older, and 100 children aged 4–11. The aphasic subjects were classified by means of clinical assessment and localization of lesions by CAT scan. All incorrect responses which included one or more recognizable English morphemes were analyzed. Some major coding categories included: (1) Functional compounds (object + verb + -er), e.g., *clothes holder* for *hanger*. (2) Noun modifier plus superordinate, e.g., *log boat* for *raft*. (3) Improvised visual descriptive compound, e.g., *pole horse* for *unicorn*. (4) Morpheme substitution, e.g., *seafish* for *seahorse*. (5) Phonological paraphasia on one of two morphemes, e.g., *testelscope* for *telescope*. (6) Assimilation of one morpheme to a familiar word, e.g., *propedals* for *propeller*. In addition to qualitative analysis, the incidence of each type of process as a proportion of the total number of morphological errors was computed for each subject group.

Results indicated several trends: although examples of each of the categories of errors appeared in the data from every group, children tended to create more improvised visual compounds; aphasic subjects exceeded the other groups in the production of phonological paraphasias. In addition, the form of the target word strongly influenced the form of the errors produced by all groups: compound words like *hour glass* elicited compound responses like *hour vase*. Objects for which function was a salient feature elicited errors in the instrumental -er form: *tongs* were called *ice grabbers*; an *oar* was called a *rower*.

This study has shown that all three subject groups, to varying extents, draw upon a common repertoire of English word formation strategies. Differences in the distribution of morphological innovations employed by the three groups, however imply that developing and deteriorating language systems rely upon different compensatory mechanisms. This implication will be discussed.

LESIONS RELATED TO DEFICITS OF IMMEDIATE AND LONG-TERM MEMORY IN APHASIA

W. P. Gordon

Aphasic patients frequently have a deficit of auditory immediate recall for sequences (i.e., digit span) and also an impairment of long-term recall as evidenced by anomia. The present study was undertaken to identify lesions statistically related to impairment of immediate recall and long-term recall in aphasia.

Computerized tomography was used to localize lesions of the 28 patients in this report. All lesions were limited to the region of the left middle cerebral artery. Scans were done at least two months postonset and analyzed by a staff radiologist for infarction at 21 possible sites. Aphasia testing was begun at least two months postonset and patients were classified by the Boston Diagnostic Aphasia Examination; 7 were identified as transcortical motor, 3 as Broca's, 3 as Wernicke's, 5 as conduction, 7 as mixed, and 3 as global aphasics.

Immediate memory was assessed by verbal recall of digits. Recognition of pictures corresponding to spoken words as evidenced by the patient pointing to the appropriate picture, was based on pictures from the Boston Test which included letters and numbers and other materials such as objects, actions, geometric forms, and colors. Long-term recall was evaluated by determining the number of different animals the patient could name (without visual cues) in 1 minute. In analysis of the data, scores of the patients with lesions of each of the 21 structures (i.e., cortex of the angular gyrus) were compared to scores of the patients without this lesion by a between-group, one-tailed *t*-test.

The results indicated different lesional topographies identified with significantly ($p < 0.05$) impaired performance on the tests:

1) Defects of immediate recall were related to lesions primarily of the superior temporal and middle temporal gyri (particularly the posterior two thirds of the superior temporal gyrus), and parts of the inferior parietal lobule.

2) Defects in recognition of pictures corresponding to letters or words were predominantly related to lesions involving the angular gyrus and white matter deep to the supramarginal gyrus.

3) Defects relating to recognition of pictures representing objects, actions, geometric forms, and colors displayed few cortical loci but a number of white matter structures including tissue deep to the cortex of the posterior superior temporal gyrus.

4) Defects of long-term recall of animal names were highly related to lesions of the head of the caudate nucleus, lenticular nucleus, and to a lesser extent, the middle temporal gyrus and other structures.

The discussion will attempt to indicate how these data relate to other studies concerning the topography of lesions producing deficits of immediate and long-term memory, how these lesion sites compare and contrast, and are each different from the mesial temporal lobe structures considered important in short-term memory consolidation deficits encountered in some amnestic syndromes.

RESPIRATORY RESPONSE IN THE UNILATERALLY BRAIN DAMAGED PATIENTS

P. B. Vrtunski and L. Morrow

Respiratory function is controlled both by subcortical (autonomic) and cortical (voluntary) mechanisms. Concerning cognitive functions, an intimate link was suggested between respiration and sustained (voluntary, cognitive) attention, but deemed negligible between respiration and reactive (psychomotor) attention (Walter & Porges, 1976). In this paradigm, the sustained attention is associated with an increase in respiration rate.

We hypothesized that the dominant and nondominant hemisphere-damaged differ in their respiratory response to two types of stimuli and presumably different information processing demands.

A total of 40 inpatients (dominant hemisphere damaged $N = 13$, nondominant $N = 12$, and control group $N = 15$) participated in the study. The experimental session consisted of presentation of 24 pictorial slides and verbal presentation of 20 sentences. Throughout the session, the respiration was recorded by a polygraph. Several minute intervals prior to and between the two series of stimuli served as a control condition.

Results were as follows. First, the overall respiration rate was significantly higher in the nondominant hemisphere-damaged group than the dominant and control groups (20.13, 16.39 and 17.60 cycles/minute respectively, $p < 0.05$). Second, in the nondominant and control groups the visual stimulus presentation was accompanied by higher respiration rate than verbal stimulus presentation ($p < 0.01$). The respiration rate of the dominant group was not significantly affected by either of stimulus conditions.

We interpret the seeming contradiction in these results as resulting from the dual control of respiration. On one hand, the overall respiration rate reflects the autonomic component and the higher rate in nondominant group is the result of weakened control projecting to the contralateral pontine centers (lesion of which may abolish the autonomic mechanism altogether; Levin & Margolis, 1977). The absence of the effect of varying stimuli in the dominant group, on the other hand, reflects a deficit of the sustained attention. We suggest that the sustained attention is verbal in character and is being mediated by the dominant hemisphere.

SOME RECENTLY SUGGESTED RIGHT HEMISPHERE SPECIALIZED FUNCTIONS TESTED IN A SPLIT-BRAIN PATIENT

A. L. Hoff and W. McKeever

Considerable interest exists in delineating the capabilities of the right hemisphere. Two possible functions for which the right hemisphere may equal or excel the left have been suggested by recent lateralized visual testing procedures with normal *S*'s. These are: (1) lexical decisions for