

# Dyslexia

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Dyslexia is a Latin word; dys (difficulty) and lexia (word) is formed by the combination of words. Dyslexia is defined as a special learning disability experienced in the development of literacy and language skills.<sup>[1]</sup> It is a neurological disorder that expresses the retardation experienced in one or more of the areas of reading, writing, self-expression, social perception, time and space orientation, even though there is no developmental brain disability at the basis of normal or superior intelligence level.<sup>[2]</sup> International Dyslexia Association defined dyslexia as a disorder in correct and fluent reading.<sup>[3]</sup>

The first signs of dyslexia were obtained in 1896 by a British doctor, W. Pringle Morgan. In the article published in the British Medical Journal, Morgan stated that a 14-year-old boy named Percy was always smart enough to be counted, that he was very fast in games according to his peers and that he had no direction left behind from his friends, but could not read it. It was thought to be related. Because one of the most prominent features of dyslexia was the confusion of letters and words and the perception of them in reverse. Later studies revealed that dyslexia is not a visual disorder but a dysfunction related to the language system. According to current information, dyslexia is a disorder that occurs during the differentiation of the language units called phonemes.<sup>[4]</sup>

## ABSTRACT

Dyslexia is known as a type of learning disorder that manifests itself in the problem of reading and reading comprehension. There are many scientific studies on dyslexia. When these studies are examined carefully, it is seen that dyslexia is more focused on its limitations than its strengths. It is known that some brains with dyslexia have been different and special since history, and what makes these extraordinary individuals differentiate from everyone else is that their brain structures are different, and dyslexic geniuses make great contributions and discoveries to lead the world. Although there have been many researches on the origin of being a genius, there are almost no researches on dyslexic genius brains. In this article, while examining the relationship between dyslexia and brain, intelligence and genius, Einstein, a genius with dyslexia, and his brain structure are emphasized.

**Keywords:** Brain, dyslexia, Einstein, genius.

When the studies on the brain structures of individuals with dyslexia are examined, it is observed that the right or left hemispheres of the brain do not develop or underdevelop and are thin and narrow compared to normal individuals.<sup>[5,6]</sup> It is known to have difficulties in pronouncing and deciphering words.<sup>[7]</sup> Dyslexia, which is a brain disease associated with finger recognition, right and left discrimination, visual screen defects, difficulty in learning hours, is actually more than a reading disorder.<sup>[8]</sup>

Although motor disorders are common in individuals with dyslexia, significant weakness and slowness in the right hand are common. In addition, as age increases and motor performance is visually supported, it is observed that dyslexic individuals become more competent in some motor jobs. These individuals, who lack perspective, can confuse the concepts of up-down and right-left as well as having greater problems in drawing bikes or watches. Delayed start, slow development of speech

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and inability to achieve full expression defects in fine motor movements. There is a delay in array memory (such as counting the alphabet, months, days of the week) and sorting problems in visual memory.<sup>[7]</sup>

Considering the chronological age of the person with dyslexia, the level of intelligence and the education they receive in accordance with their age, reading success is significantly lower than expected. The causes of dyslexia, like other learning disorders, are not yet known. Related studies have shown that 1, 2, 3, 6, 15 and 18 chromosomes have genes that cause dyslexia.<sup>[9]</sup>

The importance of genetic transmission in dyslexia is emphasized. It is reported that the risk of reading disorder is 30-40% for boys and 17-18% for girls. These rates are 5-12 times higher than the risk in a normal population. The incidence of dyslexia in society is considered to be 4% on average. Dyslexia is a developmental problem that begins with the birth of the child and the symptoms become more pronounced during the education process. Generally, although the problems decrease, the symptoms may last for a lifetime.<sup>[10]</sup>

Dyslexia involves abnormal development of brain parts that play a role in language development. Most dyslexic individuals have difficulty in phonological processes with written words as well as spoken words. Functional imaging studies show that decrease of VWFA (Visual Word Form Area) activation, the left occipitotemporal and temporoparietal cortex, and the increase activation of Broca's area includes dyslexia.<sup>[11]</sup>

Studies on the brain reveal that the right hemisphere is smaller in normal individuals than in the left hemisphere, and is equal in size or smaller in the left brain hemisphere. Differences in the left brain hemisphere of dyslexia are thought to be the cause of this disorder.<sup>[12]</sup>

## DYSLEXIA-INTELLIGENCE RELATIONSHIP

Although it is common to think that individuals with dyslexia experience some form of mental retardation in our society, this idea does not reflect reality. Among the names with dyslexia are Albert Einstein, Michelangelo and Thomas Edison. Scientifically there is no direct correlation between dyslexia and mental retardation. In the context of intelligence quotient (IQ) tests, one of the methods used in the measurement of intelligence, scientific studies have shown that there is no relationship between IQ tests and dyslexia and that people with

dyslexia at different IQ levels have similar difficulties in reading. This makes the relationship between intelligence and dyslexia more clear and proves that dyslexia is a problem that can be seen in individuals with low, moderate or high IQ levels.<sup>[4,12]</sup>

Of course not only individuals with low or moderate IQ score but also high IQ scores dyslexia can be seen in individuals with.<sup>[11]</sup> An individual with an IQ score of 150; While solving daily problems successfully, he/she may have problems in reading despite being successful in speaking and his/her intelligence score. In contrast dyslexia can be seen in individuals whose academic achievement is considered to be low.<sup>[12,13]</sup>

## THE RELATIONSHIP BETWEEN SUPERIOR INTELLIGENCE AND DYSLEXIA

The idea of genius in children or gifted people has attracted people for centuries. The English word genius is the same in Latin, and its origin is the Greek word ginesthai, which means "to be born or to exist from nothing". In the Roman period genius was used in everyday language to mean a god or soul that was given to a person by birth and that would determine his future with his character. In the following centuries, the meaning of genius has undergone a change, and people have begun to use it for people with extraordinary intelligence and creativity. In general from the seventeenth century to the early 20<sup>th</sup> century, genius was the most common term for strong creative talent. The scientific definition of people using the term "genius" came about with the widespread use of psychology as a modern discipline in the 20<sup>th</sup> century.<sup>[14]</sup>

Galton<sup>[15]</sup> was the first to study genius. Galton's work however, was more than a study of the genius psychology of important historical figures. Terman<sup>[16]</sup> initiated the first research on the content of the inhabitants. By adapting the original Binet-Simon intelligence test into English, Terman developed what is now known as the Stanford-Binet test, and conducted long-term studies of children whose intelligence he found to have god-given abilities to prove the validity of the results of having a high IQ. According to Terman, genius refers to the great intellectual ability measured by performance in a standard intelligence test. According to Galton, genius refers to the creative ability of an extremely high order of true success.<sup>[10]</sup>

Even genius people stand out because they are slightly different from the rest of society, which creates unique problems. What makes sense is the

way they deal with the obstacles and frustrations they face, whether they are at work or around them. Instead of changing their jobs or despair; they tend to turn differences and conflict into advantage and benefit from them. Freud, for example, from a poor Jewish family, wanted to pursue a career in science. When he failed to reach the status of a world-class researcher, he created a quasi-scientific field called psychoanalysis, using his special strengths in linguistic and interpersonal fields. Einstein, an indifferent student, distinguished himself by combining his mathematical and spatial abilities.<sup>[10]</sup>

Although history has introduced us to geniuses with dyslexia, individual studies conducted so far have not revealed a relationship between dyslexia and genius. There is no need to be dyslexic in order to be a genius and there is no obstacle for the individuals with dyslexia.<sup>[10]</sup>

### A GENIUS WITH DYSLEXIA: ALBERT EINSTEIN

Einstein learned to speak late. "My family was so worried that they consulted a doctor." He would later explain. Even when he was over two years old and started to use words, the housekeeper developed an oddity that made him call him "der Depperte", the fool, and other members of the family called his development "almost backwards". Whenever he wanted to say something, he would try it first on himself and whisper slowly until he was well enough to pronounce it out loud. His younger sister would recall this in the following way: Every sentence coming out of his mouth, no matter how customary, would repeat himself by wiggling his lips". They thought it was very worrying. "He had so much difficulty talking, that those around him were afraid that he would never learn to speak."<sup>[17]</sup>

Albert Einstein (1879-1955) is undoubtedly one of the greatest creative dyslexic geniuses of modern times. Einstein, who spoke late as a child, had developmental dyslexia. According to him, words did not have a role in his scientific system, he did not think of them, he tried to explain it in words after a thought came. After Einstein's death, his brain structure was examined in accordance with his will. Microscopically it was found that the lateral sulcus in the brain continued unexpectedly to the bottom of the postcentral sulcus. However in the normal anatomical structure, the posterior ramus of the lateral sulcus is located behind the angular gyrus and continues towards the parietal lobe in

the bed of the supramarginal gyrus forming the Wernicke area, but beyond the postcentral sulcus. These two gyrus beneath the intersparietal sulcus form part of the parietal lobes and the inferior parietal lobes, also called the Broadmann 39 and 40 sites. In the anatomical structure of Einstein's unique brain, the inferior parietal lobe (39 and 40 regions) is not segmented. The inferior parietal lobe, especially in the non-dominant hemisphere, is the source of artistic, scientific and literary creativity with mathematical thinking ability. The inferior parietal lobe region is larger and undivided as a result of the sulcal anatomical difference in his brain. This finding is also consistent with a previous study by Diamond et al.,<sup>[18]</sup> showing that the 39<sup>th</sup> region of Einstein is filled with fewer neurons but with a relatively high number of glial cells. In conclusion, it is accepted that Einstein's creativity and mathematical genius stem from the undivided inferior parietal lobe.<sup>[19]</sup>

### RESULT

Dyslexia is a kind of learning disability. As a result of the examination of the brain structures of individuals with dyslexia, partial differences in brain structures compared to other individuals have been found, but the causes of dyslexia have not been fully revealed to date. However it is known that dyslexia has no relation to intelligence and intelligence development. Being gifted does not prevent a person from being dyslexic. Again it is not surprising that an individual with dyslexia is very intelligent and even as a genius on the world stage.

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