Option B: How and to what extent is dyslexia a cognitive deficit? Draw on different explanations of dyslexia to build you argument.

Dyslexia is a specific learning difficulty which is indicative of people having difficulties in learning to read and write (Wood and Richardson, 2002). This is a complex condition which may manifest itself in different and varying degrees in each individual case although a number of core difficulties have been identified which may indicate a person has the condition. These difficulties include; coding verbal and visual information for example associating an individual letter grapheme with its phoneme; phonological difficulties in dealing with information in the short-term memory; difficulties in sequencing information and directional confusion (Wood and Richardson, 2002). In order to discuss the explanations associated with the cognitive deficit of dyslexia we must first understand why dyslexia is not considered 'normal' in today's literate society, how it is defined and also have an understanding of what is meant by the term cognitive.

Psychological normality can be explained statistically, medically and culturally. Statistical definitions tend to be suited to variables which can be measured on a scale (test scores). The standard deviation is then used to determine those outside the boundaries of 'normal'. A medical definition of 'normal' is those individuals which display an appropriately functioning physiology and nervous system. In this case disease or physical disorder

can explain psychological abnormality although it is recognised that often external and social factors may serve as a trigger. A cultural definition of normal would be those people who display behaviour which is in line with the political, economic and social expectations of the culture in which they live (Wood and Richardson 2002). Dyslexia could fall into any of these definitions of abnormal. A person displaying statistically a below average reading age, medically the brain not functioning as would be expected and culturally not performing at a literate level expected by the political and societal expectations of their culture .

Dyslexia is defined in three main ways; definition by exclusion, discrepancy definitions and positive indicators. Definition by exclusion would infer that the person has dyslexia because there is no other explanation for their literacy difficulties. The person appears to have 'normal' intelligence, adequate teaching and sociocultural opportunities but still they have difficulties in this area. Discrepancy definitions imply that an individual's actual reading ability is below the expected potential for that individual. The final definition positive indicators takes into consideration the behaviours an individual displays and whether these behaviours are indicative of the possibility of dyslexia. Dyslexia can often co-exist with other difficulties such as dysphasia (spoken language), dyspraxia (motor co-ordination and attention deficit/hyperactivity disorder (ADHD) (Wood and Richardson 2002). Frith (1999) suggested a framework for these developmental difficulties which incorporates three main perspectives,

biological, cognitive and behavioural. These were considered in addition to the environmental factors which may have an impact on all the other three areas. The focus of this essay is on the cognitive aspect and to what degree this perspective can provide a full account of the condition.

Dyslexia viewed from a cognitive perspective would involve describing what is going on in the brain at a functional and process level. Cognitive psychologists often liken human brains to computers, information processors. A brain receives inputs, processes them and responds to the information which has been received. In reading this would require the individual to see the word, process it and then understand the context in which it was being used. This is an over simplification of the reading process and in order to understand the cognitive perspective on dyslexia how a child learns to read needs to be considered.

Learning to read is generally thought to have three levels to the process. Initially a child develops a lopographic strategy which involves sight learning a whole word without knowing the individual letter sounds. At this stage the child does not have the skills necessary to cope with unfamiliar words. The next stage involves the child learning alphabetic decoding strategies, learning the phonemes which individual letters make and then how these can be blended together. This stage also helps with spelling words, sounding out the phonemes and blends to enable the child to write the words. Finally an individual moves into the orthographic stage which

incorporates the first two skills along with using grammatical knowledge (Wood and Richardson 2002). The next section of this essay will look at cognitive hypotheses for dyslexia and then evaluate to what extent the cognitive perspective explains this condition.

There are three main different hypotheses explaining dyslexia from a cognitive perspective, phonological processing deficit, visual deficit and automaticity and rate of processing hypothesis.

Phonological processing deficit hypothesis relates to an individual having difficulties with tasks which require short-term memory processing specifically in relation to phonological aspects of reading. It is the second stage of learning to read, alphabetic decoding strategies where the child needs to use phonological processing. If a child has phonological difficulties they would have problems separating and using sounds in words. Bradley and Bryant (1978) have shown that children with reading difficulties often also have problems with rhyming words. This may be evidence that children have problems isolating the phonemes and comparing them to other words. Short-term memory processing involves both the encoding and retrieval of information and this cognitive hypothesis does not indicate where there may be problems in this process. Another aspect in memory is the transfer of information into the long-term memory. The length of time that information is stored in the short-term memory is very short before being transferred to the long-term

memory. This could well hold implications for problems associated with transfer or retrieval of information from the long-term memory in those people with dyslexia. This hypothesis provides a reasonable explanation as to why an individual maybe experiencing problems with phonology however it has not provided an explanation as to why this maybe occurring. It also fails to explain other aspects associated with dyslexia for example why people with this condition muddle-up letters or spell words with letters in the wrong order.

The visual deficit hypothesis addresses this issue. Orton noticed that children with reading difficulties often wrote letters back to front or when spelling would write the word with the letters in the incorrect position. He suggested that this could be to a problem in the visual processing component of the brain. The visual processing unit in the brain again involves the receiving of input, processing the information and then using the information appropriately. Language in most adults is associated with the brain's left hemisphere. Orton proposed that in children with reading difficulties the left and right hemispheres of the brain had not completed the specialization procedure. This could mean that more than one area or hemisphere of the brain is playing a part in the language process. If this is the case there maybe more connections than usual associated with linking the visual and language processes in the brain which may lead to the problems displayed by people with dyslexia.

Seymour (1986) proposed that the written aspect of language was also affected by the visual processing area of the brain. He believed that the visual processing aspect of dyslexia could also be independent from the phonological difficulties experienced by some readers. This adds the dimension that people may have different types of dyslexia with varying degrees of problems associated with each individual. It is claimed that the majority of cases of dyslexia involve problems with the phonological area but in 70% of dyslexic cases there is also a mild visual processing deficit (Wood and Richardson, 2002).

There have also been suggestions that letter reversals may be due to a problem in the auditory-visual system. In this situation the child would have difficulties associating the phoneme in their head with the grapheme , what they hear in their head to what they see on paper (Shaywitz et al. 1998). This suggests that in some cases of dyslexia the problems associated with reading could be a breakdown in the communication between the auditory, visual and phonological systems in the brain.

This hypothesis again provides a reasonable explanation for how the breakdown in the visual processing unit maybe responsible for the difficulties experienced by individuals with dyslexia. It fails however to give an explanation as to why this unit in the brain is not functioning as would be expected.

These first two hypotheses focussed on very specific areas of difficulty. The final hypothesis is more general and centres on the problems associated with the automization of skills. When a skill becomes automatic it can be completed at a quicker rate and usually without the individual consciously completing it. Skills which become automatized are also less likely to breakdown in stressful situations. Reading and writing are highly complex skills and if a child has difficulty automatizing these skills then they are going to take longer to complete tasks using them. Nicholson and Fawcett (1990, 1994) found that very able dyslexics found written work and reading more arduous than their contemporaries. It has also been shown that some dyslexic individuals also have difficulty automatizing other complex skills such as riding a bike (Wood and Richardson, 2002).

Automaticity is assessed using a Rapid Automatized Naming Task (RAN). These tasks involve an individual naming letters, pictures, numbers or colours as quickly as possible. There are two types of tasks, discrete and serial. Discrete tasks involve the individual being presented with items one at a time and the time is recorded for each individual answer. In the serial task the individual is presented with all the items and the time is recorded for finishing the whole task. Those individuals with reading difficulties have been shown to perform less well on the serial RAN tasks (Wood and Richardson, 2002).

It has been proposed by some researchers that the retrieval of names is still associated with phonological deficit (Wood and Richardson 2002). Wolf and Bowers (1999) suggest that difficulties in this area can be separate from phonological problems. They suggest that there are three different types of people with reading difficulties. A phonological group who show a phonological deficit but have no problems on the RAN task, a group which show a RAN deficit but have no problems phonologically and a double deficit group which have problems in both areas and the greatest reading difficulties. The lack of automatization of skills provides a good account for the behaviour displayed by people with this condition, however, there are also other possibilities (perception, attention deficit and fatigue) which may effect the results in the RAN task. As mentioned earlier dyslexia can co-exist with other conditions one of which is attention deficit which may be contributing to the poor score (Wood and Richards on 2002). This hypothesis again fails to account for why an individual is having difficulty automatizing skills.

These cognitive hypotheses have all provided an explanation for dyslexia however they have not completed the whole picture. The cognitive hypotheses have provided an explanation as to how the processes involved in reading and writing could be causing a problem for people with dyslexia but they have not provided an answer to why the problems are there.

The cognitive element of dyslexia needs to be viewed along with the other aspects of Frith's model in order to provide a more complete picture of the problem. The behavioural element provides insight into where the person maybe having difficulties and also helps inform whether the remedial action being used is helping.

The biological element of the model can also not be ignored. There are many instances that psychological problems such as stress can manifest themselves as physical, biological problems so the idea that biological problems cannot affect psychological areas cannot be ignored. There are many biochemical factors which may effect that way are brain works and how efficiently processes are carried out including functions such as cell signalling. If there is a lack of a particular substance in the brain which helps each neuron to communicate with each other than there may well be a breakdown in the brain's systems. This may not only help provide an explanation as to why times maybe slower on the serial RAN task but also why other processes in the brain are having problems. This may even be as simple as a lack of a certain food group from the diet or the body not processing a certain food group so that there is a lack of this essential substance in the brain.

The cognitive deficit plays an important role in providing a possible explanation for the behaviour which is displayed by an individual and also explanations as to how the brain may be functioning. The cognitive

aspect, however fails to provide an explanation as to why the bra in is not functioning as would be expected. This is where the biological aspect may provide an insight especially with modern non-invasive brain imaging techniques. All three theories need to be used to complement each other and provide a fuller picture of any given case of dyslexia.

Word Count: 2154

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