

Identifying the effects of right hemisphere damage on communication effectiveness and speech and language performance using a variety of tasks

While the communication deficits concomitant with left cerebral hemisphere damage can be identified and categorized into aphasic disorders, changed patterns of communicative behavior following right hemisphere damage (RHD) are less definitive, often subtle, and may be misdiagnosed as confusion, personality changes, or emotional in origin. Speech-language pathologists (SLPs) may identify communicative deficits that other professionals attribute to a loss of memory, attention, or visual-perceptual skills (Blake, Duffy, Tompkins, & Myers, 2003). Formal assessment instruments used to evaluate communicative abilities following left hemisphere damage are designed to measure linguistic skills attributed to the left hemisphere, but they fail to tap behaviors characteristic of RHD. Traditional tests for aphasia are based upon a definition that is not consistent with the deficits exhibited following RHD (Myers, 2001).

A lack of normative assessment data documenting the impact of RHD on communication skills forces speech-language pathologists to rely on assessment protocols (Burns, Halper, & Mogil, 1985) and intuitive knowledge instead of standardized measurements to justify treatment (Holland, Greenhouse, Fromm, & Swindell, 1989; Myers, 1983, 1986). Since communication is an active, two-way interaction designed to convey meaning between a speaker and a listener, then the process must be assessed not only on the basis of speech and language performance but also on effectiveness (Code, 1987; Nicholas & Brookshire, 1993; Ulatowska, North & Haynes, 1981). Communicative abilities also must be judged across a variety of intentional contexts. The type of skills necessary for conversation differ from the abilities needed to exchange information or give instructions because they demand turn taking and modification to meet the listener's needs.

This study compared the responses of subjects with RHD to matched normal participants across a variety of communication tasks. Using operationally defined measures of communication effectiveness and speech-language performance, the abilities compromised significantly after RHD were identified. The various tasks were further examined to reveal which ones were most successful in revealing differences between groups.

Method

Ten adult males, five with RHD at least six months post onset and five neurologically normal peers were matched by age, education and occupation. Subjects had functionally normal hearing and vision.

Subjects participated in five communication tasks that were audio and video taped, then transcribed verbatim for analysis. The tasks included:

1. Spontaneous conversation – subject's responses to open ended statements.
2. Sequential information – subject provided directions from a specified location to his home and explained how to make a BLT sandwich.
3. Picture interpretation – subject described the "Cookie Theft" picture from the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan, 1967).
4. Referential communication using two dimensional designs –subject and examiner were separated by an opaque screen and took turns in the listener and speaker role matching and stacking described pairs of six novel designs inscribed on blocks. (Glucksberg, Krauss, and Weisberg, 1966).
5. Referential communication using three dimensional novel objects – same as the block stacking task except objects were placed in boxes.

This series of communication tasks progressed from being minimally restrictive and familiar to referentially precise and novel in topic and content. Spontaneous conversation permitted the subject to initiate, maintain, switch, return to, and relinquish topics until 100 utterances were obtained. The sequential information task required a linear progression of discourse that achieved a specific outcome. The picture interpretation task required specific vocabulary, attention to visual detail, and a synthesized understanding of the events and relationships depicted in the picture. Both referential communication tasks significantly restricted the choice of topic and semantic content. The stimuli required increasingly more abstract and attributionally less variable content, therefore permitting successful communication only if the speaker was able to ascertain and provide the information needed by the listener.

Results

Group differences were determined using the Mann-Whitney *U* test and a one-tailed test of significance and a profile of the RHD group's performance compared to that of the normal group using z-scores. Communicative effectiveness parameters included success, learning and efficiency. The RHD group was significantly less effective on the sequencing, and referential communication tasks than the normal group. They exhibited lexical access problems, the inability to use pragmatic cues to recognize the listener's comprehension needs, and difficulty in synthesizing steps into a meaningful whole.

Although communication learning was found to be intact in both groups, the RHD subjects required twice as many trials as the normal group to succeed on both referential tasks suggesting that repeated exposure might facilitate mastery. Efficiency measures revealed that the RHD group had difficulty accepting task restrictions and relinquishing the role of speaker, possibly the result of deficits in comprehension of pragmatic and contextual cues.

Analysis of RHD performance revealed difficulty in role-reversal and turn-taking as evidenced by simultaneous speaking and overlapping at terminal junctures. Effectiveness was further hampered by the inability to present information from a perspective other than their own, suggested by their failure to provide crucial information during the referential tasks.

The speech and language analysis revealed automatic, lower order functions of phonology, fluency and syntax, to be relatively intact in the RHD group. Deficits were identified within the domains of content (lexical access, fragmented or empty turns, and perseveration), discourse (referential unclarity), and use (listener insensitivity and feedback errors).

Discourse, which includes the sharing of communicative burden, an awareness of contextual and pragmatic constraints, attenuation to listener's needs and cues, and the degree of cohesiveness between utterances and topics, was identified as the most deficient aspect of language performance, exemplified categorically by referential unclarity.

The final area of investigation was to identify the tasks capable of identifying RHD. Each task captured unique differences between groups. Spontaneous conversation was least difficult for the RHD subjects. Significant differences were identified in lexical access, demonstrated by word retrieval difficulties, and anomia for temporal information. The sequential information task differentiated the RHD subjects' lack of efficiency, word retrieval deficits, and failure to consider the listener's prior knowledge and perspective. Picture interpretation captured deficits in connotative integration and word retrieval, caused primarily by referential unclarity.

On the referential tasks differences were found in success, learning, and efficiency. The RH subjects used significantly fewer stock expressions and self-corrections, ignored listener feedback, and demonstrated listener insensitivity by failing to revise their descriptions when cues

indicated message inadequacy. The blocks task captured referential unclarity, while the objects task revealed empty turns and perseveration. Both referential tasks proved to be adept at tapping the inability of the RHD subjects to recognize and respond to feedback from the listener.

Summary

A summary of statistical results and performance observations identified deficits following RHD to be, in order from most to least severe, referential unclarity, listener insensitivity, empty turns, lexical access difficulties, and verbal feedback errors. In combination, this cluster of deficits suggests that RHD results in the loss of pragmatic, lexically interactive language, and an egocentric perspective on communication. Results revealed that the tasks, from most to least effective in differentiating between group differences, were referential communication using novel objects, sequential information, picture interpretation, referential communication using novel blocks, and conversation.

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