TO PARSE, TRANSLATE AND TO BLEND: ANALYSIS OF NONLEXICAL READING IN DEVELOPMENTAL DYSLEXIA

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Introduction

Temple (1985, 1997) has proposed a model of reading which specifies different subsystems operating on the nonlexical reading route: a graphemic parser, in which words are segmented into graphemic chunks, a translator, which translates the graphemic representation into a phonological representation, and a blender, which combines phonological segments into an integrated phonological output (see Fig. 1).

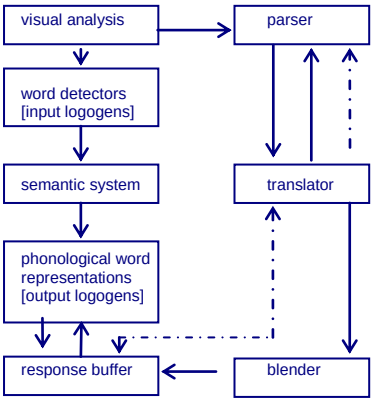

Figure 1 Model of lexical and nonlexical reading (Temple, 1985).

According to Temple, errors in reading can be classified and attributed to the proposed components. In addition, she suggested that qualitative differences of nonlexical reading in developmental dyslexia can be attributed to selective impairments of the parser, translator or blender.

The aim of the present study was to analyse reading errors in a case of developmental dyslexia according to the proposed model. It was hypothesized that difficulties in developing nonlexical reading can be explained with respect to disturbed subsystems operating on the nonlexical route.

For the analysis of errors, an error classification following Temple (1985, 1997) was adapted for German (see Table 1).

Proposed component	Expected error types
Parser	-incorrect segmentation in graphemic chunks
Translator	-substitutions -additions
Blender	-repetitions -position errors -omissions of graphemes (previously named)
Other	-omissions of graphemes (not previously named) -additions - non-classified

Table 1 Error classification with respect to the components operating on the nonlexical reading route.

Method

Participant

OL is a right-handed monolingual German speaking boy with severe developmental dyslexia. At the time of investigation, he was 10 years old. OL has no neurological history, but a familial history of developmental dyslexia. His nonverbal IQ is within normal range (CFT 20, IQ= 93). Digit span is reduced (4 digits forwards, 3 digits backwards.)

Material

An extensive assessment based on a commonly accepted cognitive model of reading (Patterson, 1988) was administered. Tasks included visual and auditory discrimination, lexical decision, synonym judgements, picture naming, various phonological processing tasks, as well as word and non-word reading. In order to reveal normal and impaired performance levels for OL, all results were compared with the performance of a 8;6 year old control child.

Results

Quantitative analysis

The results of the assessment revealed normal performance for auditory nonword discrimination, auditory lexical decision, synonym judgements and picture naming. In contrast, the development of graphemic skills are severely impaired as shown by results which differed significantly from those of the control child. In addition, nonlexical phonemic processing, such as blending of auditorily presented phonemes, was impaired. Results of tasks tapping graphemic and phonological processing are shown in Table 2.

Task	correct	%
Visual discrimination of nonwords, (1 sec.)	56/72	77,8%
Visual lexical decision	39/80	48,75%
Naming of graphemes	17/30	56,7%
Reading regular and irregular words	1/71	1,4%
Reading nonwords	0/42	0%
Blending of auditorily presented phonemes	0/20	0%

Table 2 Results (number of correct responses) for graphemic and phonological processing tasks.

Table 2 shows that OL can neither read words nor nonwords. However, naming of single graphemes is significantly better than reading words and nonwords (Fisher's exact, two-tailed, p<.000).

Qualitative analysis

OL's reading of words and nonwords can be described as sounding out graphemes one-by-one with a failure to combine the sounds into an integrated output. As shown in Table 3, the different processing strategies operating on the non-lexical route are mirrored by OL's phonological approximations.

MANDEL	[m . . ma: . . n n na: . 'na:na: .] was ist das, ein [d]? [na: . da: . na: da: .] und . [e:] . . [le:: . le: . **'le:le:**]

Table 3 Example of reading the word "Mandel" (almond).

OL's incorrect responses were mostly nonword reactions, both in word and nonword reading (74% and 88%, respectively). In order to attribute reading errors to the components of the nonlexical reading route, the last reaction of OL's phonological approximations was analysed and classified as demonstrated in Table 1.

The qualitative analysis included 78,6% of errors in word reading and 84,3 % of errors in nonword reading. Figure 2 depicts the error classification and it's attribution to the parser, translator and blender.

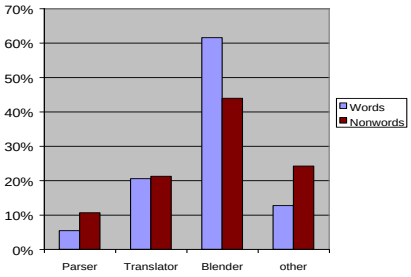

Figure 2 Attribution of error types to the parser, translator and blender.

The analysis revealed that the majority of errors occur either at the level of the parser, the translator or the blender. Comparison of error types show that blender errors occur significantly more often than translator or parser errors (see Table 4). This is in line with the inability to blend auditorily presented phonemes.

	Parser	Translator
Blender (word reading)	p < .000	p < .000
Blender (nonword reading)	p < .000	p < .001

Table 4 Comparison (Fischer's exact, two-tailed) of the amount of errors resulting from malfunctioning of the parser, blender and the translator.

The majority of blender errors are omissions, followed by position errors and repetition of phonemes.

Summary

The present study provides a detailed analysis of a single case with developmental dyslexia with reference to the cognitive-neuropsychological model of reading proposed by Temple (1985; 1997). The assessment revealed that OL could neither read words nor nonwords. His reading errors, resulting from a nonlexical approximation strategy were attributed to the components of the parser, translator, and blender. Errors occurred at each of the proposed subsystems. Significantly more errors occurred at the level of the blender than at the other two processing levels.

Conclusion

It is concluded that the main cause for OL's inability to develop a nonlexical reading strategy results from an impairment in the development of the blending-mechanism. We propose that the model by Temple (1985, 1997) provides a useful framework to assess developmental reading disorders. Further studies are needed to specify whether the proposed subsystems can be independently impaired and to what extent an interaction between the blender and the response buffer is assumed.

References
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