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DYSLEXIC AND DYSSYMMETRIC: IN A LABYRINTH OF THE CREATIVE ABILITIES AND DISABILITIES IN THE LITERACY PROJECT

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Abstract: Dyslexia is a special way of thinking. The dyslexic brain uses a holistic and visual rather than analytic verbal approach. Perception of details, small differences and relations is unstable. That way the patterns become fuzzy and the stronger right-hemisphere information processing can lead to dyslexia as well as potentially being the basis for the creation. The special way of perception creates new solutions. The corrupted pattern is not only a mistake, but also, at the same time, a way to new patterns. This slightly different pattern is the most complex image for the brain to perceive. If symmetry is harmony, dissymmetry is corrupted harmony, or disharmony. It creates tension, which, in turn, can be converted into power. The dyslexic mind is ready to err and create. The aim of the EU Project “Literacy” is to develop an online portal for young and adult dyslexics. The Portal offers a place and opportunity to turn disabilities into abilities.

INTRODUCTION

The increased ratio of dyslexics is posing an increasingly greater problem in terms of education, employment and successful social integration in general. In order to comprehend the problem, an understanding of different aspects of dyslexia and its background is necessary. The road to this understanding leads through a broader rethinking of the cultural change, on the one hand, and of the change in human abilities, on the other.

Technological tools have made possible for information transfer to be based on spatial-visual stimuli which enable a quick transfer of huge amount of information. Our brain, too, is adapting itself to this. In the digital age, the method of information processing is undergoing change. Alongside the former, analytical and sequential method of processing, a holistic and spatial-visual method of processing is getting an increasingly greater role. The number of individuals using a mode of information processing that relies more heavily on right hemisphere functioning is increasing, whereby the probability of the appearance of dyslexia is also higher.

Dyslexia is speciality in information processing, which may be the basis for not just disorders, but also for creative thinking. It is independent of the level of intelligence, but is strongly influenced by culture. An international research group has developed an online portal for supporting the social integration of dyslexic adults. The basis for the support is the assistive technology of the digital age, on the one hand, and the speciality of the dyslexic brain, namely, creativity, on the other, which, in the case of dyslexics, can clearly be linked to dissymmetry.

LITERACY	AUDIO-VISUALITY
Logical thinking	Feelings, intuition
Details	Seeing as a whole
Facts	Imagination
Words, language	Symbols, images
Knowledge, science	Philosophy, art
Recognition	Beliefs
Systematic thinking	Spatial-visual thinking
Knowing the name of things	Knowing how things work
Thinking in reality	Fantasy
Acting	Recognising possibilities
Strategy	Taking risks
Sequentiality	Simultaneity

Table : The mechanisms of the two kinds of culture and the characteristic functioning of the two hemispheres.

1 TWO TYPES OF INFORMATION PROCESSING

The proportion of the two types of information processing linked to the two hemispheres differs from person to person. Everyone is capable of both types of functioning. The way of information processing specific to an individual results from a specific proportion of the two types of functioning. The link is made by the corpus callosum. If it functions efficiently, information is accessible to both types of processing.

The left hemisphere of the brain is characterised by sequential, step-by-step processing. It can handle sequences, relations and parts. It is associated with functions in which sequentiality is essential: speech, writing, reading, counting and logical analysis all require correctly assembling and joining up smaller parts of an informational whole.

The right hemisphere functions in a different way. It processes information holistically and simultaneously. This is why this hemisphere is associated with visual, spatial abilities, understanding and enjoying music, imagination, emotions and humour; everything that we grasp as a whole. We do not recognize a face bit by bit: instead, we simply perceive at once whom we see. The right hemisphere processes stimuli without analysis or taking relations into account.

Abilities and skills associated with a specific hemisphere are, however, not linked to that single hemisphere. Both hemispheres are necessary for the right use of all skills.

Consider music: though associated with the right hemisphere, it naturally requires left brain sequential processing, as well.

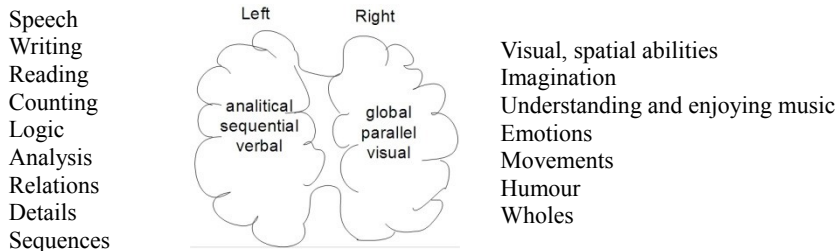


Figure : The two types of thinking associated with the two hemispheres

In practice, the processing connected to the two hemispheres is never isolated. The coordination of the hemispheres forms the basis of information processing. The left hemisphere, which is able to cope with details, analyses, orders the incoming data and puts the pieces in place, taking into account the appropriate relations. The right hemisphere is where all of this will fit together into a single whole. This is the moment when the big picture falls into place. If the resulting whole is not right, the details need more analysis until the task is finished. This process applies to the simplest and the most complex operations alike [Gyarmathy, 2012].

2 DYSLEXIA AND THE RIGHT HEMISPHERE – ADVANTAGES AND DISADVANTAGES

Dyslexic people are usually ‘right brain’ people, but this fact would not in itself lead to disabilities. There are many people with stronger right brain dominance without any literacy trouble. The difference is that these people can use both hemispheres effectively as their corpus callosum is intact. Dyslexics suffer from a poor connection between the hemispheres. Most likely, there are people who are left brain dominant with a poor corpus callosum connection. However, this problem does not affect their school achievement and literacy abilities as dramatically as in the case of those where the right brain functioning is dominant, and whose left brain functions cannot be used effectively because of the poor transfer through the corpus callosum.

Dyslexia is a deficit only from one angle (namely, from the left side), while right hemisphere functions may be outstanding. Geschwind put this into words in connection with dyslexia by using the expression “the pathology of superiority” to denote dyslexia [Geschwind and Galaburda, 1985].

In the case of right hemisphere dominance, a solution often presents itself with reference to less detail and a lower level of analysis and of awareness of relations. A

picture is formed in possession of an arbitrary amount of information. This picture is in many respects a fusion of details, a creative process. The less detail there is at its birth, the more creative it is, while the more detail there was available, the more accurate the knowledge. Anyone can experience this creative and imaginative functioning when their brains function with little information at their disposal. In a dark street, when visual details are sparse, the brain tries to recognize objects. In the case of left hemisphere dominance, it takes a lot of time to form a picture, and the individual perceives only a shapeless mass, a visual chaos. Straining the eyes and the brain unfolds an image after a while, and the individual is able to identify the object.

In the case of right hemisphere dominance, however, an object in a situation characterised by a sparsity of details, appears as successively newer and newer objects to the individual. In a dark street, such an individual will perceive a distant, indistinct object first as a bear, then maybe as a tree trunk, and then it will eventually turn out to be a garbage can.

Creative work is born in the same way. Poincaré, the mathematician once wrote that he struggled with a problem for fifteen days, when one evening suddenly a great number of solutions came to him. He felt that they contradicted each other, until they arranged themselves in pairs, forming a firm structure. By next morning, he had found the solution, and then he only needed to write it down, which took him only a few hours [Jones, 1984].

3 DYSLEXIA AND PROBLEM-SOLVING THINKING

What is great and useful in the creative process can also cause problems. The right hemisphere constantly generates new solutions. It is advantageous in a creative situation if the brain can readily give plenty of answers to the question “what else could it be then?” On the other hand, when a word needs to be read, this way of processing is less adaptive. The methodical functioning of the left hemisphere makes speech, literacy and precision processing possible.

Creative functioning often entails deficits, but it turns out that deficits can also entail creative functioning. Abilities at the disposal of an individual can lead to outstanding achievements in different ways. Academic knowledge is not the only way to the Nobel Prize.

For several decades now, biographical data, as well as neurological studies have proved that a number of creative thinkers display weaknesses in the verbal area and the processing linked to the right hemisphere is stronger than the left one in their case. They had ambivalent success at school, but they have unequivocally good creative abilities. In everyday practice, however, both professionals and laymen treat giftedness and neurological specialities leading to specific learning or other difficulties separately. Apparently, the contradictory nature of this phenomenon still masks the connection.

Albert Einstein, in whose case biographical data demonstrate a probability of dyslexia, started to speak very late and was highly musical [Kantha, 1992]. Stronger right hemisphere functioning can be inferred. Already as a small child, his outstanding musical talent was manifest, while his speech was belated. His achievements are truly

creative achievements. He never produced new physical measurement results. Einstein instead assembled results available to everyone in a different way. The Nobel Prize committee had a hard time deciding for which of his papers he should be awarded the prize. When Einstein wanted to “think”, he started to play his violin, which helped him not to think, but to let his right hemisphere do the job.

Agatha Christie, the queen of crime would have been a dyslexic, had she been born today. She was no good at spelling and grammar at school [Osvát, 1994]. The strength of right hemisphere processing made it possible for her, too, to fit the same facts together in different ways in her detective stories, and highlight different suspects each time. She presents a number of possible resolutions to the reader, while the final winner will be a solution so far not considered.

A number of great creators have been regarded as mentally retarded or struggling with weak abilities, because they were unable to meet regular expectations. Thomas Mann failed three times at school, while James Watt was considered slow and dim. Pablo Picasso was presumably a dyslexic and a dyscalculic, but was at the time thought to be mentally retarded. The list of outstanding creators, whose life confirms a connection between special achievements and deficits, is increasingly lengthier. It is time to accept that it is more often the rule than the exception that outstandingly creative minds can evolve against an irregular neurological background.

4 ACADEMIC AND CREATIVE THINKING

Abilities and skills associated with the right hemisphere are of considerably less importance at school. Subjects requiring spatial-visual abilities or technical or musical talent only make it to the also-ran category, and are listed at the very end of the school report. Despite this shunned position, the right hemisphere has a truly important task in higher level intellectual activities. Seeing the whole picture and thinking holistically provides an immediate answer to a problem. There is no need to go through a logical process. The solution simply emerges. It is, thus, no coincidence that right hemisphere dominance is much more frequent among individuals with a higher level of intelligence. At school, however, this way of thinking constitutes no advantage. On the contrary, when students are unable to explain how they arrived at the solution, they may even get into trouble.

It is most comical that while school does its best to confine thinking to the left hemisphere, Australian researchers have developed a thinking cap that stimulates the right hemisphere and blocks the functioning of the left one in order to enable the individual to reach creative achievements. Chi and Snyder [2011] claim that by blocking knowledge, imagination is free to work instead of memory. A brain thus treated can turn to a problem with no bias whatsoever. Subjects thus rendered right hemisphere-dominant were significantly better at problem-solving.

Individuals born with a “thinking cap” like this, namely, dyslexics can easily receive the label of struggling with learning difficulties. Compliance with school standards could almost very well counter-indicate problem-solving thinking, but the two are at least incongruous.

5 POWER OF DISSYMMETRY

Asymmetry is the lack of symmetry; dissymmetry is the violation of the symmetry. Very often the two concepts are mixed and that way misinterpreted [Saha, Chakraborty 2012]. Even the word 'dissymmetry' is hardly used, because 'asymmetry' is an easier concept. Chaos is a clear situation. Order with a little chaos in it is ambiguous.

The basis of creativity is tolerance for ambiguity. The fact that something does not really fit generates tension in the brain. The 'beauty of dissymmetry' comes from the creative tension of the unsure. Slightly corrupted perfectness opens up new possibilities, and makes the brain work. What is most irritating is an extremely disturbed order. It stirs our brain like the jazz. People can endure the lack of order more easily than corrupted order. Irregular, atypical, anomalous stimuli cause stress.

Similarities challenge the human brain. The *principle of homogeneous inhibition (Raeffect* named after Paul Ranschburg, who first described it) says that the more different the adjoining contents and processes of the mind are, the least they interfere with each other's development. Uniform units endeavour to merge into a joint unit according to their degree of the uniformity. This phenomenon operates, among others, in our perception, speech and memory errors [Ranschburg, 1939].

Behind the symmetry in the appearance of our brain, there lies an asymmetry in the dominance in the use of it. The left hemisphere is the leader, analytical, verbal ability is the winner in human information processing, but without the right hemisphere's contribution the left brain's solutions are boringly logical. Intuition arises from the holistic functioning of the right brain, but it is not enough in itself for the creation. Tolerance for uncertainty maintains the fuzzy picture for a sufficiently long time for the new picture to emerge. Creation itself is at the end of the process, after the left brain work, the elaboration is done, as well.

Dyslexics are born to live in a labyrinth. A poor sense of relations and directions is their weakness. They lose data, details, edges and slight differences. There is far greater number of homogeneous stimuli for the dyslexic brain than for other brains, whereby stimuli interfere much more often in the dyslexic brain. Overloaded short term memory and frequent erring is the result of this functioning. If a dyslexic person learns to have control over the labyrinth, the disadvantage turns into an advantage. The tension of ambiguity is familiar, the intuitive approach is natural. The joy of dissymmetry is the bonus for dyslexia.

6 LITERACY PROJECT - FP7-ICT-2011-7 (NUMBER 288596)

The stronger right hemisphere functioning of dyslexics is no longer compensated for by the cultural environment as previously: to the contrary, this way of processing is coming more and more into the foreground. In the digital age, a holistic and visual mode of processing due to some congenital or acquired difference would be an advantage, but the decreased verbal level of the cultural environment does not supply it with an at least adequately effective analytical thinking. As a result, those who are born with a stronger

right hemisphere in the first place and could achieve a high level of creative functioning, are put at risk.

In absence of a compensatory environment, their level of methodical thinking and knowledge is not sufficient for outstanding achievements, while their holistic and imaginative thinking is getting stronger. While fantasy is thus allowed to soar freely, it cannot be turned into achievements due to a lack of methodical processing. An unbridled vision born from this often remains at the level of dangerous ideas.

A number of creators have had to deal with the consequences of their out of ordinary brain dominance. In some professions, holistic information processing is actually highly advantageous. These include areas requiring outstanding spatial-visual abilities like arts and architecture, and even mathematics. Among mathematicians, the incidence of dyslexia is greater than average, and even dyscalculia is not infrequent. Mathematics is not about counting, which is sequential, but about finding patterns. If the corpus callosum functions properly, then no disorder will develop, whereas if transfer is impeded, then linguistic deficiencies can appear, and even an exceptionally outstanding mathematician may struggle with a reading and counting disorder.

Project Literacy offers an opportunity for young and adult dyslexics for self-testing and brain training on the project's online portal developed with support from the European Union. It presents methods and techniques to dyslexics which compensate for their weaknesses through building on their strengths. On the Portal, users have access to a Creative Corner and a Community Zone, so that they have the opportunity to exhibit the creative force of dyslexia through social activities, drawing on creative thinking and interactivity.

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