describes in *The Age of Empathy: Nature's Lessons for a Kinder Society* (2009) detailed the strategies of chimps, rhesus monkeys, stump-tailed macaques and bonobos in the way they use sex and food to strengthen positions of power. The female monkeys use sex, while the males use the power over the food. With the exception of the rhesus monkeys, because there is a matriarchy the females have many things in control. In rhesus monkeys the level of aggressive acts is significantly higher than with other monkeys; both males and females are equally aggressive. Meticulous grooming habits are widely used and an effective way to terminate a fight. There may be a relation to the hormone oxytocin, released by cuddling and touch. In this way, oxytocin strengthens bonding between partners. You can perceive *hugging* as a contemporary human form of the *social grooming* of our ancestors.

Oxytocin originated during evolution at the same time as the class of the mammals arose. This hormone starts suckling by stimulating the milk glands to produce milk. It plays an important role in childbirth by stimulating the contractions. Oxytocin is also released during the orgasm of a woman. It plays an important role in hugging: this hormone is also called the *hug-drug*. It also brings bonding between mother and child; it provides generally more trust between partners and gives a feeling

of intimacy. Oxytocin not only occurs in women, but also in men. You can see that nature is not black and white: as with testosterone and estrogen, vasopressin and oxytocin also arise in both sexes. Women have more oxytocin and estrogen, and men have more testosterone and vasopressin. In men, adrenaline is often released in response to the combination of testosterone and vasopressin, whereby the called impulses not only lead to action, but often also lead to an exaggerated response.

There are other, important and well-known hormones, such as progesterone and prolactin. In the framework of this book they are less discussed. This book is mainly about those hormones that play an important role in the social behavior of humans. It is not excluded that in the near future other hormones will be discovered and that already known hormones and neurotransmitters will come to light and will increase knowledge about human behavior.

Testosterone, estrogen, vasopressin and oxytocin primarily serve to make the genetic reproduction an attractive “job”. These hormones also deliver feelings that most people experience as very pleasant. Yet in a lifetime, only a few times you're more active to conceive a child. Usually, sex between partners is not intended to have a child. It means you are responding to the “selfish genes” without doing what these selfish genes want you to do: make a baby.

In some cultures, men are suspicious of the fact that women can have fun in sex. Fun in sex may mean that they could get that pleasure by other men. For these men, that thought unbearable. In combination with the action of vasopressin (possessiveness) these feelings can lead to oppression.

In the Western world, it is common to have only one sexual

partner in relationships. Usually, relations are monogamous. In Africa 85% of relationships are non-monogamous: a man has several wives. Around the world only 16% of all societies is monogamous. Also, in the animal world having a permanent partner for life is the exception rather than the rule. Only 3% of mammalian species are monogamous. Vasopressin and oxytocin play an important role in the nature of a relationship: vasopressin leads to controlling and defining borders of the territory, while oxytocin binds to your partner. These two hormones play an important role in the biological basis for a family. While testosterone strives for as many different sexual partners as possible, vasopressin and oxytocin make sure there's a certain degree of stability in a society by binding a family and through delimitation of the residential area.

This biological basis is shaped by legislation and by different religions. In Western, Christian view it leads to a mandatory for monogamous relationship; Asian and African cultures and religions mostly accept polygamous relationships. One may ask: which form most closely resembles human nature? For sure it is very important to shape relations within clear structures, so the children can grow in a safe environment. The increasing number of divorces in the Western world threatens that sense of safety. The number of single parents of minor children is dramatically increased in the last 20 years. The evolutionary feelings based on vasopressin and oxytocin (adhesion) have provided a safe home within the family over millions of years. After a divorce, people will have to find a new basis that provides safety and possibilities for the children to develop and grow up in a steady world. Many men, women and children discovered that this is difficult to achieve.

2.7 Menopause transition period and old age

As our body cells are constructed from DNA instructions, starting from a certain age, the instructions begin preparing for the end of our lives. Immediately after the egg is fertilized by a sperm cell, our bodies begin to build up. What starts as a microscopic, fertilized egg becomes a human being that weighs 3.5 kg in nine months. During that time period, the cell multiplies 43 times. After being born, this happens only five more times. As soon as you are born, the growth rate already diminishes. A decisive factor for growth is the insulin hormone. With a shortage of insulin, the human body develops diabetes. When does the breakdown start? From age 45 to 50, in women, there is an important hormonal change. By reducing the female hormone, estrogen, and increasing the male hormone, testosterone, women stop ovulating. Because there are no more eggs released, the uterus also gradually stops preparing for a pregnancy and consequently the body will stop having menstrual periods. All sorts of complaints arise as a result of these hormonal changes, such as thinning of the hair, brittle bone disease, unwanted hair growth on the face, dryer and more sensitive vaginal tissue, sudden sweating (hot flashes), weight gain, suffering from incontinence. These changes are significant and often psychologically hard to accept, causing depression. Many people at 55 and over manage to have interesting work that offers satisfaction and makes sense for their environment and family. This group can fulfil an important function in the framework of the epigenesis and can have a positive impact on the DNA of their grandchildren (see Chapter 6). Media and magazines constantly emphasize, however, that it is important to be young and to stay young. Sexual attraction is an important promotional item. The

biological phenomena of aging is difficult to accept if everybody is telling you that you must be young. In many magazines, you can find all kinds of tips to camouflage aging or even stop it. The pharmaceutical industry is committed to developing products with which you can postpone or neutralize hormonal disruption. Many women and men try to postpone the formation of wrinkles as long as possible through medications or using makeup. Nowadays, more and more people even go through all kinds of surgery in an effort to keep the body as tight as possible. All these resources surely offer some postponement, but in the end this delay is only temporary.

Also, men experience a gradual increase in testosterone starting around age 45. As a result, men are less motivated to ejaculate, but influences from the outside can still provide very strong sexual stimuli. Those sexual stimuli include, for example, pornography and prostitution. Men cannot avoid the irreversible path of aging and they must face a midlife crisis, or andropause. If a man of that age meets standards of sexual attraction (like a good income and a fast car), he is a potentially well-suited partner for younger women. And that happens - worldwide.

Our increasing understanding of biological factors makes it possible to control life processes that previously could not be influenced. As a result, there is a huge stream of new life-prolonging and health-promoting foods and medicines. Many people take glucosamine for joint pain, melatonin to sleep well and DHEA to live longer. In the field of sexual activity, many people are familiar with the stimulating effects of Viagra and Cialis. If online ad producers have discovered that your age is 55 or above, you will receive over twenty promotions per week by email encouraging the use of these types of products. These products will purportedly get you back in top shape, or at least

make you feel young.

This somewhat pessimistic vision of aging is consistent with the image of *selfish genes*: once the period of reproduction is over, deterioration is started. With a little bit of extra genetic material, or with a few minor changes in our chromosomes, our cells simply would continue to divide and would go on to create hormones and refresh our body's cells. But, no; this is not the case at all. Our genome tells us to stop. You see, we don't have much to say about the course of our lives - not about getting started, not about growing up and not about finishing.

The average life expectancy of women is around 82 years old, and for men it is around 76. In nursing homes, the number of elderly women is significantly larger than the number of men. We don't know what to do with aging, but we must pave the road to an inevitable death. What we do is attempt to stretch our lives out as long as possible at any cost through the use of electrical appliances and by taking dozens of medications per day. We do have ways to postpone death, but we spend very little attention to the question of how we can die in a healthy, human way.

Summary 2

The network of neurons and the endocrine system is different for each life phase and has different effects in every phase. In developmental psychology, we also know these stages of life. Here they are colored in through biological factors. From pregnancy to the inevitable end, our neurotransmitters and hormones are built up and phased out. In this chapter, we identify the neurotransmitters per phase and describe which hormones are most active. They cause the stormy dynamics of life, and they determine the sexual predisposition, cause a midlife crisis and finally form an important factor in mental problems during old age. At each stage, there are risks of behavior problems, but during puberty, guidance and support is most necessary. Especially in young men, there is a decent chance that the biological factor is not only the basis, but also the boss.

3 The delicate biochemical balance in normal behavior

In the last hundred years, there has been a lot of attention for the analysis of all kinds of diseases, both biomedical and psychiatric. Medical and psychiatric treatment took place when there was a clear indication of suffering on the part of the patient and if it was necessary for their surroundings. Around 1980, the search for *normal* behavior came into focus. Especially in biological psychology and biosociology, the biological basis came into plain sight. A greater knowledge of DNA and the neuroscientific processes gave a powerful impetus to the idea that normal human behavior has a recognizable, apparent place within our organic constitution. But normal behavior can soon become problematic as in the human body, and in the brain, the biochemical balance is disturbed.

3.1 The theory of Eysenck: genetic predisposition

In education, social work and in social communities, you will meet a variety of characters. One person can be phlegmatic and passive, and the other can be short-tempered and irascible. There are a number of theories that describe different personalities. Freud, Jung, Adler, Eysenck, Maslow, Roger, Skinner and Zuckerman have created such theories. With such a theory or model, you can characterize yourself and other people. Each theory is based on certain assumptions and insights. In the context of this book (in which the biological factor is central), the personality theory of Eysenck is of interest because its format is easy to link to biological and psychological information, such as the functioning of hormones and neurotransmitters (Eysenck, 1967). Via DNA, somebody can inherit a predisposition for an

explosive, extroverted personality. Such a personality is based on a specific mix of hormones and neurotransmitters. So, for example, some people have a lot of MAO-A and other people have just a little. Just look in each case for the active MAO-A, vasopressin, oxytocin, testosterone and adrenaline. You can translate personality theories into biological factors that determine behavior, although these theories are not initially found on a biological basis. In my opinion, Freud, Jung and Adler would have studied these neurotransmitters and would have used them for more insight. In much literature, there is a division into five main factors; the big five consist of emotional stability, extraversion, agreeableness, conscientiousness and openness.

The Eysenck questionnaire is known as the EPQ: Eysenck Personality Questionnaire (S, Arrindell, Ranchor, Eysenck & Eysenck, 1995). A revised version later appeared under the name EPQ-r. In this version, the questions in the field of psychoticism are omitted (Maas & Menso, 2005). The EPQ-r measuring the extent to which someone is extroverted or neurotic (see figures 3.1 and 3.2).

If you visit <http://similarminds.com/eysenck.html> online, you can fill out the questionnaire and gain insight on your own character.

In Figure 3.1, you can see a schematic representation of the Eysenck personality theory: on the horizontal axis is a scale that runs from very extroverted (far left) to very introverted (far right). Similarly, on the vertical axis you see a scale of extremely unstable or neurotic (at the top) to very stable (at the bottom). These personality traits are dependent on the quantity of certain hormones and neurotransmitters that are created by

the DNA of an individual and by the way the environment and nurture factors have shaped this hereditary predisposition.

⌘ The inheritance of personality

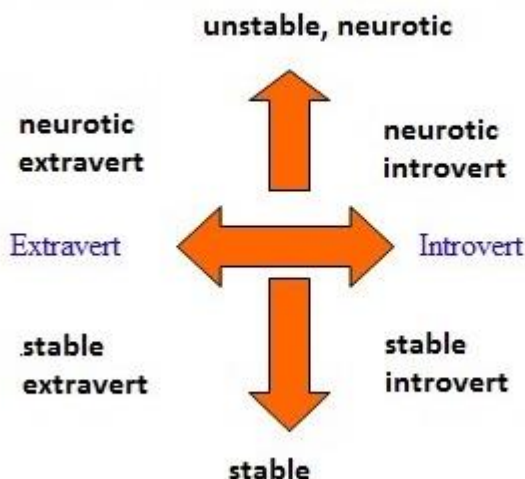


Figure 3.1 *Scheme of inheritance of personality of Eysenck*

The scheme in Figure 3.1 is further concretized into a number of character features in Figure 3.2. It may be interesting to study this scheme and determine which quadrant you would consider yourself to be in.

⌘ The inheritance of personality

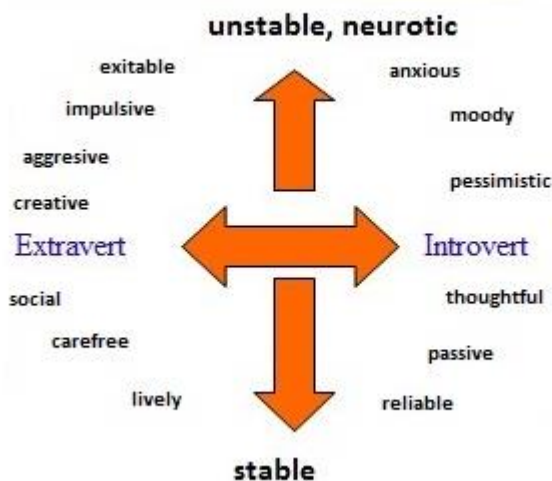


Figure 3.2 Scheme of more concrete personality theory of Eysenck

If you feel at home in the top left quadrant between extrovert and neurotic, then you are in the most dynamic but also most risky quadrant. With these personality traits, you can become a celebrated movie star or to a shrewd criminal. In that corner, you find people who are very focused on the outside world, who are looking for the appreciation of others. If you grew up in a neighborhood where many artists live, you will soon ascend the stage. If you live in a dangerous neighborhood where drugs are traded, then you have a risk to stand out as the best runner. Environmental factors are of great importance to the way the character traits form.

If you want to indicate a sequence in the way the concrete behavior comes about, then follow the arrow as shown in Figure 3.3.

Human behaviour : version 1

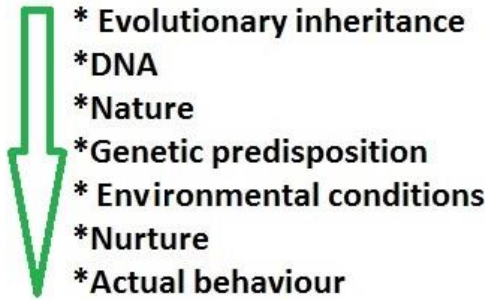


Figure 3.3 From Evolutionary inheritance to Actual Behavior: variant 1

In this book, you will find three versions of the given scheme in Figure 3.3. According to version 1, your Actual Behavior originates as follows:

Your *evolutionary inheritance* is recorded in DNA. Your **DNA** was inherited from your mother and father's DNA. At the time of conception, your DNA determined who you are. DNA determines your *nature* and gives you a *genetic predisposition*, which cannot be altered and purely depends on what your parents (and ancestors back to the Neanderthals and even further back) have passed onto you: those 23,000 genes. From the moment of conception, all *environmental factors* have had an impact on your development. The womb of your mother was

prepared to provide a safe and nutritious place for the fertilized egg. What biochemical substances were already present in the body of your mother? Did your mother listen to quiet pop classic music in the living room with a peak of MAO-A or was she packed with cortisol by working in a bar at two o'clock in the night? All kinds of environmental factors lure neurotransmitters from the synaptic vesicles to put hormones to work and penetrate into the growing fetus. So, at conception, the biological factors have already influenced the fetus. However, once born, that effect is even bigger: your parents, family members, school, friends and clubs affect your life: that's your *nurture*. They challenge you to develop your brain; they hug you or beat you. Via all those nurture factors, you finally become the person you are now, and you act with your *actual behavior*. Perhaps you should fill out the questionnaire of Eysenck and have an outside view on your own character.

3.2 The theory of Zuckerman: Sensation Seeking Scale

Another personality theory that is adaptable with the theory of Eysenck is the theory of Zuckerman. This theory provides a plausible explanation for criminal behavior. It is based on the need for thrills and spills. Thrills and spills are emotions that many people experience if they visit an amusement park or when they attend a devastating fire with barely concealed fun. Also, for example, if someone wants to commit suicide by jumping off a bridge, there are always people who are calling 'jump, jump!' Less extreme, every night thousands of people watch TV and switch between horror, fear factor and – live! – police chases. Not to mention *Jack Ass* videos.

Zuckerman has devised a Sensation Seeking Scale that allows

you to measure the need for thrills and spills. On one end of that scale, you can put some of the most accepted forms of searching for tension — for example, running on the sports field with the need to be the first to cross the finish line. At the other end of the scale, you can go so far as young people do in the suburbs in Los Angeles who strive to shoot down a totally anonymous innocent passer-by. Zuckerman ranks the accepted behavior of sports enthusiasts, the mountaineers and the horror lovers amongst *Thrill and Adventure Seeking*; in short: TAS-behavior. The more extreme forms on the sensation seeking scale Zuckerman mentions: disinhibition (Zuckerman, 1984). *Disinhibition* is the highest score in this scale:

- *Experience Seeking*: tend to activities that could bring a physical hazard or tend to social nonconformity and desire to associate with unconventional people.
- *Thrill and Adventure Seeking*: the tendency to an unconventional way of life, where you're focused on gaining experiences involving unusual sensations and risks, such as sky-diving, scuba diving, and flying.
- *Boredom Susceptibility*: susceptibility is an intolerance of repetition or boring people, and restlessness in such conditions
- *Disinhibition*: preference of "out of control" activities, such as wild parties, drinking, and sexual variety
- The questions are focused on these four categories and determine which place someone occupies inside this Sensation Seeking Scale.

On which side of the scale will you find young people who are predominantly criminals? A greater need for extreme thrills and spills corresponds to a greater share in the commission of offences. But also, under (youthful) criminals, there are still big

differences in the extent to which they participate in more or less violent actions. As you may already suspect, the most violent criminals are to be found among those who are looking for extreme forms of thrills and spills. Intuitively you know that crime *among boys* is much greater than among girls. Various studies show that the participation of crime amounts to 10 to 25% girls in front of 75 to 90% guys.

Scientific research that study the causes of criminal behavior hardly ever identify that men on average have less MAO-A than women. Nor do they mention of testosterone, vasopressin and differences in the functioning of the brain in men and women respectively. The focus is on sociological explanations such as family situation and poverty. For the difference in participation in criminal activities among boys and girls are these sociological explanations inadequate. The difference only becomes plausible if you take the biological differences between men and women into account.

Interesting question: how can we influence these patterns of behavior? The answer is: by changing these biological factors. We will explain how we can do this in part 2.

3.3 Overdose on adrenaline

One of those behaviors that belong to the “normal” lifestyle is ubiquitous aggression. This aggression has all sorts of forms, from berating via molesting an innocent passerby to an angry crowd after a football match. The first key to an analysis of the causes is so obvious, that it is mostly overlooked. However, that key is rarely used to solve problems with aggressive behavior, not by educators, not by politicians. What key?

Often, the fact that *men* are the ones who cause aggression in society is constantly overlooked. In riots after the soccer, at the riots in the suburbs of Paris (2005), youth gangs in El Salvador, in armed robberies: 90% or more is caused by men. They have control over this “game.” Testosterone makes men physically more action-oriented, they want to compete with other men, want to exercise power and speed. In principle, testosterone is just an innocent hormone aimed at reproduction and sex drive. Looking for sex leads to an active-seeking attitude, which is often frustrated because there is not always a partner who wants to contribute to the satisfaction of that need. In combination with the motive to exercise power, there is a strong demand for adrenaline production. There is only one small reason needed for an adrenaline-explosion. Where is our PreFrontalCortex (PFC) to take control?

Seen from evolution and from the way human hormones work, aggression is a normal biological factor. How is it that some people are much more aggressive than others? Adrenaline makes you ready for a fight. That was very useful in the past. Adrenaline causes your heart to beat faster and increases your blood pressure. Usually, it is a short-term effect: there is for example a flash of lightning, you are afraid (amygdala) and the

adrenal gland has immediately responded with an extra shot of adrenaline, which is twenty times greater than normal. That adrenaline shot finds its way to the receptors of major organs like the heart, the lungs, the brain, and large muscle groups. The heart pumps blood through the body to the places in your body where the most work has to be done to your muscles, your lungs and brain. This adrenaline rush takes about one to two minutes. Now you're ready to flee or fight. If a dangerous animal suddenly pops up, most people will run away, but if a person attacks you, you will consider fighting. ***Adrenaline is the biochemical basis for fight or flight.***

Over millions of years, this was a meaningful response from the body.

3.4 Some biological comments on the autistic spectrum

Men and women are not equal and not at all the same. Also, their brains are different. We have seen many of the differences earlier in this book. Autism and ADHD (Attention Deficit Hyperactivity Disorder) are dealing with yet another difference. Every individual has in his brain a ***corpus callosum***. This part of the brain forms the connection between the left and right side of the brain. In the schema of the brain you can find it in the middle of Figure 1.3. The corpus callosum connects both hemispheres through a number of relatively thick connecting cables. The larger the corpus callosum, the better the cerebral hemispheres will communicate with each other and the faster the sensory stimuli are processed. A larger corpus callosum takes care of faster information processing, widespread attention for the environment and makes many fast, intuitive responses to the environment. A smaller corpus callosum means a greater

concentration on one detail or even a resistance to processing too many impressions within short time and a faster overload of those 'telephone exchange' (Delfos, 2004). Who owns a larger corpus callosum? Men or women? A number of surveys show that women not only have a larger corpus callosum than men, but that the number of connecting neurons between the two hemispheres in women is greater than in the brain of men (Highley, Esiri, McDonald, Cortina-Borja, Herron & Crow, 1999; Delfos, 2004; Burke & Yeo, 1994). That provides an explanation for a number of differences between men and women in matters of perception. Because women have a wider neuronal highway to sensory stimuli to conduct from one to another hemisphere, women have a wider area of perception than men. Women may perceive many things at once; men can concentrate better. The differences in size of the corpus callosum in general lead to important differences between men and women. The corpus callosum can, however, still show a difference in size *per individual*. Men with a relatively small corpus callosum risk getting in trouble.

Many researchers found: Women have a large corpus callosum and thereby a large number of sensory perceptions and impressions. In order to be able to process in a timely manner, women have usually happy enough MAO-A. Men have a smaller corpus callosum. In addition, they have less MAO-A to break down exciting amines. The formation of the corpus callosum and the functioning of MAO-A and MAO-B can offer important points of reference for the explanation of human behavior. Autism is four times more common among males than females. Asperger's syndrome comes even nine times more common in men (Van Nunen, 2002). The prefrontal cortex plays probably an important role in behavioral disorders in

the autistic spectrum. It can explain the disturbances in the communication between the prefrontal cortex and other areas in the brain. However, there are also researchers who deny the differences as written here. It is a very controversial area as you can read in this article of Bishop (<http://gorman-lab.ucsd.edu/courses/files/psy222/Bishop.pdf>) . (1997) In general, these differences can contribute to insight about the huge differences in behavior of men and of women. Look at the news tonight.

In the spectrum of autistic disorders, you see a range of behavioral components that you can find also in the review of Eysenck (see figures 3.1 and 3.2). It is good to remember that in almost all cases we speak about a specific design in the network of brain neurons. Sometimes it goes for a strengthening of the male brain, sometimes for the strengthening of the female elements. Often these peculiar behaviors are not disruptive to the environment. Sometimes however there are big problems for the individual and for his environment. The beauty of the differences can sometimes become a problematic form.

3.5 The Alchemy of depression and stress

A biological factor plays an important role in the development of both depression and stress.

Depression

The balance between the different neurotransmitters in the brain plays a large role in depression. Due to a shortage of MAO-A, there are too many depression-causing neurotransmitters in the brain. Normally after a few nights rest and a few brisk walks you can ease your mind. But someone who is depressed cannot escape his feelings of defeat, the feeling of having failed and the feeling that nothing more is worth coming to action. It is to ensure that serotonin remains in the brain and is not being re-up-taken by the neurons. There are selective serotonin reuptake *inhibitors* (SSRIs) used as pharmaceutical drugs. These fall within the category of antidepressants. In her book *Why we love*, Fisher describes the influence of these SSRI's on the feelings of lust and love. It shows that people who swallow these SSRI's often no longer like to have sex anymore. According to Fisher, the SSRI's not only dampen sex-oriented feelings, but also feelings as love, attention, and adhesion. In addition to the already problematic relationship arise hereby depressive feelings. A vicious circle. Still according to Fisher, but certainly also in accordance with what you have read in Chapter 1, there is a clear explanation for the emergence of relationship problems. If we make love, oxytocin and vasopressin will also be released. This creates bonding and the feeling to want to protect the partner. Unfortunately, the reverse is also true: If you don't have sex, the adhesion usually disappears because less oxytocin and

vasopressin is released. It may be true that you can get into a depression with medication, but the risk for damaging other processes with a biochemical agent is still quite large. Medications can help to block the worst for a certain period of time but can then be counterproductive. Possible side effects may already occur, such as drowsiness, dry mouth, dizziness, heart palpitations, sweating, nausea, constipation, difficult urination and less sexual interest. The BC broadcast *Seroxaton trust* (<http://www.youtube.com/watch?v=99RWfNVJKlo>) shows that one of the bestselling and most successful antidepressants (Paxil) also leads to serious withdrawal symptoms that sometimes result in suicide. Sometimes medications are necessary and can be a huge relief for very painful mental and physical disorders. But it will be clear that you should be very prudent.

Stress

The phenomenon of stress is the end point of a whole series of complex biological responses to an evolutionary seen quite old, but otherwise very normal state, namely that of a light constant alertness to signals from the environment. An ongoing attitude of “*be careful!*” so that no robbers lurk. If there are really disturbing signals from the surrounding areas, the alertness is amplified to an anxious turmoil. Your adrenal glands start to secrete adrenaline and noradrenaline. Both increase your heart rate and cause heavy breathing. You feel hounded. Next, the hypothalamus creates a hormone to start actions. That hormone, in turn, puts a hormone corticotrophin releasing factor (CRF) to work. And as a result, the hormone corticotrophin is released. CRF causes the pituitary to produce adrenocorticotrophic hormone, which goes back to the adrenal glands and causes the adrenal cortex to make glucocorticoids (see Figure 3.4). I mention

this whole procedure to show how complicated these processes are.

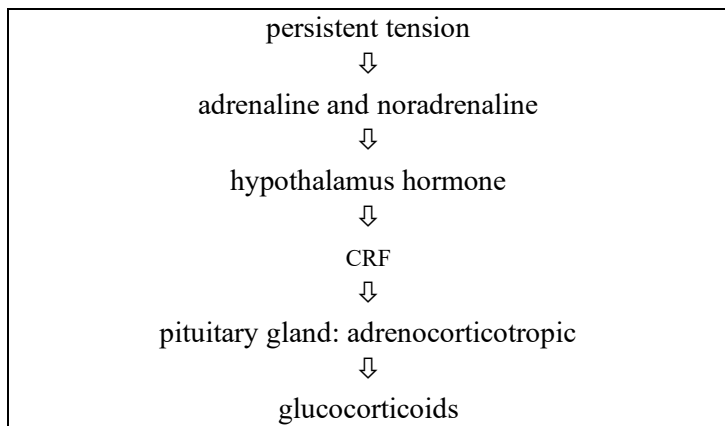


Figure 3.4 biological reactions associated with stress

The process (as described here) is still a simplification of the overall process in the brain. Eventually, this leads to your glucose levels increasing by an evil trick: proteins are extracted from muscles and other tissues and converted to glucose in the liver. In this way, your own body is partially pulled down to get additional fuel available. Meanwhile there is cortisol in your bloodstream. In states of prolonged stress, it rises twenty times more than normal. Due to the increase of cortisol, the immune system is suppressed and thereby the body saves energy to fight the enemy. This used to be very meaningful, but nowadays there is rarely a real physical enemy that causes stress. It is rather too much of a challenge at work or unrealistic expectations from the environment that you can't cope. Your body barrel that on as an enemy and equips itself against it as if there is an enemy. In this reaction, the immune system is weakened. This regularly causes an inflammatory reaction in the intestines. Knots in your

stomach, bloating, and diarrhea are the result. And all of these to prepare for the attack on an enemy who does not exist.

Summary 3

The delicate balance of neurotransmitters and hormones becomes visible in the way people behave. With this behavior you can characterize personality theories. Eysenck provides a handhold when it comes to determining the predisposition anyone has. You receive this predisposition at the moment you are born, and it is to a large extent determined by the biochemical balance in your body, especially in your brain. From evolution, inherited *Sensation seeking* is a behavioral form you still find in riots and rallies. Zuckerman has mapped this behavioral form in his Sensation Seeking Scale and concludes that this form can lead to criminal behavior. In boys, more often a criminal predisposition occurs. This predisposition is fed by a risky cocktail of neurotransmitters and hormones, such as adrenaline, vasopressin, testosterone and a lack of the calming MAO-A. In extremes this can lead to life-threatening youth gangs and extreme soccer violence. An imbalance in the delicate biochemical balance can also cause behavioral problems in the autistic spectrum and in depression and stress.

Part 2 The biological factor as the basis for behavioral influence

In part 1 you saw the way biological factors form the basis for human behavior. That knowledge is conditional to the content of part 2. It is not so that all knowledge about those biological factors is infallible, exact and once and for all. No doubt there will be new facts discovered. Nuances and some scientific investigations will be made that will shed new light on the functioning of our hormones and neurotransmitters. By and large, however, the knowledge now offers a sufficient grasp to see how you can use this knowledge to deal with human behavior. Based on the knowledge you are going to see in part 2 how people can manage the behavior of themselves, their children, their citizens or their residents. Partly, this can lead to new methodical approaches to clear political views and to stimulate our evolutionary development by having more control over our brain. It will certainly lead to a new perspective on what we do now within our society. You can link existing knowledge, such as:

- the psychoanalysis of Freud and Jung
- Adler's psychology of power,
- the personality theory of Eysenck,
- the social control theory of Hirschi

These theories can now all be linked to the newly acquired insights as related to the operation of MAO and neurotransmitters such as testosterone, vasopressin and oxytocin. For example, you can link the *id* of Freud to the limbic system and the functioning of neurotransmitters, or his *über-ich* to the prefrontal cortex. In short, it is time for an update (Leander, 2004).

4 Biological interventions

This chapter deals with the question of how biological insights can lead to interventions in everyday reality. Because it involves interventions on human behavior you can call these actions biosocial or biological interventions. Actually, the biological factor must be involved in any kind of social action, in education and in politics. To be accurate: all psychology, sociology and pedagogy have this biological factor as an unbreakable aspect.

4.1 Nature versus nurture and nurture through nature

Many instincts and impulses date back to our evolutionary history, and this evolutionary history is inherited and passed on through our DNA. Can you agree with that? This question is important, because it is the basis of the biological factor. Our culture seems so powerful and indelible. The pyramid of Cheops is not easy to let disappear. That is why we sometimes feel that our culture is indestructible. But in times of stress, humans are easy prey for their nature. The primitive brain, the limbic system and our neurotransmitters and hormones lurk, ready to take over. In a riot, a rally or war people are often driven to 'beastly' behavior, or perhaps the behavior of animals is sometimes less 'beastly' than human behavior. How strong is nature and how steadfast is nurture?

In the world of plants and certainly in the animal kingdom, we know plenty of examples of partnerships. In animal groups there are complex forms of cooperation, and with anthropoid apes you see detailed family relationships, social status and different forms of communication (De Waal, 1988). Over the last ten thousand years, people have developed social and cultural products that are clearly visible and tangible. The creation of

social and cultural structures is still a young phenomenon within evolution; it comes down to structures like the structure of a region or city, a political structure, the governance structure, a knowledge infrastructure or the World Wide Web. The individual can shape these cultural and social processes because the prefrontal cortex has developed throughout the evolution of the human brain. The prefrontal cortex is responsible for integrating and coordinating signals and impulses from the older parts of the brain. These older brain parts are focused on the survival of the individual and the reproduction of the species. They contain millions of years of experience, on the basis of which our body has developed a number of biochemical processes (see part 1). In a sense, the prefrontal cortex must teach our body how to deal with these evolutionary urges and instincts. The prefrontal cortex needs to check and correct our hormones and neurotransmitters. The process of evolution makes this origin and development of ever more complex forms of life possible. That process is not complete (yet). Again, and again, it appears that individuals lose their urges; dozens of times a week, the individual is not prepared to control his neurotransmitters and hormones. Even stronger, a large part of everything you do you are doing subconsciously (Damasio, 1995). And as you know: this can be a big problem, as larger groups of people lose control of themselves.

What has the most impact on people's behavior, human nature or nurture? This question has already led to many heated debates. The nature supporters assume that human behavior is already determined at conception for the most part; via DNA, the amounts of hormones and neurotransmitters take their position in the body. In this way, you inherited a personality which has an evolutionary basis. The influences that the environment can

exercise are negligible for nature followers. On the other hand, you find the supporters of the nurture theory, who argue that man is a blank slate at birth and that he will develop his behavior through educational and environmental factors.

4.2 To ten counting either a TCA-intervention

Many a mother will say it time and time again, as one of her children is likely to lose his temper: child, count from one to ten. In this way they apply this intuitive knowledge of biological psychology.

Our Prefrontal Cortex (PFC).

Human beings have something that sets them apart from all other living creatures: a larger prefrontal cortex (PFC). As we saw before, the PFC is the part of the brain that was developed last in human history. The PFC develops in people between the fourth and 12th year of life. The connections between the PFC and the other parts of the brain are completed at puberty; the myelinization of neurons causes the neural network to be completed by the end of puberty (Van der Linden, 2006).

Our behavior is, to a large extent, determined by impulses. Initially our primitive brain is active. Through the limbic system, a quick explosive action is taken. We will respond especially impulsively in unexpected events associated with emotions. These impulsive reactions often cause major problems; in some cases, impulsive behavior can lead to criminal behavior. In our society, each person has to control his impulsive behavior. The PFC plays a crucial role in controlling our impulses and causes a certain delay in our response to a stimulus. So, there is a *quick*

impulsive route if you react, and there is a *slower, controlled route*. The fast route runs directly through the thalamus and amygdala, and the slow route runs via the prefrontal cortex. Throughout history, the best route was the evolutionary route: the speed at which man could attack or flee (fight or flight), as it was often a matter of life and death. But now if someone comes to you with a stick in his hand, it's a good idea to ask yourself: what does this person want to do with that stick? Is this a walking stick? A pointing stick? Or a bat in the hands of a football fanatic, who saw his club lose ingloriously?

Now think again about that mother who gave her child the option to count to ten. In fact, she advised her child to control his behavior and not to let his reaction run through the rapid thalamus-amygdala route (TA), but via the thalamus-cortex-amygdala route (TCA). The direct route is via the limbic system and the indirect is via the prefrontal cortex.

Recently it has been discovered that the limbic system, our emotional brain, is built from only **paternal genes**, genes of male origin, and that the prefrontal cortex, the mental side of our brains, is built by maternal genes, the genes of female origin. Men 'ensure' the enforcement of our primitive hormonal system and women 'ensure' control and reflection through the prefrontal cortex. This might provide an explanation for the fact that impulsive behavior occurs much more in men than in women. Women are better able to preserve calm behavior thanks to a stronger predisposition regarding MAO-A and a larger corpus callosum in general. Perhaps this is an explanation for the fact that primitive, impulsive behavior, shows up much more often in men than in women. So, the biological factor offers a beautiful argument for women's emancipation and offers not-as is often thought- an argument to suppress women.

How can you use this knowledge of the biological factor methodically in social work? An example:

Philip is a quiet boy. He reads a comic book on the edge of the sandbox. A little further away there are a couple of boys playing football. Suddenly the ball hits his head very hard. He jumps up, sees who is nearest and kicks that boy in the knee. That boy starts roaring, because it really hurts a lot. Philip is taken aside by the group leader and addressed: "Philip, why did you do that?"

"I don't know; I was suddenly so angry," Philip answers.

The leader:

"Do you know what happened to you: you sat there, not quite at ease. Your body was on alert. When the ball hit your head, your body responded with a surge of adrenaline, which makes your heart beat faster. You stood up to defend yourself. You gave that kid a kick in the knee, because you wanted to disable him. But that boy did not kick that ball. You must therefore first remain calm and count to ten, that way you don't do anything that you'll regret later. It was not your aim to hurt anyone who is innocent".

That is a (Thalamo-Cortico-Amygdala) TCA-intervention: An intervention that puts the impulsive route from the thalamus to amygdala under control of the cortex. Not spectacular, no sensational new method. With the biological knowledge you have now, you can relate more of such situations to TCA-interventions. It is about acquiring insight and knowledge about the (biological) processes that control children and young people, insight you can transfer in a playful manner, for example by telling a story. Children and adults who suffer from an impairment

in the autistic spectrum often get better control of their situation if they are able to understand what is going on within them. They can try to do something about their problem based on understanding these problems. A TCA-intervention is something you can apply from the moment children are able to understand and process the knowledge offered, from about three years. In addition, the prefrontal cortex is not yet developed, and children can NOT control their impulses via the PFC before they are three years old.

4.3 An evolutionary biological-psychological perspective on ADHD and PDD-NOS

In many publications, you will find the view that ADHD is a disease, a disorder. And the name itself, ADHD, also points to a disorder: *Attention Deficit Hyperactivity Disorder*. But in fact, it is not disorder. What are we talking about? The "disease" ADHD actually is not a disease, but a legacy of evolution, namely the professional profile of *the hunter*. That professional profile of the hunter was necessary in order to survive for millions of years. In addition, it is a personality profile that is older than that of the farmer, who was tied to one place and needed totally different personality traits to be able to be successful. A hunter should get away and look for excitement and adventure; the personality of the farmer is diametrically opposed. According to this view, ADHD is a personal profile that, only under the compelling circumstances of a peasant world, becomes a 'disease' because hunters cannot live in a farmer's world. A hunter cannot live in a world of inaction, in a world where is no room on raids, no room to build a raft to follow the flow of a river. [No Valley with horses](#) (Auel, 1983). Instead, a classroom

of 50 square meters, at a table, usually with tinted windows to avoid distractions. Pay attention! Concentrate! Adjust! For some children that is really too much of a good thing. If this young man grew up on the steps of the Ukraine or in a settlement in the Sahara he would not need Ritalin. There he would be an esteemed hunter, a trader who would make great trek tours to sell his products. So, it's not a disorder, but a predisposition or personality. We should name it: ADHP, but because nobody calls it that, I will also go on using the term ADHD.

There is another one:

Pervasive Developmental Disorder, Not Otherwise Specified (*pdd-nos*) is a disorder related to autism. This clinical picture covers a wide range of behavior mainly characterized by erratic behavior. In most cases, these *developmental disorders* are due to small genetic or biochemical abnormalities in the brain (De Vries, 2006). You might wonder whether our ancestors thousands of years ago suffered less from autism, ADHD or PDD-NOS because they just could catch their fish in a wild river or hunt some dangerous animals. People literally had more space to live, and their natural energy could contribute to a meaningful existence (Auel, 2003). In addition, we have quite a few energetic and busy family members, for example, Rhesus monkeys, and baboons (De Waal, 1988).

Every individual has his own predisposition at the time the fertilized egg begins to develop. At that time, the genetic material stored in DNA becomes active, and a piece of evolutionary history comes to life. Through the construction of the prefrontal cortex, the limbic system, paternal maternal hormonal household and the more or less active neurotransmitters (including

MAO-A) originate from the construction plan of the DNA and form a predisposition. On this predisposition, you can put a model that allows you to characterize different predispositions and typifies, so a number of personality theories, such as Eysenck's personality theory, are in fact predisposition models (see section 3.1). In the brain, some parts are more active than others depending on which evolutionary predisposition was inherited, and that are expressed by a special pallet of neurotransmitters and hormones. Did you inherit more impulsive, direct actions that were designed to quickly attack and overpower your prey? Or is your brain designed for a perpetual calm reflection and to conduct your behavior via the prefrontal cortex? Brain research in 2003 has shown that certain regions of the brain in ADHD children are less active than in children who do not have ADHD, while other areas were more active. Very important is the finding that 80% of children with ADHD involve hereditary factors, which cause their hyperactive and impulsive behavior. The risk of ADHD in siblings of a child with ADHD is increased three to five times compared to the ordinary population; at second-degree family members, the risk is increased twice (De Vries, 2006). That means that in many cases where the diagnosis of ADHD is adopted it is a predisposition that is inherited.

What does this knowledge about ADHD mean in education? First, it is important to be aware of these different types of predispositions. By looking at it from a biological evolutionary position you can say that 50% of all ADHD disorders are based on the predisposition of hunters and nomads and was passed on. In addition, ADHD also has to deal with an imbalance in the biochemical processes in the brain. The biological factor plays a large role in ADHD. *"The task of psychologists, educators and*

doctors is not to put children on the “chemical lead” because the entire society cannot handle the products of its misguided theories of man and raising children, and instead hands over our children to the free pharmaceutical market. Let us return to the basic matter of personal psychology and education: The child is to acquire personal responsibility and emphatic behavior under expert guidance – and that takes the family and the school: In these fields, the child should be able to lead off mentally. This constitutes the core of the human person” (Quoted from Moritz Nestor 2012).

I emphasize that ADHD is not a disease, but it does not mean that this personality is without any risk. It is well known that children with ADHD face a greater risk of becoming criminal, facing addiction to drugs and alcohol, and have a tendency to aggressive behavior and vandalism. The term ADHD indicates that the children with this condition are not able to concentrate. In fact, these children need extra care from adults. Just like the children who are in the corner of extrovert (see 3.1) risk an unstable personality, these children need additional guidance to their innate energy. Introverted and stable children also need love and care, but they don't get into risky situations as easily. ADHD children will need guidance to support them in shaping their energetic predisposition. The child can grow into a film actor, a professional athlete, an extravagant scientist, a stand-up comedian, a mountaineer, a king of soul, a world traveler, an inventor, or a composer, as has been proven by many famous personalities. Have a look at [some pictures](#).

(<http://www.famouspeoplearehuman.com/famous-people-adhd.htm>) They have all used their predisposition to excel, but if you look carefully, many of them also were at risk to be derailed by alcohol, drugs, financial crimes and corruption, from

actor to politician.

In addition to the evolutionary predisposition, something can go wrong with respect to the biochemical balance in the brain. Based on such an imbalance or based on physical abnormalities in the structure of the brain, there are indeed major diseases. In these cases, surgical intervention or specific medication will certainly be necessary. If there is any brain damage and/or a total disturbed biochemical balance in the brain, a medical solution will be necessary.

If possible, we want to provide support through education. But it is sometimes necessary to restore the balance in the brain with biochemical resources. It is important to be careful when using Ritalin or Strattera (atomoxetine); from numerous documentaries and scholarly articles it becomes clear that Ritalin can be an effective and valuable medication, but that it is too often used as stand-alone practice without any support activities, which makes people lazy and leads to addiction. It would be much better if a behavioral approach to ADHD is chosen. The aim is to *coach* the behavior so that the child and the people around them have less trouble. An open environment with lots of space, nature, animals to cuddle and to take care of, adventure play area where they can scramble, can romp, a tree house they can build, or a hidden bomb shelter they can dig to give the opportunity to use the natural energy.

4.4 Walking away with depression

A first group of biological activities can be found in sports and games. Through exercise you can increase the level of endorphins, and endorphins make you feel more comfortable. In

1898, Kraepelin wrote that sports have a therapeutic effect and preventive protection against mental health problems. Sport promotes not only perseverance and self-control, it also promotes mental and physical resistance to external threats. A population screening among 55,000 people in the United States and Canada showed that general well-being improves if people have more recreational physical effort.

It is important to link this kind of analysis to recent results in brain research and to see the relationship with hormones and neurotransmitters. Neurotransmitters such as endorphins, dopamine and serotonin *generated by exercise*, ensure that you walk firmer in your shoes and you can do your work with more fun.

A second group of biological activities can be found in meditation, yoga, Tai-chi, Reiki and others mostly from the East-derived sources of inspiration. Just like sports, these activities establish a basis for self-control, but they also have a very strong influence on the balance of neurotransmitters in our brain. In fact, meditation acts like an overdose of MAO-A.

A third group of biological activities can be found in the production of oxytocin through hugging and massage. This “hug-drug” can mean a hefty boost for those who are cold and feeling lonely. Unfortunately, if someone has reached the stage of depression, the need for hugging mostly disappears. Also for the partner it can be a difficult step to embrace and to fondle someone who seems not to like this hugging anymore. Nowadays it is also increasingly difficult to professional social workers to physically protect and comfort somebody. Such help is dangerously close to unwanted intimacy and sexual harassment.

Massage by a licensed massage therapist can offer a solution, though massage is more associated with professional labor than cuddling. In many Eastern countries a large range of massage techniques are available, which can be chosen depending on one's personal wishes. For example, the original Thai massage offers an often-painful solution for physical problems that may also have a psychological basis.

A fourth group of biological activities fall under the collective name "religion". Religion comes from the Latin 'Religio' and means "belonging to". Religious activities offer the possibility for you to feel connected with fellow human beings. If religious activities lead to self-acceptance, if they can wash away your guilt, if they can offer support from a powerful belief and if they help to pacify the chaos in your head, religion is a powerful source to restore the disturbed balance of neurotransmitters (that's why we arrange religions under biological activities!). Presumably this effect is present and effective for all religions, but it is certainly true for those religions that emphasize a broad philosophical acceptance of all living creatures. Undoubtedly many religious meetings produce a calming effect like meditation does, so another MAO-A producer. Sometimes, however, religion can be used to repress people. Marx therefore called religions ' opium of the people '. But when used in a good way it can release serotonin and dopamine.

Rituals within religions play an important role; rituals provide a handhold for people at important moments in their lives: being born, marriage and death. Pay attention to the massive meetings of Lourdes and Mecca, Yom Kippur, Christmas and Muharram. What is the attraction? "Religio", you feel connected; not only at birth, not only in marriage and not only in the event of death. Now we hope that religions also feel connected to each other....

4.5 Alcohol, drugs and smart drugs

Our brains are formed by complete galaxies with intergalactic connections: the neurons. In between a complex system of neurotransmitters, those brain signals are blocked or reinforced. Our brain is packed with biochemical preparations which find their nutrients in our diet. The body has 'learned' (through DNA) how to build up the hormones and neurotransmitters. A lot of these biochemical substances can be found in nature. Our medications are largely derived from these materials; just think of aspirin. In addition, there are a large number of natural substances that have a direct impact on the functioning of neurotransmitters, and thus give a pleasant feeling in our brains. Supplemented by our increased knowledge of those natural substances and by the increased knowledge of the functioning of hormones and neurotransmitters, more and more applications are conceived and found under the collective name ***drugs, Eco drugs, and smart drugs***. If you are not familiar with that stuff, you'll really be amazed at the experiments in this field if you look on the internet and see what is currently happening. Anyone who is involved in education and politics would have to acquire knowledge of the latest developments. Here is some compact info on this subject:

Eco drugs are products coming directly from nature that have an effect on your consciousness, and come from plants and herbs whose narcotic or stimulant effects have often been known for centuries. Smart drugs is a collective name for resources that are composed of several substances: A smart product can be chemically made by imitating biochemical

substances found in nature. These are drugs that, for example, are prescribed to cure forgetfulness, dementia and epilepsy, but which are also used by healthy people for other purposes. Herbals are products sold under names like Cloud Nine, Herbal Ecstasy and Ephedra. The main active ingredient in these products is a substance called Ephedrine. These herbals are sold in the form of capsules, pills and herbal mixtures. Magic mushrooms is the collective name for mushrooms that affect consciousness. They can cause hallucinations: the user sees and experiences things that are not there. The use of herbs and mushrooms in order to influence consciousness is very old.

Among young people (within certain subcultures) there is a lot of experimentation with the use of various kinds of drugs, sometimes in combination with medication and sometimes also on the basis of their own biochemical inventions.

Eco drugs and smart drugs are usually natural products that are freely sold. There are still, however, risks in using them. The combined use of products can be quite unpredictable; of certain products is well known that the combination of substances with ordinary foods can even be dangerous. Finally, combinations with alcohol and drugs like speed and Ecstasy are also risky and can sometimes cause poisoning. Examples are nightshade plants such as henbane and datura. Also, very well-known nightshades as the potato and tomato contain toxic substances, in particular solanine. Solanine is one of the alkaloids, substances that are toxic especially for mammals, and that thereby give protection to the plants so they will not be eaten by mammals. Normally small quantities do no harm, however sometimes you can suddenly become allergic to it. Alkaloids are used in drugs such as morphine, ephedrine, vinblastine and sanguinarine. Also, addictive substances belong to the same group of alkaloids, such as nicotine, caffeine and cocaine. Since many of

these biochemicals are readily available in nature, there are a lot of experiments by private users and by commercial ventures, usually criminal organizations. It is not recommended to experiment with these and other hallucinogenic substances, because the difference in quantity required for the hallucinogenic effect and a lethal dose is extremely small, namely between 0.2 and 0.4%. For scopolamine, the lethal limit is 50 mg. In the past, people have developed knowledge to handle those substances: Some people have specialized as a medicine man or witch. In modern times there are many scientific inventions; via laboratories the secrets now become public, and through the internet you can find material that promises endless experiences. People swallow huge doses of vitamins, minerals and amino acids in addition to medications such as hydergine and vasopressin.

So, you see that naturally occurring drugs, legal drugs and legal biochemical resources cause a lot of confusion by the existence of illegal soft and hard drugs. The question of “What are legal drugs” and which are illegal can only be answered by experts. The trade in illegal drugs and medicines (including doping used in sports) induces an unimaginable amount of trouble in society in the form of robberies and muggings. In their free time, children are threatened with well-known and not yet known tricks to influence their consciousness.

What can you do with this knowledge? You need to acquire knowledge and insight in these matters with regard to both the use and non-use of these kinds of resources. Because part of the resources consist of medications, dietary supplements and foods that exist in everyday life and can make life a lot more pleasant or bearable, the use of these resources is valuable. In education and politics, you provide information and stimulate reflection

on any advantages and disadvantages. Advantages and disadvantages must be viewed from the perspective of gaining insight into the balance of our organic constitution and, in particular, insight into our hormones and neurotransmitters. For example: a well-known smart drug is called “deprenyl.” This is a MAO inhibitor that is used to combat depression. According to Hungarian professor J.Knoll, deprenyl makes sure that the aging process is slowed down; this process also slows down the progression of Parkinson's and Alzheimer's.

Another example is propranolol. This is a betablocker, which means that it blocks the incentives of the brain so that the heart rate remains moderate and blood vessels dilate. This way, propranolol will block feelings of fear: you have no shaky hands, no shaking knees, no trembling voice, which then provides the clear consciousness you need (for example: during an important exam or presentation). Just like info on deprenyl, information about propranolol is easy to find on the Internet and in literature. In addition, there are hundreds of other smart drugs, medicines and herbal remedies that are of interest.

In politics, it is hard to give an overview of these products and take a stance on whether they should be allowed or not. In fact: there are an enormous number of crimes committed because of this, due to many of these products being illegal. So, it seems that the disadvantages of forbidding are worse than the abuse of drugs and medicines. Perhaps we should spare the money that is used to fight drug-related crimes and spend this money on information and guidance.

A note about drinking alcoholic beverages from a biological point of view: through the (excessive) use of alcohol, people are put back on their fast TA-route (thalamus-Amygdala route). Alcohol has a narcotic effect, where the cortex becomes more and more disabled, and the limbic system (with its impulsive

reactions) takes over the control of behavior. This is especially true in times when aggressive impulses are at their highest (for example: after a night going out and still ending up with no girlfriend). For parents, educators, social workers and also for grandparents, it is important to have insight into the symptoms of alcohol, medications and drug (ab)use. Having this knowledge can not only contribute to ideas and judgments of potential risks, but also to the opportunities offered by these funds. Through biological activities, you can initiate biochemical processes and increase and decrease neurotransmitters or hormones. Sometimes, however, it is not enough to restore balance in your brain. In this case, you need the support of biochemical substances from either plants or laboratory. But, if at all possible, you should give preference to the biochemistry that you generate through simple actions, because then your body itself is in the driver's seat, because the body itself may look for a balanced structure of neurotransmitters on its own. Don't use dangerous bombs of drugs; remember you can safely manage your body with drops of self-produced neurotransmitters. DIY!

4.6 Food feeds feelings

Food supplies the biochemical building blocks for our body in general and for our brain in particular. Through unilateral or an incorrect power supply, it can happen that your body is unable to build important substances. For example, if you ingest too little fat, cholesterol or sugar, your body reacts to this and you have to deal with feelings of depression and insomnia. Receptors in your brain request that you eat more of these essential nutrients. Feelings of depression and a sense of happiness are (co-) dependent on what you're eating. Fruits that will give you happy feelings are: dried dates and figs, papaya, bananas, strawberries, sweet cherries, oranges, mangoes, pineapple, grapefruit and hazelnuts.

You need plenty of sleep to recover lost protein and to eliminate waste. Cholesterol is, though often revealed, an important nutrient for your brain. Your brain runs on 10 to 20% cholesterol. Also, sex hormones are synthesized from cholesterol. If you run out of cholesterol, then your brain warns you and you will start feeling depressed and cranky. Why is that? Cholesterol products, such as progesterone, estradiol and testosterone, ensure an increase in serotonin activity. Low cholesterol lowers serotonin uptake. Serotonin is a neurotransmitter that regulates not only feelings of happiness, but also controls sleep, memory and learning, controls your temperature, your mood, your behavior (sexuality and hallucinogenic behavior), heart and blood vessels, muscle tension, gland regulation and depression. In addition, serotonin affects cognitive abilities, pain, anxiety and appetite. Serotonin is a 'Jack of all trades' as it relates to many neurotransmitters.

The fibers in wheat, potatoes, corn, oats, rice, peas and soybeans reduce the absorption of cholesterol and can thereby make you

feel depressed. Also, glucose is important to produce serotonin. The sweet taste of sugar and honey increases the chance of a good night's sleep. Finally, fat is also of interest, because fat is the main source of power for the heart. If you really want to sleep easily, then ingest a combination of sweets and fat. If the sun has gone down, the active hormone *serotonin* is converted to the hormone *melatonin* and will put you to sleep. For optimum production of melatonin, you need optimal production of serotonin.

This is but one example of the way our food affects our senses and feelings. The way our food offers resources for the biological processes is extremely complex, just like the biological processes themselves. Cholesterol is well-known as a dangerous substance that can be life-threatening. The reality is much more complicated. Cholesterol consists of HDL and LDL particles. An LDL-cholesterol level that is too high originates inside of blood vessels and results in a build-up of LDL particles (bad cholesterol). This fatty mass can calcify, and thus will cause blood vessels to narrow. This process is called arteriosclerosis. HDL particles (good cholesterol) can slowly reduce atherosclerosis, because they have the ability to absorb cholesterol. Thereby, as a result, the accumulation of chalky particles in the blood vessels shrink. HDL is in unsaturated fatty acids. Important healthy unsaturated fatty acids is available through fish oil. Fish oil contains omega-3 fatty acids. These fatty acids can also be found in fruits and vegetables. Because our food is usually cooked, we get too little omega-3 fatty acids. Therefore, capsules containing fish oil offer a good addition to your diet. Additionally, you need omega-6 fatty acids, but not too much. A ratio of one to four between omega-3 and omega-6, respectively, will result in a correct balance. In particular, sunflower

oil, chips, salad dressings, and mayonnaise are high in omega-6 fatty acids.

Could it be true that simply taking enough fish oil and Tagalog flower oil can make your problems disappear and PDD-nos make less *pervasive*? Without therapy? Scientists believe that a *lack of* DHA can be a cause of the emergence (or worsening of the effects) of developmental disorders, including PDD-nos; they also believe EPA is of great importance in improving mental health and reducing mood disorders. Of course, we have to avoid mood disorders in children with PDD-nos. And so it appears again that PDD-nos may be a biochemical problem, where absolute deficiencies (meaning it's just not there) or relative deficiencies (it is there, but seems to be insufficient) of certain substances have taken care of the problems or concerns. A good way to obtain fish oil is to eat oily fish, such as sardines, mackerel, anchovies and the like. A safe and sure way is taking pure, uncontaminated, fish oil in the form of capsules.

Often, we get too many omega-6 fatty acids and not enough omega-3 fatty acids. The main types of omega-3 fatty acids are EPA and DHA (Eicosapentaenoic Acid and Docosahexaenoic acid). DHA is important for women who want to become pregnant and for women who are already pregnant; this is also true for women who have just given birth and for the babies themselves as well as growing children. And why? Because 20% of the children's brains consist of DHA, and because DHA supports concentration in learning environments of growing children.

Nutrition has a large influence on the function of the neurotransmitters and hormones in the later stages of life as well. PEA (phenyl ethylamine) is generated by chocolate, cheese and red wine. PEA is a mood enhancer. In addition, your brain produces

PEA if you've met a sexually attractive partner. PEA allows for the feeling of "butterflies" in your stomach. You may call it the *love-drug*.

Our hormone system is complex and is based to a large extent on our evolutionary history. If you are an educator or politician, then you will need a global understanding in the way biological processes rule our feelings and (social) actions. This will give a new view on existing knowledge, habits and methods.

In part 2 of this book, you establish a connection between the biological knowledge of part 1 and the possibilities that are offered to recognize behavior and behavioral influence. In this chapter, you have some starting points for everyday interventions. That's a start. No doubt, there will be new and surprising methods coming soon. Social pedagogues, parents and politicians can use their understanding of how food affects our feelings to actively improve the welfare of people. But it starts with your recognition of the biological influence in your daily environment, starting from the caffeine in the morning to the melatonin late at night.

Summary 4

Biological interventions are interventions by which you consciously use the knowledge about biological factors in human behavior. The evolutionary view of newer parts of our brain, the prefrontal cortex (PFC), in particular, makes it possible to gain control over the primitive limbic system, and over the older, evolutionary part of the brain. Thanks to the prefrontal cortex, you can influence the way our biochemical housekeeping keeps calm; for example, by first counting to ten when you're likely to lose patience. We call this a TCA-intervention. In addition, you can use your knowledge of biological factors by connecting this knowledge with behavioral problems like autism and ADHD. When suffering from depression, you can try to recover the balance of neurotransmitters by compensating for the shortage of norepinephrine and serotonin through a sporting effort. Meditation and yoga have a clear influence on the biochemical balance in the brain. By hugging others, you can induce the production of oxytocin and strengthen the adhesion in the process. Alcohol and drugs exert a very direct influence on our brain, but our diet also contains a variety of substances that are sent to our mind. By using underlying biochemical knowledge, you can commit interventions in everyday life. Nurture through nature.

5 Biological methods and techniques

In Chapter 4, you read how in everyday reality biological insights can lead to *biological interventions*.

In Chapter 5, you will discover that it is possible to recognize special methods and techniques, or to design yourself by manipulating biological factors. Because this involves methods and techniques regarding (ped)agogic behavior, we call them: *biological methods*. It is all about recognizing the biological factors in human behavior and designing methods and techniques with which you can control behavior based on biological processes. Sounds pretty futuristic, but it has, in fact, been used since prehistoric times. You are going to influence the biological nature via nurture. This way, you can join the work of Sitskoorn, Maguire and other researchers. They came to the conclusion that the brain is malleable and that, through training, it is possible to influence the network of the neurons in the brain to influence and even change the neurons and the neurotransmitters. The development of the network of neurons in the brain has a distinct pattern, which is generated from DNA in reaction to the surrounding environment. It is best to connect to that natural development pattern. For example, a language is best learned between one and three years of age, and self-discipline is best learned before your tenth birthday. However, by training, many neurons can be produced, established or changed (see Chapter 4), but it is more difficult and takes more time than the natural path of brain development initiated by DNA. Now we have to revise the schedule that describes the development of human behavior from its evolutionary past to concrete, actual behavior (see Figure 5.1).

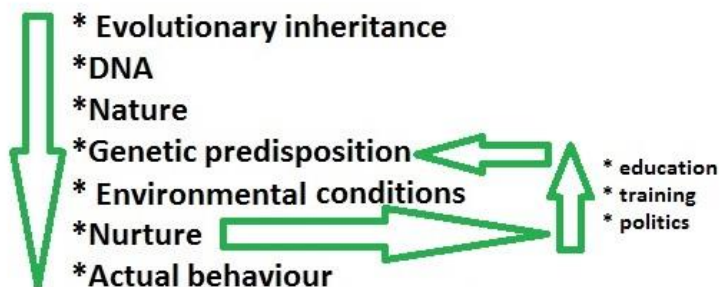
Human behaviour : version 2

Figure 5.1 From evolutionary past to actual, concrete behavior: *variant 2*

Teachers, educators and politicians provide not only a contribution to the act of nurturing, but they also affect the brain itself. In fact, we can change our predisposition!

5.1 Channeling aggression in groups

We have seen many uncontrollable riots through modern history: in Paris, London, Amsterdam, New York, Singapore, Cairo, Kiev, and many more. Most of the time, violence is answered and provoked by two parties, including police and military. Cars and rubbish bins are set on fire and police men are bombarded with everything that isn't attached to the ground on a regular street. Some riots are politically founded, others by social anger; in some cases, there seems to be no reason for it at all. Some scientists suggest that this violence is caused by poverty, high unemployment, ongoing oppression and general

hopelessness.

Social factors together with biological factors (hormones and neurotransmitters, such as adrenaline, testosterone, and vasopressin) build an explosive mixture. At an individual level, this *mélange* is still relatively innocent. On a meso level, it may lead to serious disruption of public order. At the macro level, it may threaten peace in the world. On a micro level, it is all about guiding young people on their way to adulthood. In this case, the problems are still manageable and teachers, so parents and politicians can offer meaningful guidance. On a meso and macro level, there is little more to do than the deployment of a police force or military reaction. Politicians should choose a different approach to the issue by taking away the underlying causes, such as discrimination, unemployment, poverty, boredom and a lack of perspective. Only in that way can problems on an individual level be reduced, which, in turn, can prevent an explosion.

Social control

Social control exerts a disciplining influence on rampant misconduct that runs through the TA-route, which is the fast route based on impulsive behavior. Social control will then take the place of self-discipline on the part of perpetrators. So, the TCA-route can be put into effect, which is the slow controlled route in the brain.

Rituals can play an important role in the form of social control of small crimes. The victims of these offenses and the people in the area can use these rituals to show their disapproval. This applies, for example, to offences committed as pickpocketing, the sexual assault of a girl, robberies, and general acts of

violence. If the perpetrators are caught, their anonymity as a major social achievement comes first. Protecting the anonymity of the perpetrators is actually an encouragement to continue these crimes; an encouragement that is of interest to neighboring boys and younger brothers with similar backgrounds. Replace the anonymity of the perpetrators with a ritual where neighbors (classmates, group members) speak out clearly against the offender and make it clear, that the behavior of the perpetrators is strongly disapproved.

Of course, prevention is better. All social educational action should aim to avoid escalation at a macroeconomic level. So you must proceed methodically *on an individual and small group level*. In the analysis of the initial situation, you must assume that the behavior of young people between 12 and 24 years is affected by a large number of hormones, namely testosterone/estrogen, adrenaline and vasopressin. The effects of these hormones are enhanced by the use of alcohol and (smart) drugs. This often leads to uncontrollable behavior, especially if it takes place in groups. Note: puberty is a stage in which the behavior is based on a strong evolutionary biological basis, in which the position in the group is explored by experiment, challenge and competition. Please realize that - especially for boys - it sometimes is "impossible" for them to control themselves. Evolution has prepared them for "earning" a place in the world of adults. Viewed from an evolutionary point of view, this means fighting for sex, fighting to obtain a position in a group and fighting with anybody that stands in their way. Through MAO-A, the exciting amines are quickly broken off. Men have less available MAO-A than women and have more problems that need to be combated. That's why you see so many more men than women fighting on the evening news.

Consider the knowledge about the influence of the biological factors, namely neurotransmitters and hormones. Work towards stable maturity. You want to guide young people in that difficult period in which they must learn to be an adult and learn to search for a meaningful place in society. Teachers, educators, parents and politicians should help to control these biological factors. Knowing that these biological factors can lead to uncontrollable behavior, we have to take *preventive* measures. If we wait too long, it will be too late and could lead to a third world war. No joke.

How do I do this? First, by ensuring that there are sufficient opportunities for training and occupation. Appropriate placement and jobs can help young people to acquire - in time - their own identity. If there are not sufficient places to exert energy, society will undoubtedly pay a high price. In addition to this socio-economic aspect, there are social psychological aspects of interest: young people need to acquire a position in groups they are a part of, as they want to develop their own identity and self-confidence. Now we know that vasopressin is an important hormone that rules our need to have an own territory, so you should not chase away young people from their hangouts; instead, take care to provide them with their own safe space where they can feel at home. It is not about a private space in which they can experiment with risky behavior; it's about a private space within which they get support from someone who understands them. You have *to coach* at-risk groups, not chase them away. It makes no sense to create an unfriendly cold hangout, which can be a refuge for channeled aggression and competition. You need to create a private space for the youth for exciting activities, in which they can measure their forces and test their limits – all in an effort to develop their self-discipline

through their PFC. I am not encouraging an unprotected space for rampant sexual excesses, but a meeting place for boys and girls; somewhere to discuss sexuality and good information and for discussions of standards and values. This is all about regulating the vasopressin. Also, oxytocin plays an important key role in the social development of children and young people. Oxytocin will give social boundaries and is generated by hugging, embracing and massage. Knowledge of the biological factors that determine behavior can give you the key for setting up regulatory activities and environments. It's important to understand nature and the biological basis of human behavior. This way you can see that the *inevitable and irrepressible* experiments of young people are just physically impossible to suppress without doing serious damage to their normal development. Young people should determine their own limits and they need space. People need guidance and support. That is certainly true for those young people who did not learn how to count to ten when upset. If you fail, there will be escalations and unlimited risks and, above all, there will be many innocent victims. The process of guiding has no beginning and no end. It's likely that you will find this frustrating, but every year there is a new group: Boys aged ten will be eleven, and boys aged eleven will be twelve and reach the point where they as young males are driven by neurotransmitters and hormones and will end in Young Male Syndrome (Daly & Wilson, 1988). Then you should take care that there is a boxing ring, an arena, canyons and caverns. We need teachers who teach Tai Chi, guide a survival trip, or encourage boys to climb a mountain. The military service used to be a sort of rite of passage to adulthood. For young men, it was the big step to the wide world and away from their protective family situation. Perhaps a new form of social conscription, with deployment to distant lands, would be very

healthy; somewhere with sufficient challenges and tensions. There you can prove yourself and perhaps most importantly, there you can *mean something to others*. A relatively small number of young people – mostly boys - fail to follow the road to adulthood without accidents. In those cases, intensive support is required. Guidance should be consistent with sociobiological and bio-psychological insights. From there, effective accompaniment can be realized. The only other alternative is to build more prisons to protect society against the risks of uncontrolled excesses, or face a (civil) war.

There are many problems in our society, and some seem insoluble. Some problems are noticeably larger and will soon no longer be manageable. This applies, for example, already to the problems associated with football violence, the criminalization of a number of residential areas and fundamentalist terrorism. You cannot solve these problems using awareness of biological factor, but you can use the *understanding* of the biological factors to change your view on these problems. For example, if you are watching the problems caused by football hooligans, then you will see that some very recognizable biological aspects come to mind:

- The *vasopressin* is fueled by the identification with the own football club, shaped into recognizable symbols and clothing. This is a prime example of the definition of a private territory.
- The pent-up *adrenaline* is looking for a way out, especially when you have lost the match. Where can you get rid of your energy? How can you exploit a nice adrenaline rush? Are the police around?
- The prefrontal cortex loses control of its monitoring function in the case of abuse of alcohol. The evolutionary

origins in the limbic system will quickly win. This allows hormones such as vasopressin, testosterone and adrenaline to trigger a primitive and explosive mixture. Calming biochemical like the MAO-A are virtually not present. This inevitably leads to explosion.

The question is: how can you avoid these biological statuses through channeling? Dangerous and criminal youth gangs arise. In many countries, these gangs are mostly inspired by the [Mara Salvatrucha](#) (<http://www.youtube.com/watch?v=uFGvPnvhXUU>) and the [Bloods](#) in America. You see now what I mean by *uncontrolled excesses* and by *(civil) war*.

You can't solve large-scale violence with adult educational methods. Adult educational solutions are only useful at the micro level; at most, on a meso level. Especially preventive activities can make a valuable contribution in situations that are still manageable and controllable. If prevention is not present, or if it has failed, the financial and psychological burdens on society are high. Unimaginably high.

Uncontrollable at a macro level. In the rest of this chapter, I will propose methods that are based on the manageability at the micro and meso level.

5.2 Video home therapy and super-nanny

One of the ways to provoke self-reflection is through video home therapy. That way you can force the prefrontal cortex to work. Through video recording what is happening in the family, you start to use the TCA-route (Thalamo-Cortico-Amygdala-route see section 4.2). This route runs from the thalamus via the prefrontal cortex back to the amygdala. This is the slow route compared to the TA-route (Thalamo-Amygdala), and it is slower because it makes you 'think things over'. By watching a video, you start to be aware of all those activities that people are unaware of until they 'look back' at what he (she) did. Often, parents are shocked to see their own behavior and react in disbelief: "I act that way?" Then it turns out that the behavior of the parents often causes a vicious circle of bad behavior of the children, no escape. By using video home therapy, it becomes clear what is really going on. Parents often discover, with tears in their eyes, how they respond to unwanted behavior of their children. Video home therapy can be a valuable tool in education where the short TA-route must be replaced by the TCA-route.

In 2005, a controversial program on television about education was began, called 'Super Nanny'. This broadcast was welcomed with words like "fascinating, must be seen" by the New York Times. Oprah Winfrey praised the nanny, and the program was welcomed by magazines like Newsweek and Hollywood reporter. Most importantly, parents of all levels of society started to talk about education. Jo Frost (as 'Super Nanny') appeared to tame unruly children. She eliminated most behavior problems by dinner time and bedtime in front of the bewildered

eyes of the parents. And this program is still on television. Jo Frost uses a method in which the following key words play an important role:

- empathy towards children
- a clear insight into the causes of the problems in the family
- the use of creative means in dealing with children
- the use of camera footage to create an image of the behavior

Because this is a television program, of course it must be recorded by camera; but here the camera is more than just a registration agent. The camera is an *active agent* in education, not only for the children, who can look back on their behavior, but especially for the parents who can see what 'errors' they consistently make. Here the reinforcement of the TCA-route is methodically in use. Feedback through video recordings works very directly and is quite effective. I once made a recording of a boy that was eating like an animal: swallowing the food in big portions, the food dripping on his chin. We had already tried to make him change his behavior for weeks. I made a recording that was directly shown on the screen. He looked up and changed his attitude completely in 10 seconds.

By understanding the biological factor, you can develop more empathy towards the child. You realize how much a child needs to pass through in order to grow. The child must learn to control his natural instinct for self-preservation and must comply with the values and standards of the civilized world. The children must manage their energy in a world that is many times smaller than the world of evolutionary history. Then you understand that a child of three years runs screaming and yelling through a department store because he is driven by his natural energy and wants to explore all those beautiful, challenging things. But

because you know that the child also needs to develop a powerful PFC, you will be able to accompany the child and have more patience, understanding and insight. Now you don't need to lose your temper and can stay calm. Perhaps now you can play the role of a Super Nanny. It's not only the child that has to use his PFC; we as parents have too.

By understanding the functioning of oxytocin, you know how important hugging is for adhesion, and adhesion is an important aspect in obedience. If you love someone, you'll listen to him or her more easily. That insight is especially important if you're dealing with a child that does not want to be touched; just such a child requires extra attention in that regard. These children are often rarely cuddled. Of course, there are more methodical considerations in addressing family problems that play an important role. Not all aspects are addressed in this book because I want to draw the attention to the biological factor to support you as a Super Nanny.

5.3 Using creativity as a biological force

It is possible to use sports and games, drama, dance, music and audio-visual media for educational purposes. These methods are meant to use creative resources to improve communication with you and your pupil. You do this especially since not all people are so good at expressing themselves through words. In addition, the purpose of these methods is to increase the client's creative thinking. Through creativity you can come to new solutions. In social work and education, you usually have to deal with situations in which people are jammed. In addition, people often have a lot of fun using creative adult educational resources. And now where is the connection with biological

adult educational methods? Creative-pedagogic methods have educational impact for the following reasons:

- The **endorphin level** in the brain increases through the pleasure that someone experiences while doing the activities.
- A connection between **the limbic system and the prefrontal cortex** is made by these activities. Basic feelings of evolutionary history play an important role. Spontaneous emotions must be kept under control constantly: the game should not turn into real life. As in an erotic dance (and dance almost always has an erotic component), testosterone is generated, and it must be controlled and through creative design be converted. That way, you can learn to control your emotions and develop self-discipline.
- Through creative means you can try out your emotions, explore your borders and recognize your unprocessed emotions.

Some of these biologic-creative activities will briefly be explained:

Sports and games

Sports can have a positive effect on your state of mind because endorphins are produced if you make great efforts. In January 2007, it was reported in the news that football clubs focus their training specifically on children with ADHD. Playing football turned out to evoke a positive influence on the behavior of the children who participated. In addition to the sports which rely on teamwork and perseverance, there is a group of activities that appeal strongly to increasing bravery and breaking boundaries.

Young people who are able to afford it can find their thrills and spills in sports such as: mountaineering, parachuting, parasailing, kayaking and caving. There are several organizations that specialize in outdoor sporting events such as rafting, mountain biking, parkour, paintball, kayaking, quad bikes, horse riding and dream cars.'

The question is always: can we channel our evolutionary-based drives by doing these activities? Do these activities lead to a better balance in our brain? Or is there a risk that we will need increasingly aggressive incentives by doing these sports? Do they lead to lust, murder and sexual assault? Do you expect the next step is 'steaming' and 'happy slapping'? I don't think so. On the contrary: it is prevention because it ensures channeling and creates increased self-control.

For the time being, you can assume that these activities can offer an escape for our biological evolutionary predisposition. Perhaps in a few decades we can mimic real life-threatening situations through virtual reality and by using robots. In such an environment we can enjoy our hunting instinct 'safely'. That's where modern techniques meet evolutionary drives.

Dance and movement

Of all creative educational activities, *dance* offers the most leads for evolutionary-psychological connections. An important issue concerns the movements that exercise your [emotions](#), your muscles and bones. If you watch the National Geographic Channel or Animal Planet, you can often admire the courtship and mating rituals of insects, reptiles, fish, birds and mammals. Through these rituals you can see that dance and movement find their origin in the creative and artful ways that creatures have

invented in order to convince the partner that they are really healthy and desirable. For [people, dance is a fascinating way to express themselves](#) and to get to know a partner. In the 1960s this happened in a very ritualized way: the girls sat in a large circle around the dance floor. The boys stood at the bar and drank for courage. As soon as the orchestra began to play, the young men stormed over to the girls, made a more or less polite gesture of invitation and dragged the partner onto the dance floor. That was where you got to know each other by talking (safe because the orchestra was drowning out their voices) and flirting with each other (safe because the muted light with the mirror ball ensured that flushing remained invisible). After the dance the girl was gently brought back to her place. If you liked the girl very much and if you thought that she would not say 'no' you offered her a drink. During the evening, different types of music were performed with different dance styles, so through the music you could discover on which points you best fit together. So, you could apply the personality theory of Eysenck: from exuberant outgoing to shy and stable. About half an hour before the end of the dance night, slow shuffle songs were played so you could see how close you had become. In this way, hundreds of young men and girls explored whether they liked each other in a safe way. Lately we have many kinds of dancing that also can be watched through [dance contests and performances](#). Just looking at these videos will provoke your endorphins.

Music

Affinity to a particular rhythm is something you will learn during the first years of your life. If you have only heard

Western music in your youth, it is almost impossible to appreciate music types that are different, such as traditional Chinese music or classical Thai music. Music can differ so much from your own musical feelings that you don't even recognize the sounds as music. Then what is the relationship between music and the biological factor? Music has everything to do with emotions, and emotions consist of eruptions of neurotransmitters and hormones. This applies to all types of music in all cultures. Music can produce a range of strong feelings. Music and dance are a rock-solid, century-old combination.

You could say that Simon & Garfunkel, The Rolling Stones, Coldplay and Shakira function as neurotransmitter in the brain of the excited audience.

Hey girl, I can see your body moving

And it's driving me crazy

And I didn't have the slightest idea

Until I saw you dancing

Hips Don't Lie, Shakira.

An important element consists of participating in a collective experience musically, especially if the individual voices can expand to a [massive choir](#) together. Football fans [know all about this](#).

Making music still provides additional creative-pedagogic impulses, such as strengthening self-esteem, increasing self-discipline and [fine-tuning your own expression on other people](#). In the context of the biological factor, however, the emphasis is on the production of emotions and moods, on expressing your feelings and on the processing of fear and grief.

Visual arts

During a lecture on 'Nature of people', one of my students gave a surprising presentation. She said that she accompanied an autistic boy, and the boy did not want to be touched. Assuming her knowledge about the functioning of oxytocin and its relationship with adhesion problems (see section 2.6), she decided to see if a visual technique could benefit the boy. She gave the boy a large sheet of paper and asked if he wanted to draw something. "What must I draw?" She said: "I will draw something on your back and then you try to guess what it is and you draw the same on the sheet of paper." That was OK.

She drew a house on his back and he drew a house on the paper. She drew a tree, and he drew a tree.

After a few drawings he sighed, "That was a nice feeling." This example demonstrates well that your knowledge of the biological factor can offer new applications. It is always about influencing the biological factor through creative applications; nature via nurture.

Drama

Playing a role on stage allows you to *empathize* with someone else. In a situation that is not real life, you can bring to expression all kinds of relationships and feelings *as if* it is reality. That way, you can experiment with the relationship between yourself and the world. For example, you can try out how it feels to empathize a very aggressive neo-Nazi 'being'. If you empathize completely with someone else, you can try to take over his biological predisposition. For example, you convert your natural sense of territoriality to an extremely strong xenophobia. Only when you realize how closely xenophobia is related to the natural need to protect your territory and your family are you really a learned man who knows how to control these feelings.

Drama offers the perfect opportunity to experience all kinds of forms of behavior without being punished for it. Especially in combination with other players, it is possible to explore and process emotions. Psychodrama and drama therapy provide professional methods for using drama to overcome problems. In a documentary about the gangs of [Mara Salvatrucha in El Salvador](#), we saw how the prisoners empathized their role in the gang; they played out how an aspiring gang member was kicked and found his place in the group. It is probably possible to become aware of what was happening to you. In addition, you can find out for yourself what it takes to get your life back under control.

But as it is said earlier in this book: [once the problems are too massive](#), you cannot cure them by playing drama. The whole social area must be changed to a completely new stage; starting with educating the children, providing work and breaking

radically from the old situation. It is already a civil war.

Audiovisual media

The use of a video camera was mentioned when discussing the method of video home therapy (5.2). The inclusion of simulated situations can be an efficient method for gaining self-knowledge by the direct feedback of recorded sound and image. The images work stronger than the feedback from observers (Steffen & Steffen, 2007). Also, recording situations in daily reality is very confrontational and almost inevitably leads to facing the truth. Television broadcasters frequently make use of this power and provide information about what actually is going on. Sometimes people protest against these methods, because they feel that privacy is being violated and that these methods are not ethical. Suppose you make a recording when some boys are bullying a classmate. Looking back by using the recording, the offenders are mostly ashamed and did not realize that they harmed the feelings of their classmate in such a significant way. Is it ethical to show the recordings to other people? Naming and shaming. In the Netherlands in 2014 there was a television broadcasting about the problem of bullying in school time. The judge did not allow them to bullying children on television because their privacy seemed to be violated. But the program showed clearly that this was an effective way to stop the bullying within a few weeks.

Sometimes showing reality, unfortunately, can turn out to be infectious. A self-made bomb on YouTube multiplies itself thousands of times; a journal excerpt in which a distraught family member kills himself leads to imitation in the weeks that follow; maybe even a report on gangs is a final confirmation of the phenomenon and leads to a stronger sense of identity within

the members and even makes them feel proud to belong to that gang. This is a methodical dilemma that should not be underestimated.

5.4 Computer games

On the basis of the knowledge contained in part 1 you can wonder if actually participating in criminal activities (such as stealing) is identical to playing a computer game in which 'criminal activities' are 'committed'. I mean identical in regard to our biological functioning, in particular with regard to hormones and neurotransmitters. Is there a difference between the neurotransmitters that are provoked by a real crime compared to the neurotransmitters that are provoked by the video game? Could it be that playing these games means a canalization of ancient instincts and impulses? If the answer is 'yes', playing aggressive computer games can prevent this behavior. That is diametrically opposed to the common view that promotes that aggressive computer games encourage aggressiveness, and that aggressive television and video films increase aggression on the streets. Read also: *Grand Theft Childhood* of Larry Kutner and Cheryl Olsen (2008)

It is possible that playing an aggressive game on the computer forms a good counterpart for people who love thrill and adventure seeking. Also, in a computer game you have to control yourself if you're losing. This applies to the category of aggressive fighting games as well as more socially accepted games such as SimCity, FarmVille and Roller Coaster Tycoon. There is the tension of building up an empire and boosting your commercial power. Also, playing The Sims brings about great excitement because you're responsible for an entire family. Games such as these are more commonly played by girls. You also can wonder if sexuality related crimes (such as abuse, rape, or

pedophilia) can be regulated, canalized and sedated by using videogames, animated videos and dolls.

The methodical use of the game system *Wii U* can lead to new insights and engaging applications. This video game system transforms real movements into movements on the computer screen, so you can mimic a virtual fight, a sport or a chase. Educators and social workers can use these activities, because you can methodically prevent excesses in the real world. That means that attention should be paid to computer games and virtual reality in training. It is important to play these games yourself and experience how they work. On the basis of those experiences you can guide children playing computer games.

Having knowledge and paying attention to these new games are needed for educators. A watchful eye with an occasional critical question certainly makes sense. It is better that a boy lets off steam behind the computer screen playing *Grand Theft Auto* than to beat down an innocent passer-by after a night out exploring his biological predispositions. As youths learn to control their behavior in a computer game, they can likely also control themselves in real life, so they are not *at risk*. Under guidance, playing computer games can be a meaningful biological adult educational method for the canalization of evolutionary biological hormones like adrenaline, testosterone and vasopressin. Sports and play have fulfilled that function for centuries in different variants. It's a kind of [Second Life](#).

New media provides new questions that politicians, lawmakers and other authority figures have to answer. For example, within "Second life" may you kill someone? Seduce a minor? Are you allowed to steal something virtually? May an adult explore his frustrations and obsessions in a virtual world unpunished to let off some steam? There are really extreme games. As "APB Reloaded" wrote:

“Hit the streets as a licensed vigilante or hardened criminal in the crime-ravaged metropolis of San Paro where shootouts, car-chases, robbery, and vandalism are all in a day's work. Climb the ranks of your chosen organization and you could earn fame, deadly weapons, exotic vehicles, and stylish new clothing; fail, and you'll be just another ugly corpse clogging up the alleys.”

Source: <http://store.steampowered.com/app/113400/?l=english>

Perhaps you think: it should be morally rejected. But if you can avoid a real crime in this way, perhaps we could avoid *killing fields*? With AI LLM, like ChatGPT, Gemini, DeepSeek we have to deal with an exponential growth of possibilities in social behavior, both positive and negative.

5.5 Youth at risk

Programs such as “Children, Youth, and Families at Risk” (CYFAR) do an intensive job of developing self-discipline. This is necessary because young people have huge personal problems, and a program like Youth at Risk (YaR) can achieve a great reversal in the problem behavior of young people. It works like this: young people are first bound to a short preparation and letter of agreement. Next, they are placed in a challenging environment in which many survival-like activities as possible, programs with solid sporting activities such as kayaking and rock climbing, and then the young people will participate in an evening program. In that part of the program, they are invited and challenged to tell their life story; not to complain, but with the intent to do things differently and in a better way. Figures show that such activities have a good chance of success due to their intensive method and offer many good methodical starting points that can lead to differentiated training programs for youth at risk. The promises are high: *The implications for this trend are huge. If American society can focus the type of attention and resources on providing effective youth sports-based programs in low-income urban areas as we do in more affluent areas, overall crime rates will drop in our cities and overall educational attainment almost certainly will climb. Barack Obama also supports these activities.*

5.6 The importance of touching, cuddling and massage

Already in 1940, Bowlby was quite right when he posited that the physical proximity of the mother was of great importance for the child for its sense of security. The same sense of security

and bonding is also seen in monkeys: a baby monkey is almost constantly attached to the mother's coat. Bowlby claims that the physical proximity of the mother is in fact the evolutionary function of protection against possible danger. If a mother is out of sight, then the child will initially protest, next it will be desperate and start crying and screaming, and finally if the mother did not (at the time) come back, it will go nuts and reject the mother. Touch and caress evokes the production of oxytocin, and this hormone is the counterpart of adrenaline and cortisol. Can we use this knowledge for education? In Denmark, a director of a primary school initiated a method that connects to the ideas of Bowlby, called 'Taktil Rygmassage' (tactile back massage). It is a method in which children massage each other's backs.

According to Jørgensen, the creator of the method, the children are respectful, and they solve problems easier, and they can concentrate better in class.

There is also a massage method called 'Shantala massage', a technique that comes from India and was brought to Europe by French doctor Leboyer. The technique is used mainly with newborn babies with massage oil to massage the body of the baby. This method is also applied to adults, and it turns out that the method is valuable for adults who are seriously ill and terminal patients. Massaging, hugging, caress, touching; these are all variants of which adhesion arises on the basis of the hormone oxytocin. In addition are some other beneficial effects to be expected, such as easing muscles, and evoking endorphins. Of course, this method requires good preparation and consultation with colleagues. We are dealing with acts that cause feelings of intimacy; indeed, these feelings are provoked voluntarily, but

the border between a helping touch and unwanted intimacy and sexual harassment is small. It is therefore important to discuss these methods with colleagues, and the activities must be accompanied with openness and clear rules.

<http://www.taktil.se/taktipro.htm>

5.7 Pets as an additional therapist in well-fair

The television channel Animal Planet has made a series of programs starting in 2002 under the name 'Celldogs' (<https://www.youtube.com/watch?v=jKORDvr6rBY>). In American prisons, neglected and aggressive stray dogs are entrusted to serious criminals for several years, with the aim to re-educate and gain the dogs' trust. This experiment turns out to be very successful: even the most socially maladjusted inmates showed social behavior. It also has a positive impact on the violence in prison and the behavior between guards and prisoners themselves. One of the episodes is set in Nevada State prison. In this episode we see [Steve Olausen](#), a convicted murderer spending a life sentence in prison. He developed a close bond with his dog Roxy and declares: "I never thought that I might miss something or someone. By Roxy, I know that I have a heart. A big heart. I feel it."

The fact that taking care of a pet has positive effects on the well-being of caregivers means that keeping a pet can be used also as therapeutic agent in care centers. The approach is based on the method of [Pet Partners](#), a foundation founded in the United States. Animals can be invaluable for people; not only for healthy people who still can run with the dog, but also for people in their last phase of life. The explanation can be found in the unstoppable adherence of our most loyal pet. The pet needs

attention and care and thereby promotes simple acts such as brushing, feeding, throwing balls. These are all spontaneous gymnastic exercises, whereby the health and well-being of care-givers is promoted.

The release of oxytocin, the *hug drug*, forms the common biological link between the enjoyable feeling of love-making, the soothing feeling of delicious fidgeting, the calming influence of a pet on prisoners and the beneficial influence of care animals in a care center. Oxytocin has had an important function from evolution seen in confidential contacts between people. The opposite is also true: if the same confidential contacts are eliminated, this will lead to clear damage and to aggressive distrust. That's why the training of guard dogs includes that the dog is not being hugged or pet by strangers; a guard dog that accommodates the thief with a wagging tail is not a good guard dog. Eliminating hugs when bringing up children is also a substantial basis for an aggressive attitude and mistrust. Hugging has an important influence on the release of oxytocin, and thus of developing acceptance and trust. Even the production of phenylethylamine starts and sometimes the love between (wo)man and animal is clearly visible.

In America, Animal Assisted Therapy (AAT) has been developed by professionals; in a less specialized form this is called Animal Assisted Activities (AAA), mostly led by volunteers. In American literature there is a clear link between the application of this therapy and the healing effects of oxytocin.

Pets provide internal chemical therapeutics for people

"Community programs that bring animals and people together for companionship and therapy began in the 1970s, and are growing

rapidly. The introduction of animals into the patient's environment is a way of humanizing health care. This is becoming increasingly important because the more that high technology is introduced into society, the greater the need for high touch," (Naisbitt, 1982).

"Tests show that within minutes of petting a dog, the humans and dogs alike experience massive release of such beneficial hormones as prolactin, oxytocin and phenylethylamine."

Source: <http://www.pawsandhearts.org/P&Hbenefits.htm>

The discovery that animals may constitute an important factor for well-being is also reflected in the large number of care farms that operate today. More and more farmers want to contribute to care and well-being by using their farm as a therapeutic medium. Most care farms offer day care for people who need care and guidance. You'll find people who have intellectual disabilities, people with mental assistance needs, people with disabilities, (ex-) prisoners, (ex-) addicts, people with autism, people with brain damage, and young people and the elderly who need special guidance. The farms are run by farmers, and sometimes there are also education and care professionals. The activities on a care farm are all based on natural biological activities: they do a job on self-discipline and perseverance (developing PFC), they require a solid physical effort and can thus generate endorphins, and they offer the possibility of animals to pet and cuddle up and generate safety and calmness. Through this work, perhaps people feel connected to the base of life again, and they develop a bond with fellow men and themselves.

Summary 5

The biological interventions mentioned in Chapter 4 can be extended to comprehensive biological methods if you use the knowledge from Chapter 1, 2 and 3. You can apply this

knowledge systematically to pedagogic and community work. By applying these *methods* within training, upbringing, education, politics and social action, you use the operation of our biochemical housekeeping to solve problems that ask for a heavier approach than the *interventions* from Chapter 4. It is important that you integrate biochemical knowledge within the analysis of the initial situation. You look at a different way to the problems of youth gangs, football hooligans and fundamentalist violence. Under these problems, you discover concrete behavior that is caused by the almost uncontrollable chaos of biochemicals in the body. A chaos that often is enhanced by artificially ingested biochemical substances like alcohol, medicines and (hard) drugs. You can also make methodical use of knowledge around the biological factor regarding long-term problems in education and mental health. As a result, a number of well-established methods will be seen in a new light; you can recognize *video home therapy* as a biological method, because this therapy has a very direct influence on the prefrontal cortex and on the body's own biochemistry. Computer games can play an important role by channeling aggression within a safe environment. With computer games, you can develop self-control skills in a playful way as an exercise, and so enhance the PFC via TCA. In addition, you can develop methods that are based on well-known television programs in which young people learn to take their life into their own hands again, like Youth at Risk. Interventions from Chapter 4 on hugging can be developed into a complete method, such as Shantala massage, the method of Tactil Ryg, and the method of Touching Child Care. With these methods you can prevent children in a class from bullying each other. Finally, at the end of this chapter it turned out that a dog, a cat or a rabbit can form the basis of a biological

method and that even prisoners (sentenced to death) thereby again feel that they have a heart. We discovered that all these interventions and methods are based on evoking and regulating hormones and neurotransmitters such as adrenalin, serotonin, oxytocin, phenylethylamine, dopamine, vasopressin, and many more that you can find in this book.

6 Human nature in worldwide context

In Chapter 4 you read about the way we can influence individual behavior. In Chapter 5 you find methods based on the biological factor to regulate behavior in groups. In this Chapter I will make some important notes about the biological factor concerning our whole wide world. And yes, the internet is where you can find more information.

6.1 The Human Genome Project

Thanks to the increasing knowledge in the field of the human genome, more and more detailed knowledge of hereditary diseases are being brought to light. Every year, dozens of hereditary abnormalities are discovered and get a definitive spot on one of the 46 chromosomes. Once you know where a hereditary disease is localized in our DNA, then, in principle, you can remove this damaged DNA. In addition, you can combat this hereditary disease by manipulating the genetic material.

Some diseases are already millions of years old and have a fixed place in our DNA. Some of those hereditary diseases occur only in certain races, while other people don't experience that disease at all. The DNA of different races shows small differences, only around 1% of the genetic coding. Because the world population is moving faster around the world, and because men and women search and find their partners worldwide, the genetic material is quickly becoming mixed and there will be more and more variations.

To fully map out the human genome, the [Human Genome Project](#) was started. For many people this is an important and interesting project. In the genetic material of different races, unique material is found that protects a particular group against diseases. Such a piece of genetic code can be very important for

healthcare and for the pharmaceuticals industry. With that code we can now already, but certainly also in the near future, work on genetic modification, meaning the genetic code of hereditary diseases can be replaced by the healthy code of others. Some people consider this as an exploitation of certain populations therefore and reject the Human Genome Project. There are also people who consider it to be a form of racism and find that it's an insult for different population groups. Others claim that the patent rights to the – often rare – bits of genetic code must be assigned to the appropriate population group who own that healthy gene. There are already contracts drawn up so that the native population will share in the revenue that their unique genetic material can capture (Rozendaal, 1998).

Until a few years ago, scientists assumed that DNA dictates exactly how a cell has to develop, however in recent years scientists have discovered that the DNA is more flexible than anyone had previously thought. DNA contains a code that indicates the boundaries of what can be developed, but there are numerous variations within DNA that can be put *on* or *off*, making different developments possible. You can compare this phenomenon to the way software in a computer works: you can always choose to do something or not to do something. Which piece of DNA should be activated or disabled depends on a number of factors: the place that the cell occupies in the body, the time when the development is to be deployed and the environment outside the body. The impact of environment is something scientists have discovered very recently. The impact that these factors have is particularly exercised at the moment the sperm and the egg are formed, just before fertilization. The genome gets information about the conditions outside the body. For example, if at that time there is a famine, the spermatozoon will record that information and put some pieces of DNA *on*

and turn on other bits *off*. These pieces of DNA are called exons. Gilbert, Douza and Long, published a book in 1997 titled *Origin of genes* in which they argued that during life an organism can make new genes by combining different exons. They called this method exon shuffling, the 'relocation' of exons (Gilbert, Douza, & Long, 1997). (See also: [The ghost in our genes](#), BBC.) An example: from the development of crocodile and turtle eggs, females develop at temperature A and males at temperature B. This means that temperature A puts on a different set of exons than at temperature B. That process of turning on and off is called [epigenetics](#). That's the way the expression of genes is influenced by [epigenetics](#)

Since 2005, a new chapter began in the field of research on RNA, and this is a major role for RNAi (RNA interference). Based on RNAi, genes are switched on and off, making it possible to cure hereditary diseases and viruses such as HIV. Recent knowledge in the field of RNAi and epigenetics has caused a revolution in our thinking about heredity. Until now, we thought that DNA forms an inescapable timetable for the development of a living being; however, we now see that there are numerous conditions (environmental factors) that directly affect the way DNA comes to expression. Exons are switched on and off during development. For the first time in human history, mankind is aware that DNA can be influenced by environmental factors, which also means that if we change the circumstances there will also be a change in the genetic material. Mankind will get a grip with trial and error, and step by step will carefully contribute to that immense construction work: our DNA. The possibilities to intervene in our genetic material grow daily. Replacing exons which contain a genetic disease with healthy

DNA already happens in laboratories. The use of stem cells for the cloning of organs is still under discussion in politics but is being tried out in animals (especially mice).

On the one hand we find the scientists who exert influence on our DNA; on the other hand, are the grandpas and grandmas, brothers and sisters who can influence the DNA of men and women. That's another reason why young men and women must be guided to a balanced maturity. The seed that a young man produces shortly before he fertilizes a young woman is affected by the environment. The same applies to the egg of a young woman before she gets pregnant. The parents of this young couple or family members such as their grandparents can contribute to a positive, secure environment by taking care of beneficial environmental factors. By epigenetic influence the switches to the exons are fixed to a healthy future for the new life that is forming. The immediate environment can in this way have a beneficial influence on the fetus. The people in that environment carry a responsibility for the predisposition with which the child will encounter the world. Have a look on the internet (search for "Genetics") and you will find [astonishing information about this subject](#).

These influences are also shaped by events such as famine, natural disasters, war, and violent attacks. Such experiences can trigger biological and psychological "switches," preparing individuals and even future generations for similar threats. In this way, environmental conditions affect not only those directly involved but also bystanders, contributing collectively to the development of future generations.

These insights suggest a significant revision of how we understand evolution as it translates into concrete human behavior

(see Figure 6.1). Most importantly, phenomena such as violence, bullying, aggression, war, famine, and disasters leave lasting negative imprints on future generations.

Human behaviour : version 3

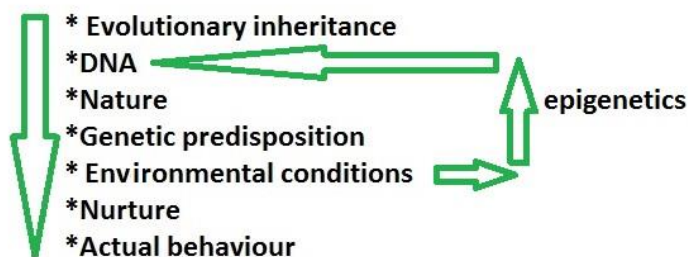


Figure 6.1 From Evolutionary inheritance to Actual Behavior: variant 3

6.2 A life-coach for neurotransmitters

Your brain is the central registration area, where all the ups and downs of your body are registered. Painful stimuli lead to an alarm signal that leads to direct action. When action is required, the body responds immediately by mobilizing extra energy. The heart rate increases, muscles are activated, breathing accelerates to supply more oxygen, and the immune system prepares its defenses. You can experience such a response, for example, when you step on a piece of sharp glass or when you are stung by a wasp. In such moments, it is obvious that you do not feel fortunate. A basic condition for happiness is, at the very least, the absence of pain.

Endorphins play an important role in counteracting pain. They function in a way similar to morphine and are produced naturally by the body as part of its neurotransmitter system. In addition to reducing pain, they can create a sense of euphoria and well-being. High levels of endorphins are released during activities such as physical exertion or orgasm. Certain taste sensations—such as sweet, sour, or spicy—can also stimulate their release.

Endorphins are therefore the carriers of a pleasant, happy and good feeling, and are quite equal to happiness. Now it is not possible to have a constantly high concentration of endorphins in your body; after a while you feel this happiness fading away. You get used to the situation of being fulfilled. It delivers a new status quo.

In the affluent western society that often leads to looking for new, even stronger incentives of gratification, you just want only that delicious feeling of those endorphins back. Take, for example, enjoying sexual gratification. Normally you only need time to recover after an orgasm and after some period of time, there will be the need for sexual excitement. If you have no patience for it, then you will not feel like waiting for days and you look for additional incentives. The sex industry has knowledge of this phenomenon and produces all kinds of titillating toys and tools. This is very opposite to other regions in the world where holding hands is already very exciting and showing an uncovered leg challenges conservative norms. The same is happening with tasting food; in exactly the same way you can also pamper your taste buds. This is well known in the food industry; many companies produce a range of drinks and snacks that make you go on eating and drinking. Life becomes a 'grande bouffe', and just like in the movie "[La grande bouffe](#)", in the long term, the endorphins work no more. This way of striving to increase the

endorphin level is quite similar to the way a drug addict spends his life: constantly working for that compulsive saturation of the disordered biochemistry in his brain.

Happiness and health are closely related, and we are estranged from our basic feelings of happiness. That's why we can use a life coach: we are alienated from a natural form of gratification. A natural pattern would mean: satisfaction of needs *and then just wait* until a powerful requirement has increased. Maslow constructed a needs pyramid, in which our needs are organized in a hierarchy, and our needs follow each other in a natural pattern. *After the satisfaction of basic needs, the higher needs must be met* (Maslow, 1996)

(<http://www.simplypsychology.org/maslow.html>). According to Buddhism, suffering is caused by desires, so by releasing your desires the suffering will stop. Perhaps we need a life coach in this post-religious era, a coach that can help us to solve the problems regarding being overweight, plastic surgery, cardiovascular diseases, stress and burnout through bringing Maslow's pyramid back to a natural endorphin pattern. A life coach would, in any case, need to have a lot of knowledge of the biological factor and of organic adult educational interventions. Perhaps you can become now your own life-coach, because now you have that knowledge.

6.3 The importance of MAO-A and calmness

A number of British, American and New Zealand scientists did research on the MAO-A gene. This research showed that a 'lazy' MAO-A gene in combination with child abuse during infancy often leads to a life full of behavior such as stealing, vandalism,

rape, murder and fighting. Men who were mistreated but who did have an 'active' MAO-A gene became much less violent later in life. The research was conducted among 442 men who all were born in 1972 and focused on the MAOA gene. It was revealed in 1993 that this gene is linked to aggressive behavior. This MAO-A gene stands for *monoamine oxidase A* and works especially in the brain; it breaks down substances such as serotonin, dopamine and noradrenaline. These substances are released in stressful situations to make life bearable. When the stress is over, those substances must be broken down, which is done by MAO-A. It deactivates the provocative amines, while MAO-B has the function to deactivate the soothing amines.

So, a lot of MAO-A and a little bit of MAO-B stands for stable, calm emotions (Aan de Brugh, August 3 2002).

Testosterone and estrogen suppress MAO-A and increase MAO-B, which creates an increase in exciting amines such as adrenaline, noradrenaline and serotonin. If these substances are not broken down, the brain will stay in a constant state of excitement and stay in a stress position. This buildup of tension can lead to aggressive behavior, as the body seeks an outlet for the accumulated stress. In the study, approximately two-thirds of the men had a normal (active) MAO-A gene variant, while one-third carried a low-activity ("lazy") variant.

The researchers further analyzed a subgroup of 442 men, paying particular attention to those who had experienced abuse during childhood. Abuse was defined broadly and included maternal rejection, physical violence resulting in injury, and sexual abuse. Behavioral outcomes were assessed using criteria from the Diagnostic and Statistical Manual of Mental Disorders. These criteria included theft, lying, destruction of property, and physical aggression toward people or animals.

Within this group, 13 men had both the low-activity MAO-A

variant and a history of severe childhood abuse. Of these, 85% later developed significant behavioral problems, and 30% received criminal sentences.

This raises an important question: which factor plays the decisive role—the genetic predisposition, the early-life environment, or the interaction between the two?

The gene that should ensure sufficient MAO-A is **an X chromosome** and it **does not occur on a Y chromosome**. Women have two X chromosomes and men do not; they have one X and one Y chromosome. As men have the MAO-A gene malfunction (it's called the 'lazy' allele), the chances of lasting stress and, therefore, aggressive behavior are greater. But women have **two X chromosomes**, so they might be less likely to have problems with the MAO-A gene: they always have a spare MAO-A gene. It would be interesting to investigate if this is also an explanation as to why women are commonly better able to soothe. That research can yield a lot of data that is important for social behavior. It is complex research, as shown in this video on You Tube: *The stupid stupidity surrounding*. Easier to understand is this article: *Born to be wild* (<http://reason.com/archives/2002/08/07/born-to-be-wild>)

For society, there is a huge difference between the problematic behavior that is associated with *a lack* of MAO-A and problematic behavior that is associated with *an excess* of MAO-A.

During puberty, young men are looking for their own limits and possibilities, and they have to deal with the explosions of testosterone often accompanied by flashes of vasopressin and higher levels of adrenaline. That is often too much to control, and is a basis for problematic behavior. Young people, mostly young **men**, are commonly searching for exciting adrenaline

kicks, especially when they live in a boring environment.

It is extremely important to get a better grip on the phenomenon of aggression. There is a lot of beating and kicking. The term senseless violence was introduced because we could not understand why so many innocent people were beaten or kicked (Baker, 2003). In all cases, a male offender was involved and was aged 15 to 25 years.

Aggression had a meaningful function over millions of years in the struggle for life; you would quickly lose your own life if you did not respond with aggression. Nowadays we can earn our bread without aggression, and there are hardly any significantly life-threatening situations (except natural disasters, terrorist attacks and road accidents). And right now, aggression often leads to gruesome events in which innocent people are victims of permanent disfigurement or in which senseless violence leads to death. It makes you really mad.

From a biological perspective, aggressive behavior is often linked to the activity of hormones such as adrenaline, testosterone, and vasopressin. These substances can increase arousal, risk-taking, and dominance-seeking behavior. In some cases, this may escalate into harmful actions such as vandalism, criminal activity, or sexual aggression—particularly when combined with social and environmental pressures.

Such behavior frequently occurs in groups. Adolescents, especially males, may take risks to gain status and recognition within the group. Elevated testosterone levels can reinforce this drive for competition and dominance, a pattern that has parallels in the animal kingdom. Among many species, young males form groups and compete with one another, while older dominant males attempt to exclude them from access to females. This dynamic can lead to opportunistic and sometimes covert mating behavior.

In human societies, similar group dynamics can emerge, particularly in environments where social control is weak. In some urban areas, tightly bonded youth groups may claim territory and operate with limited adult authority. In such contexts, illegal activities—such as drug dealing or prostitution—can become sources of income. It is important to recognize, however, that these outcomes are shaped not only by biological factors but also by social conditions, upbringing, and opportunities within society.

In 2006, the French Government tried to stop the growth of unemployment benefits through political measures. The youth saw a deterioration of their position in these measures; consequently, huge riots broke out in the Paris suburbs and beyond, where it became clear that these young people already had virtually unlimited power within their territory. A similar situation can be found in El Salvador, Honduras and Guatemala, where youth gangs, such as the Mara Salvatrucha, have control of entire neighborhoods, as do [the Bloods](#).

The motto of the gang members is having fun, sex, alcohol and drugs, which is a reversal of values and standards in comparison to what most other people want. Following the riots in Paris, it became clear that youth work had been phased out over a series of years. This was put forward in numerous documentaries. This is likely a possible cause: If young people are no longer supported on the way to adulthood, then it can all go wrong. That is also the pessimistic vision of *Golding* in *Lord of the Flies* (Golding, 1959). Social control is an important tool that can prevent outbursts of violence, aggression and crime. It is striking how this aspect of social control in most countries is ignored. The anonymity of the perpetrator comes first and is protected by privacy laws (Hall, 1969; Van Dijk et al., 1998). Politicians

have the main key for solutions, because they decide how to provide education and employment long time before the problems are too big and insolvable.

Protection of the anonymity of offenders is diametrically opposed to the impact that 'social control' can have on regulating social behavior in a positive way.

When someone is attacked without having provoked any violence, it is often described as "senseless violence." From the victim's perspective, this is entirely justified. However, for the perpetrators, such acts may serve a purpose—often linked to the adrenaline rush, group pressure, or the desire for excitement and status.

In some cases, violence is deliberately staged and recorded on mobile phones to be shared online. This phenomenon has been referred to as "happy slapping," although there is nothing "happy" about it. Another form involves extorting an innocent victim—not only for financial gain, but also for the thrill associated with intimidation and control. This practice is sometimes called "steaming."

In such situations, a group—often consisting of adolescent boys—surrounds a victim, using threats, humiliation, or intimidation to create fear. This fear is then used to coerce the victim into handing over money or belongings. The term "steaming" reflects this process of building pressure until the victim gives in. Various forms of violence are associated with heightened arousal after nights out, often involving alcohol, group dynamics, and increased levels of hormones such as adrenaline, testosterone, and vasopressin. Examples include sexual assault, sudden physical attacks on passers-by, and other impulsive acts of aggression. These incidents provoke widespread outrage, yet in practice they remain difficult to prevent and address. A deeper understanding of the underlying biological and social

mechanisms may help in developing more effective responses. Online platforms, such as YouTube, unfortunately contain many recordings of such incidents. While disturbing, these videos can illustrate the behavioral patterns discussed in this chapter. Although these forms of violence are statistically more common among men, it is important to recognize that similar biological mechanisms can influence behavior in women as well.

6.4 Aggression out of control

Neurotransmitters and hormones regulate human behavior on an individual level, but when people are gathered in a massive crowd, these biological factors rise to a high potency and often to a high risk that easily can get out of control. Fueled by politics, there have been many outbursts of aggression, as lately seen in Egypt, Libya, Sudan, Syria, Ukraine and many other countries.

Usually, it starts with political dissatisfaction with the process of democratization. Social media such as Facebook and Twitter can quickly mobilize a large crowd. These meetings may be peaceful for months; however, there is not much required to evoke neurotransmitters such as vasopressin and adrenaline to cause major problems. It could end in a civil war. In all these cases of violence, it is much the same as with a blazing fire: as long as it is small it can be controlled. But once it gets out of control there is major suffering. What started as a call for peace and democracy ends up in a war. The lesson to learn is: keep it small. Vasopressin creates a fiercely territorial drive that is virtually indelible, especially if people grew up within a single region, a city, a country for a number of years. Especially during childhood and adolescence, within a given area, the vasopressin will strongly mark the borders. Often countries are formed after a period of warfare and the borders were built by physical force; however, the old feeling of "this is my territory" remains dormant. If then the people revolt due to dissatisfaction, sooner or later the old territory feelings will awaken, and that area will be usurped again. This happens in many countries, sometimes with disastrous consequences, and cities and towns are completely destroyed. This should be a

warning that it is extremely important to give space to the old identity and that larger contexts (such as countries or continents) only can be formed on a voluntary basis. People will claim their roots and borders in the same way as they would fight for home, hearth and family. Driven by vasopressin (to keep the territory), supported by adrenaline (to fight) and bound by oxytocin (to keep together and withstand all pressure), people are willing to die for their own group. It's very sad to see that often the battle ends with totally destroyed houses, no home, heart or family left.

I think it is time to realize, that women really do have a biological factor that's more fit to enable peace and harmony in the world. Men had a chance to prove that they could rule the world and take care of their families, but in most cases they failed until now. Just look around at what is happening. Men are in charge and make war. Women try to counteract the excitement and ease the suffering. Still there is just a small number of women in leading rolls all over the world, but men are physically stronger than women, so they maintain their power. Men did have a great role in defending their territory, but these days there are so many people on earth that working together is now necessary to survive. We must change from vasopressin to oxytocin and give a place to MAO-A.

6.5 Scientific truth

In this book you find a number of recent results of scientific research; many of the assertions and conclusions in this book are based on the accuracy of these biochemical research results. If these results prove to be incorrect, then these conclusions and interpretations must be changed and perhaps even deleted. The internet offers a huge amount of current information. The most important data from the literature mentioned in this book are authenticated via the internet to see what the latest knowledge is. For example, a key question is whether the active monoamine oxidase (MAO-A) is indeed only situated on the x chromosome and not the y chromosome, and as you know, women have X X and men have X Y.

I found that information on the site <http://omim.org/entry/309850> (visited on April 30m 2014).

In the human body there are a number of inherited syndromes that are associated with the X chromosome. The HTPG -gene (hypoxanthine-guanine-phosphoribosyl transferase) is also only found on the X chromosome; if this gene is missing, HTPG-Lesch-Nyhan Syndrome occurs. These patients exhibit extremely self-injurious behavior, in particular by biting on lips and fingers. This syndrome only occurs in boys! Girls have two X chromosomes, making it virtually impossible that the gene could be missing in them. On the other hand, Turner syndrome only occurs in girls, because it is a congenital defect which is situated on the second X chromosome, and happens when the X chromosome, in whole or in part, is missing. Girls who have this abnormality in their genetic material remain in their puberty

and do not continue normal physical development. This developmental disorder is caused by the inadequate functioning of the ovaries. As a result, there are no sex hormones produced and breast development and menstruation do not occur, however intellectual development is usually normal.

It is good to remember that such research results give very important indications about what is happening in our body. But you also should be aware that there may be new interpretations which will offer other explanations for human behavior. It is therefore important to follow the biochemical results of scientific research.

Everyone can follow scientific research by searching online and especially using prompts in AI LLM like ChatGPT, Gemini, DeepSeek, and Claude. That gives us a huge acceleration in the spread of knowledge and capabilities. On the basis of that knowledge, in turn, you can find new solutions for human behavior problems. For example: if it proves to be possible to spread oxytocin doses throughout a football stadium, shall we use it to calm down an aggressive public that is demolishing furniture and preparing to rally in the center of the city? Imagine that these football fans come out hugging the police and singing cheerful songs.

Eysenck, Buikhuisen, and Edward Wilson were reviled because they took an initiative in hereditary research. Later they were acknowledged, as those who initiated the scientific explosion in the application of knowledge from bio-sociology, evolutionary psychology and biological psychology. In the 1970s, professor Buikhuisen wanted to do research on the genetic basis of crime. There were many protests at the time, and the objections came from all kinds of angles. Different religious leaders preached that the human genome is a creation of God. According to them,

people are not allowed to do any research, because they are afraid that scientists will intervene in the human genome. In addition, the women's emancipation movement of the 1970s had nothing good to say about the differences between men and women, because they did not want to recognize any differences, either cultural or biological. From a political angle, it was also highly suspicious to engage in the biological factor. Left-wing politicians defended the view that crime had a social cause and that genetic research could not offer any relevant insight. Genetic research from the broad political spectrum was not trusted because it was reminiscent of the concentration camps of Hitler, where Nazi doctors performed inhuman experiments on prisoners.

Research into the biological factor has made it clear that it is precisely in the field of biological differences that women have an important positive contribution to global peace and security, opposed to men who defend their territory and virtually continuously battle with opponents, driven by vasopressin and xenophobia, sometimes rightly so, but often mistakenly.

In 1995, Prof. Dr. Doreleijers (child psychiatry, Vu University Amsterdam) did some research which showed that two-thirds of youthful criminals suffer from a mental disorder with a neurobiological basis (Doreleijers, 1996). Until then, most disorders were not recognized and therefore not treated. At the Department of Child Psychiatry at the University of Utrecht similar research was performed. At this time in the Netherlands, research into neurobiological causes for criminal behavior was still pretty new. Neurobiological factors may have a genetic basis, but research into such a relationship was considered suspicious. In 1992, a lecture by the psychologist Hans Eysenck was cancelled following a threatening phone call stating that the

event would be disrupted, as he was accused of promoting racist and fascist ideas. Eysenck—known for his work on personality theory—has since been partly reassessed, though debate about his views continues. Meanwhile, the Dutch criminologist Wouter Buikhuisen withdrew from academic life and later became an antiques dealer, choosing not to re-engage with the controversy surrounding his work.

It is understandable that research suggesting a genetic component to criminal behavior is met with caution and skepticism. Historical abuses, particularly the human experiments conducted under the Nazi human experimentation, have left a lasting sensitivity around linking genetics to behavior.

Behavior always emanates from a combination of biological factors and the effects of the environment on an individual. It is the MAO-A, the vasopressin, the adrenaline, the testosterone, the serotonin and oxytocin which together in mutual interaction with the environment determine what someone is going to end up doing. What defines a “good” person or a “successful” individual depends strongly on cultural and historical context. Behaviors that are valued in one setting may be discouraged or even condemned in another. For example, in some traditional, conflict-prone regions, masculine identity may be associated with strength, toughness, and the ability to defend one’s territory—traits often linked to heightened activity of hormones such as adrenaline and vasopressin. In contrast, in peaceful urban societies, these same behaviors may be viewed as aggression or antisocial conduct.

Similarly, in times of war, societies often rely on individuals who are able to act decisively under stress, sometimes rewarding traits that would be considered problematic in peacetime.

This illustrates how biological predispositions can be interpreted as either adaptive or harmful, depending on the circumstances.

Historical perspective further complicates moral judgment. Acts of violence may be framed as heroic or criminal depending on context, allegiance, and outcome. For example, resistance actions during wartime may be celebrated in one narrative and condemned in another. In many cases, those who prevail in conflict shape how such actions are remembered.

To address these complexities, international institutions such as the International Court of Justice were established to promote a more universal framework of justice. However, not all nations recognize or accept its authority, reflecting the ongoing challenge of defining justice across different cultures and political systems.

And in the case of an excess of MAO-A, for some people you're a coward that fails to defend his territory, and for other people you are driven by ideals and a brave pacifist. If you do not have knowledge about these biological factors, you don't know how much risk there is for youth. Media, teachers and politicians can provide information about what biochemical research has brought to light, and based on that knowledge you can come to new points of view and new methods to influence behavior. Education can play an important role. It is very important to work together with scientists from the fields of neuroscience, biological psychology, bio-sociology and evolutionary psychology. Scientists are often deeply ensconced in their own field, in their own specialism. Bringing this data together will provide opportunities to develop new, improved methods and techniques in many fields within society. Such cooperation is extremely relevant, and is also fascinating, exciting and

challenging.

Finally, to bridge the gap of knowledge I have written this book; first in Dutch for my students in Social Care, and later for the broader public in English. It is an example of (a small part of) the knowledge that is available in literature and on the internet. Hopefully the biological factor will soon be integrated into teaching methods and politics. Then this knowledge will become a normal part of psychology, sociology and pedagogics. Then you will find the words oxytocin and vasopressin in the registry of each book on human behavior. Then this book is unnecessary.

Summary 6

Very recently the concept of epigenetics has been explained in a number of scientific publications. It means that some of the genetic material can be turned on and off by 'switches' on the basis of environmental factors. Thus, the DNA reacts to the environment and can change the DNA and put some properties in the front and other properties to the rear. That means that you as father, mother, or grandparent can exercise influence on the genetic material of children, in particular when this DNA in the sperm and the egg is formed. The genetic material that is carried by young men and young women is formed by the whole environment, including bystanders.

In addition, this chapter focuses on the life coach. This coach can teach people about what is 'lucky' and how they can be happy. Remember that happiness is a certain biochemical cocktail in your brain.

MAO-A and empathy are very important, and I explained why women must have a bigger role in society, unless you want to continue our violent history and would like more war to occur. Finally, this chapter comments on scientifically proven facts; what is true and what is not true. I encourage you to stay critical. Exceeding your own discipline can open new perspectives and lead to better methods.

Time table

In the past 50 years Molecular Genetics has completely changed the knowledge of human nature.

1953 James d. Watson and Francis H.C. Crick double helix model designs for the molecular structure of DNA, partly on the basis of Roentgen diffraction investigation performed by Rosalind Franklin.

1958 Francis Crick formulates the central dogma of molecular genetics: information goes from DNA to RNA, and RNA to protein, and not the other way around. 1966 introduction of the concept of codon: the unit for information in DNA and RNA consisting of three consecutive bases (nucleotide triplet).

1970 Howard Martin Temin and David Baltimore discover retro viruses synthesizing DNA: RNA-RNA viruses that are outgoing.

1972 introduction of the recombinant DNA technique (genetic modification). The artificial merging genetic material making transgenic organisms.

1973 beginning of public concern about genetically modified micro-organisms that could be potentially dangerous.

1975 International Conference in the United States (Asilomar, California) advocated drawing up guidelines for research using recombinant DNA technology (genetic modification).

1977 establishment of Genentech, the first biotechnology company to produce pharmacological substances.

1983 Kary b. Mullis introduces the polymerase chain reaction (pcr), a technique for fast and easy DNA fragments to clone. (1993: Nobel Prize).

1988 Start the Human Genome Project decoding the human genome.

1992 the y chromosome and chromosome 21 is completely mapped.

1997 Exon shuffling and start of epigenetics

2000 human genome is broadly known: it consists of 23,000 genes and 20,000 Pseudo genes. 2001 The order of all chromosomes is provided.

2003 the Human Genome Project is completed providing information on the locations and sequence of human genes on all 46 chromosomes

2008 – Japanese astronomers launched the first Medical Experiment Module called "Kibo", to be used on the International Space Station.

2009 – Cedars-Sinai Heart Institute uses modified SAN heart genes to create the first viral pacemaker in guinea pigs, now known as iSAN's.

2010 Epigenetics become more and more important to provide insight in the way diseases are inherited

2012 – 31 year-old Zac Vawter successfully uses a nervous system controlled bionic leg to climb the Chicago Willis Tower

http://en.wikipedia.org/wiki/Timeline_of_biotechnology

Literature

Many books and articles were consulted by the author in the period September 2006 – May 2007. Most books are in Dutch. You can find the list of literature on <http://human-DNA.org>. We will try to find the equivalent in English if possible.

Websites

For an up-to-date overview of relevant websites, you can visit <https://human-dna.org/overview-on-links-in-how-to-change-our-human-behavior/> .

About the author.

Ruud Loeffen graduated in 1971 from the School of Social Work in Sittard. Until 1981, he worked in youth social services. From 1982 to 1990, he was a lecturer in AAM/ATA (Applied Activities and Methods / Applied Training Activities) at the same institution.

Between 1990 and 2009, he served as a lecturer at the School of Cultural and Social Development, now part of Zuyd University. In addition to his specialization in audiovisual education, screenwriting, and directing drama, Loeffen has pursued long-standing academic interests in human behavior. Since 1970, he has studied evolutionary psychology, and since 1998 he has focused on biosociology and biological psychology.

The central question guiding his work has been: *How does the human mind perceive the surrounding world, and how does it regulate the interaction between individuals and their environment?*

In 2009, he developed the course “*The Nature of Human Beings*” at Zuyd University. He also authored the book “*How to Change Human Nature by Regulating Our Neurotransmitters and Hormones*,” in which he summarizes key insights from his research and teaching.