

## **Treating written verb and written sentence production in an individual with aphasia: A clinical study**

### **Background**

Written language is an important communication modality for some people with aphasia. Although there has been some important work in this area (e.g. Mitchum, Haendiges & Berndt, 1993; Jacobs & Thompson, 2000; Murray & Karcher, 2000; Robson, Marshall, Chiat & Pring, 2001; Murray, Timberlake & Eberle, 2007) the effectiveness of treatments for written verbs and written sentences is less well explored in comparison to treatments for spoken verb and sentence production deficits (e.g. Raymer & Ellsworth, 2002; Thompson & Shapiro, 2005). Verbs are a notoriously difficult word class for many people with aphasia (Zingeser & Berndt, 1990; Thompson, Lange, Schneider, & Shapiro, 1997) compromising their ability to construct sentences. This clinical study describes the efficacy of a relatively brief treatment which targeted the written verb and written sentence production of an aphasic individual. This study was undertaken in the context of current clinical practice in the UK, using a model of service delivery whereby the aphasic speaker is seen by the clinician once a week for a block of 10 weeks. The framework guiding our intervention was the model of spoken sentence production proposed by Bock and Levelt (1994). Treatment was targeted at the functional level of the model so attention was given to the order of two content word classes (nouns and verbs) in an elementary sentence frame (e.g. *boy kicking ball*). Function words were omitted on the assumption that these are produced at the positional level.

### **Method**

*Participant:* At the time of the study, LW was a 63 year old woman who had suffered a left middle cerebral artery infarct at the age of 56. This resulted in moderate to severe aphasia which affected understanding of language and a moderate to severe apraxia of speech. The severity of her spoken language output was difficult to assess due to the marked apraxia of speech but LW had very limited spoken language. She was right handed, had no hemiplegia and had good limb motor control and manual dexterity. Hearing and vision were within normal limits. LW's spontaneous writing was restricted to single nouns which were orthographically correct on most occasions and she communicated through writing, drawings, some residual speech and non-verbal means. Table 1 shows her written language abilities pre-treatment. The tests we used are for spoken language which we adapted for written language.

*Design of the study:* A multiple-baseline across behaviours experimental design was used with three phases: Baseline, treatment and maintenance. At the baseline phase two baselines for the stimuli were taken, each a week apart, before the beginning of treatment. This was followed by a treatment phase (10 weekly sessions) and a maintenance session, 3 weeks after the end of treatment. A control task, letter spelling to dictation, was also used.

*Treatment aims and tasks:* (1.) To improve written production of 12 intransitive and 15 transitive verbs. (2.) To improve the production of written subject-verb (SV) sentences. (3.) To improve the production of written subject-verb-object (SVO) sentences. For aim 1 LW had to write the action depicted in a picture. For aims 2 and 3 she had to write a sentence (the elementary type described earlier) in response to pictures. The same sets of verbs and pictures were used throughout the intervention which were selected from Druks and Masterson (2002). All tasks were attempted at every session. Feedback involved orthographic cueing of the first letter of the verb (or noun) and copying the whole verb (or noun) if cueing was unsuccessful.

Colour coding and numbering of words was used to demonstrate the order of sentence constituents.

## Results and Discussion

LW's response to the verb treatment is shown in figure 1 while her response to the sentence treatment in figure 2. The keys to the figure notations are: B1 and B2 are the two baselines, T1-T10 charts progress at each treatment session and M is the post-treatment maintenance phase. The results from the post-treatment assessments are shown in table 1 together with the corresponding statistical analyses comparing pre- and post-treatment. We now discuss the results relating to each of the aims.

*Aim 1:* At the baseline phase (figure 1) LW had little success in writing intransitive (B1, 25%; B2, 17%) and transitive verbs (B1, 20%; B2, 26%). At maintenance (M), three weeks later she was still able to write correctly 75% of the intransitive and 80% of transitive verbs. Treatment of transitive verbs did not start until she was 80% correct with intransitive verbs (T2).

*Aim 2:* Production of SV sentences (figure 2) began to improve from T1 onwards (58%) and continued throughout treatment with little variation. At maintenance phase (M) there was a small decline in performance (75% correct) but it was still at a high level in comparison to T1 and baseline phase (B1, 25%; B2, 17%).

*Aim 3:* Production of SVO sentences (figure 2) followed a similar pattern to sentence with intransitive verbs although these sentences were more challenging. At the maintenance phase (M) there was a decline in LW's ability to write SVO sentences (40%) suggesting that they were more difficult than SV sentences. Although she would begin the sentence with a subject she would continue with the object before writing the verb (e.g. *the man the car driving*).

In addition to these improvements which were the focus of treatment, LW's ability to write verbs not targeted in treatment also improved. Her performance on the written action naming (table 1, VAST) improved (28% to 55%), a statistically significant change. There was also a non-significant improvement (55% to 73%) in her ability to write nouns (PALPA) and no improvement in the control task, spelling of single letters to dictation. There was no change in her ability to write grammatically correct sentences (sentences with all function words present) in the sentence construction subtest of the VAST (nor was this something that was targeted in treatment). However, there was a subject in all 20 erroneous responses in this task while (100% post-treatment vs. 45% pre-treatment).

LW was trained to produce an elementary sentence frame which lacked function words (tense morphology in particular). A similar response to treatment was also noted for the speaker Mitchum and colleagues (1993) reported. The difference between our treatment and that of Jacobs and Thompson (2000) and Murray et al. (2007) is that both functional and positional level processes were targeted in the latter treatments with consequent improvements in both levels. We propose that treatment at positional level might follow once the functional level has been established (cf. Mitchum et al., 1993). In conclusion, the treatment, albeit brief, resulted in marked changes in LW's ability to write verbs and sentences using an elementary sentence frame and other positive changes made her a more effective communicator.

## References

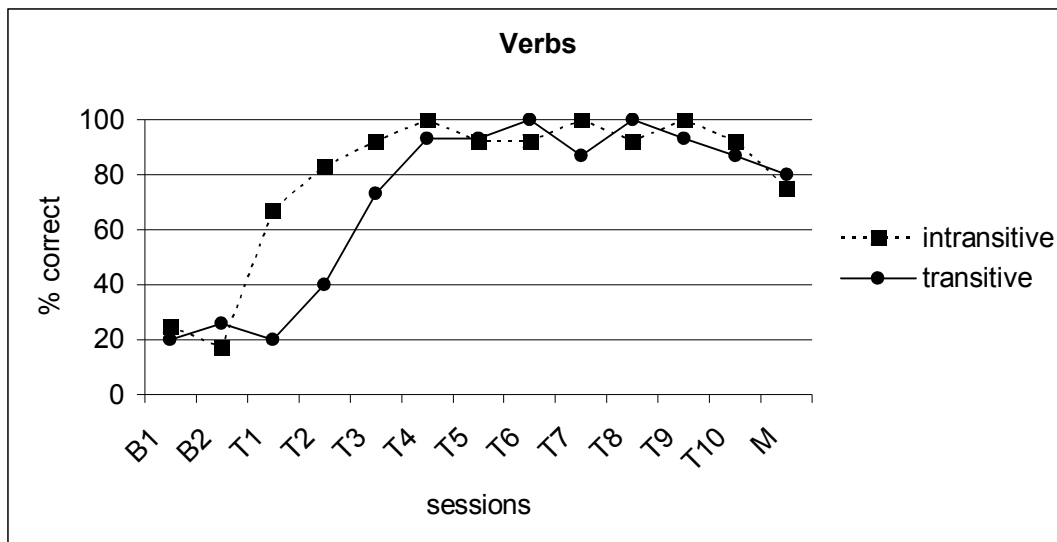
- Bastiaanse, R., Edwards, S., & Rispens, J. (2002). *Verb and sentence test*. Bury St. Edmunds, UK: Thames Valley Test Company.
- Bock, K., & Levelt, W. (1994). Language production: Grammatical encoding. In M. A. Gernsbacher (Ed.), *Handbook of psycholinguistics*. San Diego, CA: Academic Press.
- Druks, J., & Masterson, J. (2000). *Object and action naming battery*. Hove, UK: Psychology Press.
- Jacobs, B. J. & Thompson, C. K. (2000). Cross-modal generalization effects of training noncanonical sentence comprehension and production in agrammatic aphasia. *Journal of Speech, Language, and Hearing Research*, 43, 5-20.
- Kay, J., Lesser, R., & Coltheart, M. (1990) *Psycholinguistic assessment of language processing in aphasia (PALPA)*. Hove, UK: Psychology Press.
- Mitchum, C. C., Haendiges, A. N., & Berndt, R. S. (1993). Model-guided treatment to improve written sentence production: A case study. *Aphasiology*, 7, 71-109.
- Murray, L. L., & Karcher, L. (2000). A treatment for written verb retrieval and sentence construction skills. *Aphasiology*, 14, 585-602.
- Murray, L. L., Timberlake, A., & Eberle, R. (2007). Treatment of underlying forms in a discourse context. *Aphasiology*, 21, 139-163.
- Raymer, A. A., & Ellsworth, T. A. (2002). Response to contrasting verb retrieval treatments: A case study. *Aphasiology*, 16, 1031-1045.
- Robson, J., Marshall, J., Chiat, S., & Pring, T. (2001). Enhancing communication in jargon aphasia: A small group study of writing therapy. *International Journal of Language and Communication Disorders*, 36, 471-488.
- Thompson, C. K., Lange, K. L., Schneider, S. L., & Shapiro, L. P. (1997). Agrammatic and non-brain subjects' verb and verb argument structure production. *Aphasiology*, 11, 473-490.
- Thompson, C. K., & Shapiro, L. P. (2005). Treating agrammatic aphasia within a linguistic framework: Treatment of underlying forms. *Aphasiology*, 19, 1021-1036.
- Zingeser, L. B., & Berndt, R. S. (1990). Retrieval of nouns and verbs in agrammatism and anomia. *Brain and Language*, 39, 14-32.

**Table 1** Pre- and post-treatment assessments

Tests	Scores		
	<i>pre-treatment</i>	<i>post-treatment</i>	<i>p values</i>
written action naming <sup>1</sup>	28% (11/40)	55% (22/40)	( $\chi^2$ (1) = 6.241 p < .01)
written object naming <sup>2</sup>	55% (22/40)	73% (29/40)	( $\chi^2$ (1) = 2.650 n.s.)
written sentence construction <sup>1</sup>	0% (0/20)	0% (0/20)	N/A
letter spelling to dictation	53% (8/15)	40% (6/15)	( $\chi^2$ (1) = 5.36 n.s.)

<sup>1</sup> Bastiaanse, Edwards & Rispens (2002) <sup>2</sup> Kay, Lesser & Coltheart (1990)

**Figure 1** Verbs



**Figure 2 Sentences**

