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Proverb interpretation in fluent aphasia and Alzheimer's disease: implications beyond abstract thinking

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Abstract

This study compared proverb processing across three groups, i.e. patients with fluent aphasia (APH), patients with Alzheimer's Disease (AD), and normal control subjects (NC). Proverb stimuli were used to examine the effects of group membership and proverb familiarity in two presentation formats (i.e. spontaneous versus multiple-choice) on performance. The sensitivity of linguistic and cognitive measures as predictors of ability to interpret proverbs was also investigated. In relation to NC subjects, patients with fluent APH exhibited significant difficulty formulating responses for familiar and unfamiliar spontaneous proverbs, whereas patients with AD demonstrated lower performance only on the unfamiliar proverbs. On the multiple-choice paradigm, however, patients with APH exhibited minimal difficulty. Conversely, the patients with AD manifested significant problems selecting the correct abstract response for familiar proverbs. With regard to predictors, language was relevant to familiar proverb interpretations and to proverbs presented in the spontaneous format. Cognition was a sensitive predictor for unfamiliar proverb interpretations and to the multiple-choice format. Deficits on the proverb tasks are discussed with reference to the potential breakdown of underlying linguistic and cognitive processes. The present data support the diagnostic value of proverbs in elucidating brain–behaviour relationships.

Introduction

Proverbs have been utilized extensively as a diagnostic tool across a variety of disciplines including psychiatry, neurology, psychology, and speech–language pathology. Proverbs are familiar, fixed, sentential expressions that convey well-known truths, social norms, or moral values (Abraham 1968, Mieder 1985, 1993, Norrick 1985, Seitel 1969). They are commonly used as a brief test to evaluate an individual's ability to think abstractly and aid in the diagnosis of dementia.

Van Lancker (1990) suggests that abstract thinking is the highest level of cognitive functioning which may be evaluated using proverbs. Gibbs and Beitel (1995), however, challenge the commonly held assumption that correct proverb interpretation is directly linked with the ability to think abstractly. They argue that

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successful proverb interpretation is not necessarily represented in the abstract explanation, but more completely in concrete, detailed interpretations of the figurative sayings. Indeed, proverbs take their generic meaning from a number of specific contexts as exemplified by interpretations of the proverb: 'Don't count your chickens before they're hatched'. This is typically interpreted in the context of spending money prematurely, but could also be applied to context such as a job search or the permanence of a relationship. Since proverbs may have multiple meanings, depending on context, the creative aspect of proverb interpretation must be taken into account when judging the adequacy of a response.

Aphasiologists argue that individuals with aphasia may have difficulty conveying the abstract meaning for proverbs due to limitations in verbal expression rather than primary deficits in abstract thought (Van Lancker 1990). On the other hand, since language and cognition are intricately interrelated, a deficit in one domain may diminish performance in the other.

Certain linguistic and cognitive abilities serve as prerequisites for formulating correct abstract interpretations for a proverb task. Van Lancker (1990) states that, to produce an adequate interpretation of a proverb, the patient must have knowledge of the non-literal item, adequate grammatical skills, sufficient verbal expression, the metalinguistic ability to produce a definition, and the cognitive ability to make inferences. At a linguistic level, interpreting a proverb relies on the ability to manipulate the semantic, syntactic, and pragmatic systems. From the semantic system one must understand the language, then access the lexicon to verbally construct a conceptualization of the non-literal interpretation. Utilization of the syntactic system is also entailed in expressing the complex relationships between events contained in the proverb (Ulatowska *et al.* 1995). Pragmatically, the context to which the metaphorical meaning applies must be appreciated to comprehend the intended meaning.

At a cognitive level, correct proverb responses involve the recognition of the metaphorical aspects of proverbs and the use of inferencing to tie this metaphorical meaning to various contexts (Gibbs and Beitel 1995). The process of accessing the non-literal meaning differs for familiar versus unfamiliar proverbs. For familiar proverbs, access to the non-literal meaning may be more automatic and direct than accessing the metaphorical meaning for unfamiliar proverbs, thus requiring less inferencing (Van Lancker 1990). Some have postulated that familiar proverbs are stored in semantic memory as a unit similar to a lexical item (Van Lancker 1990). For unfamiliar proverbs the individual may have to access the literal meaning prior to the non-literal meaning, placing greater demands on working memory than those required for familiar proverbs. Thus, familiar proverb interpretation may involve semantic memory, whereas the unfamiliar proverb task relies more heavily on working memory and problem solving. Working memory is also implicated when the proverb is presented in a multiple-choice format since an individual must consider the various selections of a multiple-choice task while simultaneously holding the target proverb in memory.

In this paper we examine whether discourse-specific profiles can be identified for individuals with fluent aphasia (APH) and patients with Alzheimer's disease (AD). Despite similar discourse disturbances (Blanken *et al.* 1987, Nicholas *et al.* 1985, Mathews *et al.* 1994) and shared involvement of left posterior brain regions, the inherent disparity between cognitive and linguistic abilities between AD and APH groups is likely to have a differential effect on proverb interpretation (Kempler *et* *al.* 1988). As alluded to above, proverbs provide a unique discourse text. Although a proverb is conveyed through a single statement, the saying represents a discourse text because the non-literal meaning is directly associated with various rich contexts (Gibbs and Beitel 1995).

The purpose of this study was to compare proverb interpretation across patients with fluent APH, patients with probable AD, and normal control (NC) subjects. Our primary goal was to investigate the effects of group diagnoses, proverb familiarity, and interaction of these two variables in two presentation formats (i.e. spontaneous and multiple-choice) on proverb interpretation. Additionally, we examined the level of linguistic and cognitive competence associated with successful proverb interpretation.

Methods

Subjects

Subjects consisted of three groups: 10 adults with fluent APH, 10 adults with AD, and 10 NC adults. These subjects were drawn from a larger study examining discourse processing in various populations. The APH and AD subjects were selected based on a mild/moderate level of severity. Additionally, in order to be considered for our study, subjects were required to exhibit some level of verbal abstraction ability by attaining a minimum scaled score of 6 on the Similarities subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R, Wechsler 1981). The characteristics of the three study groups are summarized in Table 1.

For patients diagnosed with APH, early brain scan studies (i.e. CT and MRI) supported the supposition of a single posterior lesion in eight of the 10 cases. Brain imaging results were not available for the other two patients with aphasia; however, case history information indicated a single cerebrovascular incident. The severity of each subject's APH was estimated using the aphasia severity rating scale from the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan 1983). APH type and severity judgements were based on analysis of test results and tape-recorded spontaneous speech samples. Severity ratings for the APH group ranged from 3 to 4, indicating mild to high-moderate levels of impairment. The group consisted of patients with fluent APH who had adequate auditory comprehension to perform the experimental tasks. A relatively high level of receptive ability was confirmed by a score of 9 or greater out of a possible 12 points on the Complex Ideational Material subtest of the BDAE for each subject. These patients displayed verbal behaviours characteristic of fluent APH as defined by Goodglass and Kaplan (1983) including facility of articulation, long strings of words, and a variety of grammatical markers.

The diagnosis of probable AD was made by the University of Texas Southwestern Medical Clinic for Alzheimer's and Related Diseases, based on neurological, cognitive, and behavioural testing using National Institute of Neurological and Communicative Disorder ADRDA criteria (McKhann *et al.* 1984). Patients demonstrated a mild to high-moderate severity level as evidenced by the Clinical Dementia Rating (CDR) (Hughes *et al.* 1982), Mini-Mental State Examination (MMSE) (Folstein *et al.* 1975) scores, and by maintenance of daily activities. At the time of testing, AD patients were still managing household affairs, making business and financial decisions, and driving.

Table 1. Group characteristics and performances on tests of cognition and language

Variable	APH (SD) Mean (SD)	AD Mean (SD)	NC Mean (SD)	p Value	Multiple comparison
Demographic					
Age	65·4 (7·73)	64·7 (8·60)	65·3 (8·66)	0·9824	NS
Education	15·4 (2·12)	15·2 (3·65)	15·8 (2·10)	0·8819	NS
Gender	6M, 4F	5M, 5F	5M, 5F	0·875†	NS
Handedness	10 R	9R, 1L	9R, 1L	0·586†	NS
Cognition					
MMSE	26·10 (2·23)	22·30 (2·83)	29·50 (0·71)	0·0001	AD < APH < NC
Raven	18·70 (2·54)	14·00 (4·27)	21·10 (3·03)	0·0003	AD < APH, NC
Pic. Arr.	10·40 (2·76)	6·00 (4·04)	12·10 (2·92)	0·0017	AD < APH, NC
Block	9·90 (2·56)	6·50 (3·66)	11·40 (3·53)	0·0132	AD < APH, NC
Language					
BNT	24·40 (3·37)	22·30 (5·54)	28·10 (1·52)	0·0079	AD, APH < NC
Sim	10·60 (2·17)	9·75 (1·58)	12·90 (2·42)	0·0107	AD, APH < NC
CIM	10·80 (1·23)	8·88 (2·10)	11·60 (0·70)	0·0013	AD < APH, NC
RSAP	8·80 (1·69)	9·13 (1·13)	9·90 (0·32)	0·1274	NS

Note: Pairwise comparisons for all variables except gender and handedness were performed using a Student–Newman–Keuls multiple comparison.
† A Chi-square analysis was used to compare gender and handedness.

Key: APH = patients with aphasia, AD = patients with Alzheimer's disease, NC = normal controls, MMSE = Mini-Mental State Examination, Ravens = Ravens Coloured Progressive Matrices score, Pic. Arr. = Wechsler Adult Intelligence Score–Revised Picture Arrangement scaled score, Block = Mean WAIS-R Block Design scaled score, BNT = Boston Naming Test total score, Sim = WAIS-R Similarities scaled score, CIM = Boston Diagnostic Aphasia Examination (BDAE) Complex Ideational Material raw score, RSAP = BDAE Reading Sentences and Paragraphs raw score.

The NC subjects had no history of mental decline, brain damage, or other significant disease such as diabetes or cardiovascular problems. The subjects were matched for socioeconomic, educational, and occupational levels allowing for a similar premorbid level of cognitive and linguistic functioning. All subjects across groups were relatively well educated and had professional to semiprofessional occupations prior to disease onset. Age and gender were also taken into account. With two exceptions, all subjects were right-handed, and no individual had a history of institutionalization.

Performances on standardized cognitive and linguistic measures were examined using an analyses of variance, followed by a Student–Newman–Keuls multiple comparison to determine which groups differed. Comparisons of cognitive performance across tasks (Table 1) revealed that AD subjects scored significantly lower than the APH and NC groups on all cognitive measures, whereas the APH group differed significantly from the NC group only on the MMSE.

On linguistic tasks (Table 1), a different pattern emerged. Results from the Boston Naming Test (BNT) (Kaplan *et al.* 1983) and Similarities subtest (WAIS-R) (Wechsler 1981) revealed significantly reduced scores for both the AD and APH populations as compared to the NC group. No significant difference, however, was noted between the patient groups. On the Complex Ideational Subtest (BDAE) (Goodglass and Kaplan 1983) the AD group had significantly lower scores than either the APH or NC groups. Finally, comparison of performance on the Reading Sentences and Paragraphs subtest (Goodglass and Kaplan 1983) revealed no significant difference across groups.

Task

Ten proverbs taken from the California Proverb Test (Delis *et al.* 1984) were administered to each subject in two formats: *spontaneous* and *multiple-choice*. Of the 10 proverbs, five were classified as familiar and five as unfamiliar, based on normative data collected by Delis and colleagues (1984). Sample proverbs and their corresponding multiple choice selections are presented in Appendix A. We have validated the familiarity of the proverbs with the healthy control subjects in our larger study by asking the subject to rate the given proverb's familiarity. For the *spontaneous task*, subjects were required to verbally express their interpretation of each proverb. Each proverb was presented by the examiner verbally and in written form. Responses were audiotaped and transcribed verbatim. The *multiple-choice task* involved four choices (i.e. correct abstract, correct concrete, abstract foil, and semantic foil) provided as possible proverb interpretations. For this latter task, each proverb and its possible answers were presented in written form and read aloud by the examiner. Subjects were instructed to select the best possible answer.

The spontaneous format was always administered prior to the multiple-choice condition. No feedback as to accuracy of response was given under any of the conditions, although general probes for elaboration occurred in the spontaneous conditions in a manner consistent with psychological testing procedures of the WAIS-R, similarities subtest. Carry-over effects are minimized when the spontaneous format is administered first, since the meaning of a proverb can be expressed in a variety of ways. In contrast, exposure to a correct interpretation on the multiple-choice selection would be more likely to constrain or facilitate subsequent performance on the spontaneous task.

Analysis

Response coding

For the primary question regarding differences on familiarity and test format, responses for both spontaneous and multiple-choice formats were scored. Spontaneous interpretations were rated independently by four judges according to accuracy and correctness on a seven-point scale modified from that designed by Delis and colleagues (1984) (see Appendix B). The scale represented a continuum from concrete to abstract interpretation, with 0 signifying an incorrect response and 6 a complete abstract response. The judges scored as correct any response that conveyed the generic sense of the proverb, even though the specific content varied across individuals. Scoring for spontaneous interpretations was based on responses obtained from approximately 150 normal subjects who participated in our larger study of discourse processing. A manual, containing multiple sample responses for each point on the scale, was developed prior to coding our subject's responses, and was consulted to establish consistency of coding across subjects. Reliability of response codings revealed 100% agreement across raters for the NC group, 91% for the AD subjects, and 89% for the APH group. Discrepancies between ratings were discussed until a consensus was achieved. An objective three-point scale was used to quantify correct abstract (two points), correct concrete (one point), and incorrect (zero points) responses for the multiple-choice task as defined by Delis and colleagues (1984).

Statistical analysis

The proverb responses were examined using a repeated-measures analyses of variance with a between-subjects factor of diagnosis at three levels (AD, APH, NC), and repeated factors for Familiarity (at two levels, familiar and unfamiliar) for each testing format (i.e. the spontaneous and multiple-choice conditions). *Post-hoc* analysis was performed using the Student–Newman–Keuls multiple comparison. p-Values were adjusted to control for any lack of homogeneity of variance using a Geisser–Greenhouse correction adjustment (Greenhouse and Geisser 1959). Included in the repeated measures ANOVA is a test for a Familiarity by Diagnosis interaction for each testing format (spontaneous and multiple-choice).

To consider the level of linguistic and cognitive competence on standardized measures associated with successful proverb interpretation two variables were created from the data (i.e. a Language composite and a Cognitive composite). This analysis focused on language and cognitive performance on composite measures regardless of diagnosis. These were created as T-scores (i.e. mean of 50 and standard deviation of 10 over all the data) of the mean of the Z-scores of their components. For Language, the components are sample Z-scores of scaled Similarities (WAIS-R) (Wechsler 1981), BNT (Kaplan *et al.* 1983) total, raw Complex Ideational Material (BDAE) (Goodglass and Kaplan 1983), and raw Reading Sentences and Paragraphs (BDAE) (Goodglass and Kaplan 1983). For Cognitive, the components are sample Z-scores of scaled Block Design (WAIS-R) (Wechsler 1981), scaled Picture Arrangement (WAIS-R) (Wechsler 1981), and *Raven's Coloured Progressive Matrices* (Raven 1962) total. The created variables, Cognitive and Language, were used to predict correct responses for Spontaneous (i.e. proverb rating of 5 or 6 indicative of a complete, abstract interpretation) and Multiple-choice (i.e. score of 2 indicative of selecting the correct, abstract choice) using linear logistic regression. Responses were considered failures for this particular analysis when spontaneous codings were four or below and multiple choice scores were one or zero. The significance of the association is expressed as the Wald chi-square p-value. A threshold was selected for each Cognitive and Language composite for all outcome measures (Spontaneous Familiar, Spontaneous Unfamiliar, Multiple-choice Familiar, and Multiple-choice Unfamiliar) using an ROC (receiver operator characteristic) technique to maximize sensitivity and specificity.

Results

Table 2 shows the results of the ANOVA for the effects of Group (diagnosis), Familiarity of proverb, and the interaction effects of Familiarity and Group separately for the Spontaneous format and the Multiple-choice format. Analyses for the two sampling formats were not combined because the scoring involved different scales, (i.e. Spontaneous (0–6) and Multiple-choice (0–2)). In addition,

Table 2. Results of the repeated-measures ANOVA examining the effects of group, familiarity, and familiarity × group interaction for each of the formats, i.e. spontaneous and multiple-choice

Source	d.f.	MS	*F*	*p*
Spontaneous format				
Between subjects				
Group	2	23·192	11·17	0·0003
Subjects/group	27	2·077		
Within subjects				
Familiarity	1	29·4	44·88	0·0001
Familiarity × group	2	3·896	5·95	0·0072
Familiarity × subject/group	27	0·6551		
Multiple-choice format				
Between subjects				
Group	2	0·713	3·57	0·0428
Subjects/group	26	0·2		
Within subjects				
Familiarity	1	0·583	12·93	0·0013
Familiarity × group	2	0·014	0·31	0·7339
Familiarity × subject/group	26	0·0451		

MS = Mean squares.

Table 3. Means and standard deviations across proverb tasks for the aphasia (APH), Alzheimer's disease (AD) and normal control (NC) groups and *post-hoc* test results for group differences

Proverb task (max. score)	Mean	SD	Group effect (F(2, 26))	*p*	Significant group difference ($p \leqslant 0{\cdot}05$)
Spontaneous familiar (6)			5·69	0·0087	APH < NC
APH	4·12	1·38			
AD	4·78	1·05			
NC	5·68	0·48			
Spontaneous unfamiliar (6)			12·67	0·0001	AD, APH < NC
APH	2·80	1·82			
AD	2·46	1·14			
NC	5·12	0·59			
Multiple-choice familiar (2)			3·31	0·0526	AD < NC
APH	1·84	0·21			
AD	1·58	0·47			
NC	1·92	0·14			
Multiple-choice unfamiliar (2)			2·77	0·0812	NS
APH	1·60	0·40			
AD	1·36	0·50			
NC	1·78	0·26			

since interaction between Group and Familiarity was significant, group comparisons were run separately (ANOVA) for each of the Familiarity variables (i.e. Familiar and Unfamiliar). The results of the pairwise comparisons using the Student–Newman–Keuls test are reported in Table 3, including the group mean scores and standard deviations according to Format and Familiarity.

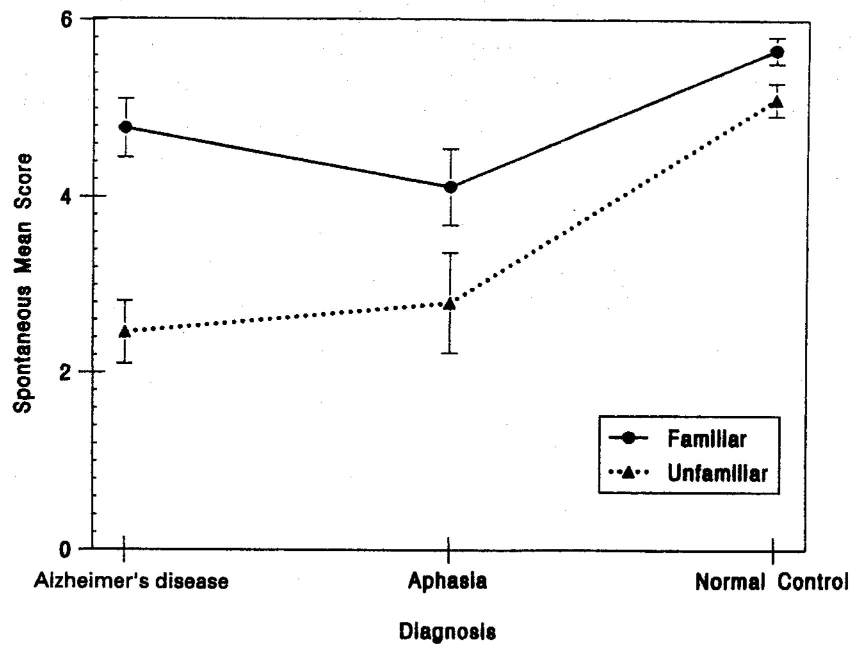

Figure 1. Means and standard error values on the Spontaneous format for familiar and unfamiliar proverbs across the three groups.

Spontaneous format

A significant effect of group membership was found for the Spontaneous format of the proverb task (Table 2). Moreover, there was a significant effect of Familiarity. Figure 1 illustrates the consistently lower performance on the Unfamiliar task as compared to the Familiar task for all three groups. An interaction between Familiarity and Group was also identified on the Spontaneous format.

As shown in Table 3, pairwise comparisons indicated that the APH group scored significantly lower than the NC group for both the Familiar and Unfamiliar proverb type. The AD group performed significantly lower than the NC group only on the Unfamiliar task. No significant difference was found between the APH and AD groups. The interaction between Familiarity and Diagnosis is revealed by the change in relative performance for the AD versus APH group as compared to the NC between the two Familiarity conditions. As shown in Figure 1, the mean performance for the APH group was lowest of the three groups in the Familiar condition, whereas the AD group performed the lowest on the Unfamiliar condition. Therefore, despite a failure to find significant differences between the AD versus APH groups, there was a significant difference relative to NC when the two Familiarity conditions were also taken into account.

Multiple-choice interpretations

For the Multiple-choice format the ANOVA revealed significant effects for both the Group Diagnosis and Familiarity condition. No significant interaction effects for Group by Familiarity were indicated. The effects of Familiarity are illustrated in Figure 2. There was a consistently lower performance in the Unfamiliar condition as compared to the Familiar condition across all three groups. It is of interest to note the increased variability across all three groups on the Multiple-choice format, Unfamiliar condition (Table 3, Figure 2).

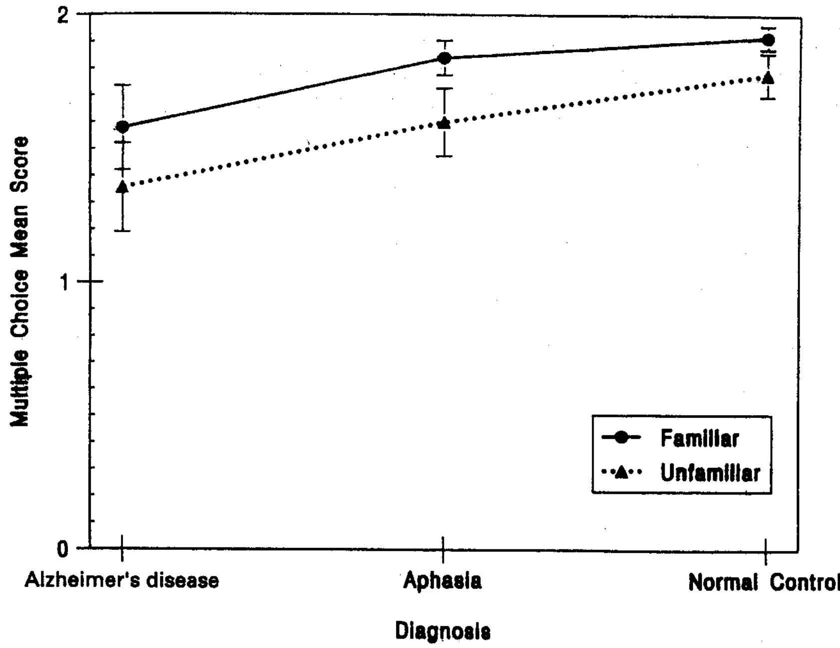

Figure 2. Means and standard error values on the Multiple-choice format for familiar and unfamiliar proverbs across the three groups.

With regard to group effects, the AD group tended to perform the lowest of all three groups on the Multiple-choice format (Figure 2). The difference between the AD and NC reached significance for the Familiar condition and approached significance level for the Unfamiliar condition (Table 3). No significant differences were found between the APH group and either the AD or NC groups in the Multiple-choice format (Table 3).

Predictive value of linguistic and cognitive performance on proverb interpretation

The results of the logistic regression used to predict correct responses for the spontaneous proverb task revealed an association between language ability (as measured by the standardized tests comprising the Language composite) and ability to construct a correct response for the familiar proverbs ($p = 0{\cdot}0071$). In contrast, the association between cognitive ability (reflected by the Cognitive composite) and correct interpretation for familiar proverbs failed to reach significance ($p = 0{\cdot}1576$). For unfamiliar proverbs there was a strong association with the ability to produce a correct interpretation and both the Language ($p = 0{\cdot}0036$) and Cognitive ($p = 0{\cdot}0042$) composites.

For the multiple-choice proverb format, both Cognition ($p = 0{\cdot}0341$) and Language ($p = 0{\cdot}0430$) domains were predictive of ability to select the appropriate interpretation for the familiar proverbs. For the unfamiliar proverbs the association with cognition was nearly indicative of performance ($p = 0{\cdot}070$), whereas the predictive value of the language variable failed to reach significance ($p = 0{\cdot}1799$).

Summary of findings

To summarize, the findings implicated a different pattern of impaired and spared abilities on proverb interpretation tasks displayed by our group with fluent APH versus our group with AD as compared to the NC group. Patients with APH tended to perform poorly on familiar and unfamiliar proverbs for the spontaneous task and within normal limits on familiar and unfamiliar proverbs for the multiple-choice task. Conversely, patients with AD tended to perform well on spontaneous familiar proverbs and fail both spontaneous unfamiliar and multiple-choice familiar proverbs, with difficulty also signalled on multiple-choice unfamiliar proverbs.

The results also highlighted the cognitive and linguistic abilities associated with performance on each task. Language competence was a more sensitive predictor of performance on the spontaneous familiar task while a combination of language and cognitive skills was linked with the spontaneous unfamiliar task. Performance on the cognitive measure tended to be a more sensitive predictor of performance on the multiple-choice task, although language was important on the familiar proverbs.

Discussion

Proverb tasks provide a rich diagnostic measure of discourse that taps the mental processes in deciphering non-literal language that have implications beyond abstract thought processes. In particular, proverbs can be utilized to measure information processing at both linguistic and cognitive levels, which may be useful in distinguishing strategies across brain-damaged populations (Ulatowska *et al.* 1995, Van Lancker 1990).

The present study supports the view that proverbs may be differentially impaired between patient groups with distinct patterns of brain damage (Van Lancker 1990). Our data confirm previous findings that patients with APH have significant difficulty on proverb interpretation tasks in which expressive language is required versus relatively better performance on multiple-choice tasks when the language is provided (Brundage and Brookshire 1995, Ulatowska *et al.* 1995, Van Lancker 1990). Our results showed that patients with APH perform poorly on tasks that require verbal explanations for the meaning of both familiar and unfamiliar proverbs. In particular, they had difficulty propositionalizing the non-literal meaning of proverbs. In fact, the patients with APH were less adept in producing abstract explications for familiar proverbs as compared to NC than were patients with mild AD, although both APH and AD groups scored lower than NC subjects on unfamiliar proverbs. In contrast, patients with APH showed near-normal level performance on a multiple-choice format where they were able to select the correct abstract interpretation when provided with several alternative responses for both familiar and unfamiliar proverbs. Patients with AD, however, were significantly impaired on selecting the correct abstract interpretation for familiar proverbs (Kempler *et al.* 1988).

In considering why the patients with APH may be less successful in giving abstract interpretations for familiar proverbs than the patients with AD, yet more successful when selecting the correct choice on a multiple-choice paradigm, a number of explanations are considered. These explanations include the domains of comprehension, language access, compensation by intact brain regions, semantic memory, working memory, and attention.

Since APH represents a primary disturbance of language, the most obvious explanations would be those related to linguistic manipulation. For one, the patients with APH may have had problems due to comprehension deficits. The particular APH population studied consisted of patients with fluent APH, who often show impairments in the receptive modality. Results from the standardized battery, however, revealed relatively preserved auditory comprehension for the APH group. Moreover, the pattern of near-normal performance level by the patients with APH on the multiple-choice format may support relatively preserved comprehension, or at least recognition.

Additionally, the difficulty shown by patients with APH on the spontaneous format may arise from deficits in accessing the necessary language to formulate a response. This explanation is supported by the fact that patients with APH had marked difficulty in adequately verbalizing a correct abstract response regardless of whether the proverb was familiar or unfamiliar. The results indicate that high-level patients with fluent APH are able to comprehend certain proverbs and to select the correct abstract interpretation; however, they fail if they have to simultaneously think of the meaning to be conveyed and the language to express it.

The expressive deficit on spontaneous proverb interpretations is interesting given what appears to be a relatively preserved recognition and perhaps conceptualization of proverb meaning on the multiple-choice format in our APH group. Perhaps in struggling to find the words to convey the meaning of a proverb, patients with APH may adopt a strategy of utilizing the wording of a given proverb, resulting in a more concrete level of response. Nonetheless, APH patients may retain the ability to appreciate the non-literal meaning as reflected in correct choices on multiple-choice proverb interpretation tasks. Clearly, APH patients' inability to convey abstract interpretations may not correspond directly to impaired abstract reasoning.

The relatively better performance on the multiple-choice format for the APH group may be attributed to compensation by the intact right hemisphere. For example, the proverb interpretation may be processed as a gestalt level of meaning by the right hemisphere, while the refinement of this global meaning is impaired as this linguistic particularization of the meaning is carried out by the left hemisphere which is damaged in APH (Van Lancker 1990). If this is so, then an intact gestalt level of processing by the right hemisphere would allow the aphasic patient to select from a number of possible choices. In turn, the damage to the left hemisphere would account for the breakdown in constructing the spontaneous interpretation. For patients with AD the left and right hemispheres are typically both compromised, perhaps contributing to failure on multiple-choice items, even after giving a correct response on spontaneous familiar interpretation. However, this explanation alone does not account for the near-normal performance by the patients with AD on the spontaneous familiar proverb task.

The contribution of language difficulties to proverb interpretations is not confined to patients with APH, but may also contribute to the problems observed in some patients with AD. The demarcation of linguistic deficits associated with APH versus primary cognitive impairments in AD is too simplistic. Clearly, linguistic deficits commonly appear as an early symptom of AD (Bayles *et al.* 1989) and cognitive deficits are frequently documented in APH (Chapman and Ulatowska 1994). This study demonstrated that low language performance, on the standardized language measures, appears to be a sensitive predictor of failure on spontaneous proverb interpretations regardless of the diagnostic classification of either APH or AD. Thus, although the patients with AD as a group did not perform significantly below the NC group, a few AD patients with low language were unsuccessful on the spontaneous familiar proverb interpretation task.

Cognitive impairments may also contribute to the differential patterns of spared and impaired abilities observed for the patients with APH and patients with AD. The impairment in spontaneously interpreting familiar proverbs for APH and residual capacity in early AD may be accounted for by a disparate access to semantic memory. Van Lancker (1990) proposed that familiar proverbs are stored as a single unit of meaning and retrieved much like a lexical item. Access to semantic knowledge may be better preserved in early AD but disrupted in APH.

The semantic memory explanation, however, does not account for why AD patients failed on selecting the appropriate interpretation when given choices. That is, if familiar proverb interpretation is related to semantic memory, and if semantic memory is relatively spared in the early stage of AD, why would the subjects have difficulty with multiple-choice tasks? The unusual pattern of relatively lower performances when given choices than for spontaneous explanations for AD patients may be due to limitations in working memory or to attention deficits. To perform the multiple-choice task an individual must be able to hold the proverb in memory while problem-solving which of the four choices best fits the meaning. It is possible that the AD patients are unable to hold the list of choices in their working memory, and are therefore unable to perform the problem-solving necessary to complete this task successfully. Alternatively, patients with AD may attend to whatever choice is the most prominently foregrounded in their working memory, selecting that response without considering subsequent items. The locations of errors across the four choices were evenly distributed, failing to support either a recency or primacy effect for the AD group as a whole.

In conclusion, this study indicated that proverbs provide a useful diagnostic measure for adult clinical populations. Proverbs can be manipulated along a variety of dimensions (familiarity, presentation format, etc.) to illuminate strategies in processing non-literal language by patient populations with varying degrees of cognitive and/or linguistic impairment. Whether or not unfamiliar proverbs are appropriate stimuli for adult populations is controversial. We propose that unfamiliar proverbs may provide valuable information regarding strategies adopted in processing non-literal language, particularly when used for comparison across a variety of formats. We acknowledge that the tasks used herein are limited in scope. More elaborate development of proverb tasks, such as matching proverbs to context or ordering proverb interpretations for stories, is currently under way by the second author of this paper.

Proverbs represent an ubiquitous figurative expression that literally pervades our lives through advertisements, news stories, political commentary, parental training, religious teaching, and everyday conversation (Mieder 1993). Proverbial sayings provide a rich resource not only of diagnostic value but also of content for treatment to facilitate patients with cognitive and/or linguistic disturbances. Expansion of this study to examine performance in patients with non-fluent APH, individuals with right-hemisphere lesions, or individuals with closed head injury would further our knowledge regarding differential disturbance of proverb interpretation in clinical populations with different communicative disorders.

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Appendix A: Example of a familiar and unfamiliar proverb with corresponding multiple-choice items

Familiar proverb

Don't count your chickens before they are hatched.

Type

Correct abstract A. One shouldn't always assume that things will turn out the way one expects.

Abstract foil	B. The good is the enemy of the best.
Semantic foil	C. Chickens don't continue to sit on eggs after they have hatched.
Concrete	D. There may be fewer chicks than there were eggs.

Unfamiliar proverb

The long way home is often the fastest.

Type	
Abstract foil	A. A friend in need is a friend indeed.
Semantic foil	B. A long stay away from home is the fastest way to grow up.
Concrete	C. Travel on familiar roads, even if there appears to be a shorter route.
Correct abstract	D. One often makes a task more complicated by trying to find a simple solution.

(Taken from the California Proverb Test—(Delis *et al.* 1984)

Appendix B: Coding system (modified from Delis *et al.* 1984)

6 – Correct abstract response
5 – Partial abstract response
4 – Incomplete, partial abstract response
3 – Correct concrete response
2 – Partial concrete response
1 – Incomplete, partial concrete response
0-A – Incorrect abstract response
0-C – Incorrect concrete response
0-NR – Incorrect no response