A semantic treatment for Cantonese anomic individuals with different underlying impairments

Anomia is one of the most common features of language disorders subsequent to brain injuries. Because of its pervasiveness and persistence, numerous studies of different treatment approaches have been conducted on anomic patients with deficits to different loci in the lexical system. A comprehensive and critical review of anomia treatment studies shows that while most therapies are able to enhance a patient's naming performance, they vary greatly in terms of their effect to generalize to untreated stimuli or whether the effect is long-lasting (Nickels, 2002). To better our understanding of the interaction between task and impairment, which is essential to the development of a theory of rehabilitation, Howard (2000) has proposed to apply the same treatment to patients with different underlying impairments and examine how they respond to the therapy. The present study continued the work of Law et al. (in press). It replicated their treatment protocol on two Cantonese anomic subjects, both with moderate semantic deficits but differing in other language aspects. Through pooling the results of these two studies, two questions were answered. Law et al. concluded that the extent of semantic impairment could predict how well a patient would respond to the combination of semantic feature analysis (SFA) and semantic priming; this study extended the examination of this relationship to individuals with moderate semantic disruption. In other words, would anomic speakers with moderate degrees of semantic deficits respond positively to the therapy? Furthermore, would the extent of semantic impairment remain the key factor in determining treatment success? For ease of reference and comparison, in reporting the findings of the two patients in this study, we also include information on the three subjects in Law et al. wherever it is appropriate.

Method

Subjects

Two Cantonese brain-injured individuals, YYW and TWT, with naming difficulties were invited to participate in this treatment study. Their background information, along with that of the three participants in Law et al. (in press), is given in Table 1. The performance of YYW and TWT on various tasks during initial assessments is shown in Table 2. The language and memory deficits of the anomic subjects are hypothesized and summarized in Table 3. The disruptions of YYW and TWT were quite similar except phonological output. An important difference between them was the level of naming disorder. Taking all the subjects together, with the exception of phonological input in which the subjects were at most mildly impaired, they exhibited various degrees of disruption in the other four aspects.

Table 1 about here

Table 2 about here

Table 3 about here

Treatment design

A multiple baseline design was used consisting of a baseline, two treatment phases, and a maintenance phase.

Three baseline sessions were carried out within two weeks. In each session, the anomic subject was asked to name 256 pictured objects. Those pictures that the subject could name correctly no more than once were selected for further assignment to treated, generalization, and control items. Stimuli with high familiarity ratings were trained (Treatment phase 1) before ones with low familiarity (Treatment phase 2). Passing criterion from one treatment phase to the next was at least 85% correct on treated items over three consecutive sessions. If the subject failed to reach criterion within 20 sessions, therapy would be withdrawn.

If the subject could complete both treatment phases, he would proceed to the maintenance phase consisting of three weekly sessions in the second, third, and fourth week after the last treatment session.

To find out whether significant improvement was made in naming treatment, generalization, and control probes, and whether greater progress was seen in naming one probe type over another, the McNemar's test and the Chi-square test were used, respectively.

<div align="center">Results</div>

As mentioned earlier, Law et al. (in press) suggested that the degree of semantic deficits greatly determined whether an anomic patient would benefit from SFA. Given that both YYW and TWT had moderate semantic impairments, the prediction would be similar treatment outcomes for both subjects, positive or not. However, contrary to expectations, different treatment results were found for the two subjects. While YYW completed both treatment phases and maintained treatment gains of more than one month after therapy was terminated, TWT did not respond to the intervention. The findings are shown in Table 4. For YYW, significant differences were found for high and low familiarity treatment stimuli between performances before and after the introduction of treatment. The improvement in naming treatment items of both familiarity conditions was greater than generalization and control probes. As for TWT, although he named high familiarity treatment stimuli significantly better after treatment was given, his performance never reached criterion. The therapy was withdrawn after 20 training sessions.

A summary of treatment outcomes of subjects in this study and Law et al. (in press) is given in Table 5. Even though YYW responded positively to SFA, unlike MTK and YSH, his performance on untrained items remained low.

Table 4 about here

Table 5 about here

Discussion

The results of the present study seem to challenge the conclusions in Law et al. (in press). Although YYW and TWT both suffered moderate degrees of semantic disruption, only YYW responded to the treatment. This raises the question whether semantic processing alone can predict treatment success. Second, there was no treatment generalization to untreated items for YYW. In other words, YYW probably had not acquired the strategy of SFA. To identify other factors that may be responsible for the effectiveness of the treatment for YYW, we examine the results of potentially relevant tasks other than those reported earlier. They are given in Table 6, together with their pre-treatment naming accuracies. We noted previously that YYW's naming disorder was less severe than TWT's (70.5% vs. 39.6%). This may be taken to indicate that post-semantic processes, i.e., access from semantics to phonology and the phonological output level, in YYW are in better condition than TWT. The claim about a relatively preserved phonological lexicon is corroborated by the observation that YYW's reading skills are largely preserved whereas TWT is clearly dyslexic. Near-normal functioning at these levels enabled YYW to take advantage of the phonological component of the treatment protocol, i.e., repetition, which trained him to associate specific concepts with their phonological representation. This also explains why his naming performance on untreated items remained low.

Table 6 about here

In conclusion, through comparing the results of the present study and Law et al. (in press), we demonstrated the soundness of the approach advocated in Howard (2000). Further insights were gained into the relation between language deficits and the combined treatment of SFA and semantic priming. In addition to semantic disruption, the conditions of post-semantic processes, in particular the phonological output level, also determined treatment outcomes.

References

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Table 1

Background information on YYW and TWT of this study and the subjects, MTK, YSH, YKM, in Law et al. (in press)

	MTK	YSH	YYW	TWT	YKM
Age	40	71	60	46	61
Gender	Male	Female	Male	Male	Male
Education	9 years	9 years	12 years	11 years	University degree
Onset date	September 1994	August 2000	May 2004	April 1999	1st stroke – 1992; 2nd stroke – January 2002
Etiology	Traumatic brain injury with left parietal epidural haematoma	Ischaemic stroke with huge left parietal frontal infarct involving Broca's and Wernicke's areas	Left MCA infarct	Left putaminal haemorrhage without ventricular extension	1st stroke – sub-arachnoid haemorrhage; 2nd stroke – left basal ganglion haemorrhage
Motor/sensory impairment	Right hemianopia, left hemiparesis, apraxia of speech	Nil	Right hemiparesis, mild dysarthria	Right hemiparesis, mild dysarthria	Right hemiparesis, mild dysarthria
Permorbid occupation	Worker in a photo shop	Accounting	Accounting	Businessman	Broker

Table 2

Results of initial assessments

	MTK	YSH	YYW	TWT	YKM
Auditory discrimination (n = 40)	40 (100%)	39 (97.5%)	39 (97.5%)	40 (100%)	37 (92.5%)
Repetition (n = 30)	16 (53.3%)	12 (40.0%)	29 (96.7%)	25 (83.3%)	28 (93.3%)
Verbal semantic tests					
Oral naming (n = 217)	80 (36.9%)	28 (12.9%)	153 (70.5%)	86 (39.6%)	71 (32.7%)
Spoken word-picture matching (n = 126)	120 (95.2%)	120 (95.2%)	117 (92.9%)	112 (88.9%)	102 (81.0%)
Synonymy judgment (n = 60)	55 (93.2%)	48 (80%)	50 (83.3%)	51 (85%)	43 (71.7%)
Non-verbal semantic tests					
PPT (n = 37)	35 (94.6%)	31 (83.8%)	30 (81.1%)	31 (83.3%)	22 (56.5%)
BORB (n = 23)	22 (95.7%)	21 (91.3%)	15 (65.2%)	18 (78.3%)	15 (65.2%)
Memory tests					
Digit forward sequence	5	2	6	7	8
Chinese Rey Auditory Verbal Learning Test					
Immediate recall (n = 75)	17		18	24	12
Delayed recall (n = 15)	4		0	3	0
Recognition (n = 15)	13		10	7	9

Note. YSH was unable to carry out the verbal learning test.

Table 3

Hypothesized nature of impairment in YYW, TWT, and subjects in Law et al. (in press)

	MTK	**YSH**	**YYW**	**TWT**	**YKM**
Phonological input	Preserved	Largely preserved	Largely preserved	Preserved	Mildly impaired
Phonological output	Moderate	Severe	Largely preserved	Mildly impaired	Largely preserved
Semantic processing	Very mild	Mild	Moderate	Moderate	Severe
Phonological memory	Moderate	Severe	Mild	Mild	Preserved
Verbal memory (Recognition)	Largely preserved	--	Severe	Severe	Severe

Table 4

Results of statistical analyses

	YYW	
	Phase I (High familiarity items)	*Phase II (Low familiarity items)*
Treatment items	26.7% (B2) vs. 100% (T7)**	26.7% (B1) vs. 100% (T19)**
Generalization items	33.3% (B3) vs. 40% (T3)	26.7% (B3) vs. 33.3% (T14)
Control items	33.3% (B2) vs. 41.7% (T14)	
Treatment vs. generalization	100% (T7) vs. 40% (T3)**	100% (T19) vs. 33.3% (T14)**
Treatment vs. control	100% (T7) vs. 41.7% (T14)**	100% (T19) vs. 41.7% (T14)**
Generalization vs. control	40% (T3) vs. 41.7% (T14)	33.3% (T14) vs. 41.7% (T14)

	TWT	
	Phase I (High familiarity items)	*Phase II (Low familiarity items)*
Treatment items	21% (B3) vs. 79% (T17)*	NA
Generalization items	21% (B2) vs. 43% (T4,T8,T10,T16)	NA
Control items	12.5% (B2) vs. 31% (T11)	
Treatment vs. generalization	79% (T17) vs. 43% (T4,T8,T10,T16)	NA
Treatment vs. control	79% (T17) vs. 31% (T11)	NA
Generalization vs. control	43% (T4,T8,T10,T16) vs. 31% (T11)	NA

Note. B = baseline, T = treatment, NA = non-applicable.

* $p < 0.05$, ** $p < 0.005$.

Table 5

Summary of treatment outcomes of YYW, TWT, and subjects in Law et al. (in press)

	MTK	YSH	YYW	TWT	YKM
Phase I – High familiarity	Completed	Completed	Completed	No	No
Phase II – Low familiarity	Completed	Completed	Completed	No	No
Generalization to semantically related probes	Yes	Yes	No	NA	NA
Generalization to control items	Yes	Yes	No	NA	NA
Maintenance of treatment gains	Yes	No	Yes	NA	NA

Table 6

Performance of YYW and TWT on oral naming and reading aloud

	YYW	**TWT**
Oral naming before treatment (n = 217)	153 (70.5%)	86 (39.6%)
Reading aloud object names (n = 217)	215 (99.1%)	124 (57.1%)
Reading aloud single words (n = 390)	361 (92.6%)	129 (33.1%)

Note. The single words were items from various word lists described in Law and Caramazza (1995).