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COMPREHENSION OF LEXICAL SUBCATEGORY DISTINCTIONS BY APHASIC PATIENTS: PROPER/COMMON AND MASS/COUNT NOUNS

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Previous research has found that agrammatic Broca aphasic patients have particular difficulty using determiners like "a" and "the" for the purposes of sentence comprehension. In this study, we test whether or not such difficulty extends to the level where lexical subcategories are distinguished by these articles. The absence or presence of a determiner distinguishes proper from common nouns (e.g., "ROSE" vs. "A ROSE"), and mass from count nouns (e.g., "GLASS" vs. "A GLASS"). Groups of agrammatic Broca and fluent aphasic subjects were required to point to one of two pictures in response to a sentence such as "Point to the picture of rose" or "Point to the picture of a rose". Sentences were presented in either printed or spoken form. Results indicated that for the agrammatic Broca patients, printed presentation yielded significant improvement over spoken presentation only for the proper noun/common noun distinction. Performance was significantly poorer for the mass noun/count noun distinction as compared to the proper/common distinction for these patients, and mass nouns proved particularly difficult. Interpretable patterns were not observed on either subcategory distinction for the fluent aphasic subjects. Current theories of agrammatism cannot fully explain these data. An independent explanation is offered that suggests proper noun/common noun is a universal semantic distinction. On the other hand, the mass noun/count noun distinction is more purely syntactic, and thus is particularly difficult for agrammatic Broca patients.

KEY WORDS: aphasia, comprehension, lexical, sentence, agrammatism

Patients who speak agrammatically often have comprehension problems too. The production and comprehension limitations exhibited by agrammatic Broca aphasic patients involve, among other things, an inability to use grammatical function words (e.g., articles, auxiliaries, prepositions) normally. Agrammatic patients' problem in production of function words is salient; their problem in comprehension is apparent on minimal experimental probing. It is the latter problem that is the focus of this paper.

Several studies have found errors in the comprehension of spoken language when that comprehension crucially depends upon the processing of articles or determiners, the most common English words. Heilman and Scholes (1976), for example, found that agrammatic Broca patients had difficulty distinguishing the meaning of "She showed her baby the pictures" from the meaning of "She showed her the baby pictures." Grossman, Carey, Zurif and Diller (1986) reported that agrammatic Broca patients were impaired at distinguishing proper from common nouns when the distinction was marked by the presence or absence of an article (e.g., "Point to the rose" vs. "Point to Rose"). In another study, agrammatic patients failed to appreciate the distinction between definite and indefinite articles (Goodenough, Zurif and Weintraub, 1977). Unlike neurologically intact subjects, the agrammatic patients did not seem to realize that a definite article refers to a uniquely identifiable object (e.g., "the black one"), while an indefinite article refers to an object that is not uniquely identifiable (e.g., "a black one").

These difficulties occur when patients must comprehend rapid, naturally intoned speech. When on-line processing demands are reduced—that is, when sentences are spoken slowly and repeated or when instructions are printed so that patients can control the rate of information flow—agrammatic Broca patients distinguish proper from common nouns successfully (Grossman et al., 1986). Grossman et al. suggested that their agrammatic patients' difficulty was in isolating the article in the acoustic stream and that the patients' knowledge of the subcategorization facts for proper and common nouns was intact. However, slowing presentation rate or printing instructions does not alleviate all of the agrammatic Broca patients comprehension difficulties involving articles. Zurif and Garrett

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(1984) found that printed instructions did not allow agrammatic patients to appreciate the distinction between "a black ball" and "the black ball." In this case agrammatic patients have a deficit that extends beyond their difficulties in isolating articles in fluent speech.

There are at least two possible explanations why agrammatic Broca patients can distinguish "a rose" from "Rose," but cannot distinguish "a black ball" from "the black ball." The first has to do with the syntactic level at which interpretation takes place. The distinction between "Rose" and "a rose" is at the lexical level; the first instance of "ROSE" is a proper noun, whereas the second is a common noun. Syntactic context merely specifies which lexical subcategorization—proper or common—is intended. In contrast, the "ball" in "a ball" vs. "the ball" has the same lexical reading: it is a common noun in both cases. That only the latter picks out a particular ball depends upon an analysis of both the determiner and the noun, that is, *the whole noun phrase.* Hypothesis 1 (henceforth, the "lexical level hypothesis") is that agrammatic Broca patients are capable of interpreting information only at the lexical node level of syntactic structure. In fact, Caplan has suggested that agrammatic Broca patients may be able only to construct a linearly ordered set of lexical items (e.g., Determiner + Noun + Verb) without assigning phrasal (e.g., Noun phrase = determiner + noun) or clausal (e.g., Sentence = Noun Phrase + Verb Phrase) structure (Caplan, 1983, Caplan and Futter, 1986). Thus, any distinction made at the lexical level—that is, proper (e.g., "Rose," "Penny") from common (e.g., "a rose," "a penny") nouns—should not be difficult for agrammatic Broca patients. But distinguishing "a ball" from "the ball" should be difficult for these patients because it is a distinction that depends on an analysis of the entire noun phrase.

The second explanation is related to a recent proposal of Grodzinsky, who suggested that terminal nodes for minor lexical categories are not specified in agrammatism (Grodzinsky, 1984; 1986). The bottom-most node labels in a phrase structure, such as [DET] (determiner), [AUX] (auxiliary), [INFL] (inflection) are present but unfilled. In this view, even under ideal circumstances the absence or presence of an article may be represented by the patients, but the specification for the article as definite or indefinite cannot be represented, because such specification must be represented, or filled, *within* the terminal node. We will refer to this hypothesis as the "unfilled node hypothesis." The unfilled node hypothesis accounts for the difference between "a rose/Rose" and "a ball/the ball" by noting that the first distinction is marked simply by the presence or absence of a determiner, the second requires that the particular determiner—whether definite or indefinite—be represented.

To decide between these two hypotheses, the present study contrasts agrammatic Broca patients' sensitivity to the proper noun/common noun distinction with their sensitivity to another lexical subcategory distinction, the mass noun/count noun distinction. Both distinctions are presented in printed as well as in spoken form. Table 1 shows the syntactic contexts in which proper nouns, common nouns, singular count nouns, and mass nouns occur.

TABLE 1. Distribution of noun type and definite/indefinite articles in English.

Noun type			
Proper	*Common*	*Singular count*	*Mass*
∅	*a*	*a/the*	*∅/the*
Rose	*a rose*	*a/the glass*	*glass/the glass*

In Grossman et al. (1986) proper nouns were contrasted with common nouns (e.g., "Cliff, a cliff"). Thus, the presence or absence of even an unfilled [DET] node—a node that does not need further specification as indefinite or definite—governs which subcategorization is correct. By comparison, if mass nouns are contrasted with singular count nouns, the presence or absence of a determiner is not sufficient to resolve the subcategorization, as shown in Table 1. If there is no determiner, the noun must be a mass noun, but if there is a determiner, the determiner's identity must be established before the noun's subcategorization can be established. "The" may precede both mass and count nouns ("the sand," "the table"), but "a" may precede only count nouns. ("*A* sand" is, therefore, ungrammatical). Only filled nodes—in this instance those that are specified as indefinite or definite—are sufficient for distinguishing mass nouns and singular count nouns. Importantly, if the unfilled node hypothesis is correct, it is predicted that agrammatic patients should be impaired in distinguishing mass nouns from count nouns even under conditions that minimize on-line processing demands—that is, where stimulus items are printed and no time constraints are enforced. However, because proper nouns and common nouns are distinguished only by the absence or presence of the DET node, and the further specification of the determiner as indefinite or definite is not required, the unfilled node hypothesis predicts that agrammatic Broca subjects should perform normally on this distinction.

On the other hand, both the count noun/mass noun distinction and the proper noun/common noun are lexical subcategorizations. In neither case does interpretation require analysis above the lexical level. Thus, the lexical level hypothesis predicts that agrammatic Broca patients should be unimpaired at distinguishing both count from mass nouns, and proper from common nouns, particularly in conditions where instructions are printed. Also, under conditions that place high on-line processing demands (i.e., spoken stimuli at normal rates), agrammatic Broca patients should be impaired, relative to normal subjects, at both distinctions, given that Grossman et al. (1986) found that these patients have difficulty isolating articles in ongoing speech.

Finally, there have been claims in the literature that fluent aphasic patients have similar performance limitations on comprehension tasks as do Broca patients (Goodglass & Menn, 1985; Peach, Canter, & Gallaher, 1988). Arguments for identity of performance limitations rest on demonstrations that both groups show similar profiles on off-line tasks such as sentence-to-picture matching. Notwithstanding the possibility that failures on a given comprehension task could have different process-

ing antecedents (see, e.g., Friederici & Graetz, 1987; Shapiro & Levine, 1989), we included a group of fluent aphasic patients to investigate whether or not problems with using determiners to mark lexical subcategory distinctions are syndrome-specific.

In summary, the absence or presence of an article ("a") signals the distinction between proper and common nouns. For mass and count nouns, however, "the" and the lack of an article signal mass nouns, and both "a" and "the" signal singular count nouns. Thus, the identity of the article—*if an article is present*—must be established in order to distinguish mass from count nouns. According to the lexical level hypothesis, agrammatic Broca patients should do well on both subcategory distinctions—mass/count and proper/common—because both can be interpreted at the lexical, and not phrasal, level of syntactic analysis. On the other hand, the unfilled node hypothesis suggests that agrammatic Broca patients should do well on the proper/common distinction because it is signalled simply by the absence or presence of an article. However, because this hypothesis claims that agrammatic Broca patients cannot acknowledge the further specification of an article as definite or indefinite, the mass noun/count noun distinction should prove particularly difficult for these patients. Spoken presentation of either distinction should result in poorer performance than printed presentation.

METHOD

Subjects

Ten right-handed aphasic adults were assessed. Each subject experienced a single cerebrovascular accident resulting in a unilateral lesion of the left cerebral hemisphere. The subjects were classified as presenting either agrammatic Broca ($n = 5$) or fluent ($n = 5$) aphasia on the basis of performance profiles on the *Boston Diagnostic Aphasia Exam* (*BDAE*) (Goodglass & Caplan, 1983) or the *Western Aphasia Battery* (Kertesz and Poole, 1974), and clinical evaluations by speech-language pathologists and neurologists. In addition, lesion data were obtained for 8 of the 10 patients. Table 2 contains the relevant data for the subjects.

The ages of the agrammatic Broca subjects ranged from 51 to 67 years, with a mean age of 56 years. Mean post-onset time was 28 months. The age range for the fluent group was 52 to 72 years, with a mean age of 63 years. Mean post-onset time was 17.4 months. The speech of the agrammatic Broca subjects was effortful and contained few grammatical function words compared to content words. The subjects comprising this patient group were also agrammatic in comprehension. For example, on independent sentence-to-picture matching tasks, these agrammatic Broca patients were unable to interpret reversible passive and object relative clause sentences at above chance levels, yet performed above chance on reversible active sentences controlled for length and lexical content (see Grodzinsky, 1986; Schwartz, Linebarger, Saffran & Pate, in press). The fluent group consisted of 3 Wernicke, 1 transcortical sensory, and 1 anomic aphasic patient.

Subjects were screened prior to the experiment to ensure that the task demands of matching printed and spoken stimuli to pictures were within their performance capabilities. In this simple screening task, subjects were presented with 10 printed and 10 spoken words. With the presentation of each word subjects were required to point

TABLE 2. Subject data.

Subject	*Age*	*Post-onset*	*Education*	*BDAE: AC*[a]	*Neurological*
			Broca's		
1 DF	51	2 yrs.	HS	86%	Large lesion in Broca area: 1/2 of Wernicke's area
2 LD	57	6 yrs.	HS	76%	Left frontal parietal extending into temporal lobe
3 WL	67	2 yrs.	13	70%	Left parietal, post-central supramarginal and angular gyri[b]
4 JM	53	14 mos.	HS	N/A	Negative CT
5 SB	54	6 mos.	13	89%	Left posterior frontal and insula
			Fluent		
1 JL (Wernicke's)	67	2 yrs.	11	N/A	Left superior to inferior parietal, supramarginal and angular gyri
2 HB (Wernicke's)	59	2 yrs.	14	N/A	Negative CT
3 ES (Wernicke's)	67	2 yrs.	14	65%	Left parietal intracerebral hematoma
4 FF (Transcortical sensory)	72	6 mos.	HS	43.6%	Left MCA thrombosis
5 CJ (Anomic)	52	6 mos.	HS	90%	Left MCA infarct and internal carotid artery occlusion

[a]Mean percent correct for combined auditory subtests (i.e., word discrimination, body part identification, commands and complex ideational material). [b]The neurological data for this patient are quite unusual. The CT scan information would seem to indicate a classic Wernicke aphasic patient profile, yet WL presented as a Broca aphasic patient who was agrammatic in both production and comprehension (see discussion of patient #3 in Tramo, Baynes, & Volpe 1988).

to one of two pictures, one corresponding to the word, the other a foil. Those subjects who performed at or above an 80% cut-off on both the printed and spoken words were included in the experiment. Two potential subjects were eliminated by this pretest.

Procedure and Stimuli

Subjects were required to point to one of two pictures in response to a sentence containing a target noun with or without a preceding indefinite article (e.g., common/proper: "Point to the picture of a rose," and "Point to the picture of Rose;" count/mass: "Point to the picture of a glass," and "Point to the picture of glass"). For each distinction, we took advantage of the fact that in English there are familiar nouns that are both homographic and homophonic and are ambiguous as to their lexical subcategory. We used 13 such nouns for each distinction. Each noun appeared in two sentence frames, one with and one without a preceding indefinite article, yielding 26 test sentences per presentation mode (spoken, printed) for each distinction.

For each distinction (proper/common: mass/count) and each presentation mode, two separate sets of 13 sentences were prepared, so that both subcategorizations of the same noun did not appear in the same set. For example, in Set 1 for the proper noun/common noun distinction, a subject would receive the sentence "Point to the picture of Penny," "Point to the picture of a rose," and so forth, and in Set 2, "Point to the picture of a penny," "Point to the picture of Rose," and so forth. In Set 1 for the mass noun/count noun distinction, a subject would receive the sentence "Point to the picture of a glass," "Point to the picture of punch," and so forth, and in Set 2, "Point to the picture of glass," "Point to the picture of a punch," and so forth. Within each of these sets, the order of sentences was randomized, subject to the constraint that a particular subcategory did not appear in more than two consecutive trials. Each distinction was considered separately—that is, all proper/common stimuli were presented together, and all mass/count stimuli were presented together—with order of the two distinctions (mass/count, proper/common; proper/common, mass/count) randomized across subjects.

Pictures were produced for both senses of each noun. For example, for the proper noun "Rose" the picture was a woman. For the common noun "a rose" the picture was a flower; for the mass noun "glass" the picture was glass in a window; for the count noun "a glass" the picture was a glass of water. The 26 nouns and descriptions of their corresponding pictures are provided in Appendix A.

It should be emphasized that these materials were first tested on a group of 10 neurologically intact control subjects. Only those contrasts that yielded perfect performance were included in the study. In this way, we could be sure that within a particular subcategory, any one sentence-picture combination would not be inherently more difficult than any other.

The sentences were tape recorded and presented free field during one session, and in printed form (each sentence, all in capital letters, on a separate 5″ by 8″ card) in another session. The sessions were conducted three to five days apart for each subject. The order of conditions (printed, spoken; spoken, printed) was randomized across subjects.

RESULTS

Examination of the individual subject's raw data (Appendix B) revealed that the agrammatic Broca patients' performances on printed presentation of proper and common nouns were nearly errorless. Consequently, statistical analyses of the proper and common noun data could be conducted only when they involved spoken presentation. Thus, our first analysis evaluated the proper noun/common noun distinction versus the mass noun/count noun distinction with spoken presentation. An overall mixed design analysis of variance was performed with aphasia type (agrammatic Broca, fluent) as a between-subjects variable and noun distinction (proper/common, mass/count) as a within-subjects variable. Table 3 shows the data for the analyses.

A significant interaction between aphasia type and noun distinction was found, $F(1, 8) = 24.05$, $p = .001$. A test for simple effects within each noun distinction was performed for each aphasia group. There was a significant effect of noun distinction for the agrammatic Broca aphasic subjects. Performance on the mass/count distinction (73% correct) was significantly poorer than performance on the proper/common distinction (88% correct), $F(1, 8) = 30.22$, $p = .001$. For the group of fluent aphasic subjects, there was no significant different between the mass/count distinctions (75% correct) and the proper/common (71% correct) distinctions.

We carried out a second set of analyses to examine performance on each noun type *within* each of the noun distinctions. First, a mixed design analysis of variance was performed on spoken presentation with aphasia group (Broca, fluent) as the between-subjects variable and noun type (proper, common, mass, and count) as the within-subjects variable. A significant interaction between aphasia type and noun type was observed, $F(3, 24) = 4.76$, $p < .01$. Accordingly, a test for simple effect for noun type (proper, common, mass, and count) was per-

TABLE 3. Mean percentage correct for noun type and presentation mode.

	Noun types					
	Proper	*Common*	*Mean*	*Mass*	*Count*	*Mean*
			Broca's			
Spoken	82	95	88	63	83	73
Printed	97	98	98	68	88	78
			Fluent			
Spoken	71	71	71	74	75	75
Printed	71	68	70	66	68	67

formed for each aphasia group. Analysis of the agrammatic Broca subjects' data revealed a significant effect of noun type, $F(3, 24) = 7.90$, $p = .001$. Protected t-tests (Cohen & Cohen, 1975) conducted on the Broca subjects' data revealed that performance on proper nouns (82%) was poorer than that on common nouns (95%), though this contrast did not reach statistical significance [$t(4) = 2.63$, $p = .06$]. Performance on mass nouns (63%) was significantly poorer than that on count nouns [(83%), $t(4) = 3.18$, $p < .05$]. T-tests comparing performance against chance levels of 50% revealed that performance levels were better than chance ($p < .05$) for each noun type (proper, common, mass, and count), except for the spoken presentation of mass nouns (63%) ($p = .06$). Thus, although the agrammatic Broca patients were impaired on this task relative to the perfect performance of neurologically intact subjects, they were able to do the task.

A test for simple effects of noun type (proper, common, mass, and count) for the fluent subjects' data revealed no reliable differences among the noun types, $F(3, 24) < 1.0$, with performance at approximately 70% correct. Though their overall performance was worse than that of the agrammatic patients, they were also able to do the task: T-tests comparing performance against chance levels of 50% revealed that performance on each noun type in each presentation mode was significantly better than chance ($p < .05$).

Finally, a mixed design ANOVA (aphasia group × noun type × presentation mode) was performed on only the mass and count noun data for *both* spoken *and* printed presentation (a similar analysis could not be performed on the proper/common data because of ceiling effects for printed presentation). A significant interaction between aphasia group and noun type was observed, $F(1, 8) = 10.64$, $p < .01$. A test for simple effects of noun type for each aphasia group revealed an effect of noun type for the agrammatic Broca group only. Collapsing across presentation mode, mass nouns (65% correct) resulted in significantly poorer performance than count nouns (85% correct), $F(1, 8) = 25.04$, $p = .001$. A significant interaction between aphasia group and presentation mode was also observed, $F(1, 8) = 12.99$, $p < .01$. A test for simple effects of presentation mode within each aphasia group revealed a significant effect of presentation mode for the fluent group. Printed presentation (67%) resulted in significantly poorer performance than did spoken presentation (75%), $F(1, 8) = 9.11$, $p < .05$. As for the agrammatic Broca group, though presentation mode did matter with the proper noun/common noun distinction insofar as near-perfect performance was found with printed, but not spoken presentation, printed presentation did not significantly improve performance over spoken presentation for mass or count nouns.

DISCUSSION

Although both fluent patients and agrammatic Broca patients were impaired on this task relative to normal subjects, the two groups did not show the same performance profiles. The difference between the two groups argues against the claim that the same performance limitations characterize both groups of aphasic patients. Because the fluent patients' performances were not influenced by the independent variables manipulated in this study, except for an effect of presentation mode for mass and count nouns, this experiment provides no insight into the precise nature of their deficit. However, the heterogeneity of the fluent group (three Wernicke patients, one transcortical sensory and one anomic) should be taken into account, even though the patterns of responses to the tasks were similar for all the fluent patients (see Appendix B).

We now turn to an interpretation of the data from the agrammatic Broca patients. The data on the proper noun/common noun distinction replicate those of Grossman et al. (1986) in spite of substantial changes in the procedure. Grossman et al. included three contexts for each target word: no determiner (e.g., "ROSE"), determiner (e.g., "THE ROSE"), and nonsense syllable ("BA ROSE" or "THOO ROSE"—neither the person nor the flower was described in the nonsense syllable sentences). The nonsense syllables differed in their phonological similarity to English determiners, and this manipulation was included to assess the hypothesis that isolation of determiners in ongoing speech is one factor in the agrammatic Broca patients comprehension problem. In this study, we eliminated the nonsense syllable condition and still found that performance was better than chance in almost every condition, and that performance was at ceiling with printed presentation.

Thus, the conclusions of Grossman et al. stand. A difficulty in isolating at least certain function words during ongoing speech adversely affects agrammatic Broca patients' sentence comprehension. Printed presentation, presumably by minimizing time and memory demands and eliminating the need to recognize and isolate the article in speech, circumvents this processing limitation. Without these on-line processing problems, the agrammatic patients are unimpaired in their capacity to represent the distinction between the presence or absence of an article and to use this information to distinguish proper nouns from singular common nouns.

Performance on the mass noun/count noun distinction was significantly poorer than that for the proper noun/common noun distinction, and in contrast to the proper/common condition, no improvement was registered for printed over spoken presentation. Apparently, the agrammatic Broca patients are impaired in their capacity to use information about articles to distinguish count from mass nouns, even when the difficulties of isolating function words from on-line speech are obviated. In this respect, the pattern of results resembles that for the appreciation of the distinction between "a" and "the," in which patients were impaired under both spoken (Goodenough et al., 1977) and printed (Zurif & Garrett, 1984) presentations.

These data complicate the lexical level hypothesis. This hypothesis claimed that no differences should be found between any noun types, that agrammatic Broca patients' representations at the lexical node level are intact, and that failures arise when higher order constituents (e.g., phrases and clauses) must be interpreted. All

four noun types—proper, common, mass and count—are discriminated normally at the lexical node level, yet they did not yield the same pattern of results on this task for the agrammatic patients. Thus, not all representations at the lexical node level are intact in these patients. It may be that the present data suggest an independent impairment that is not considered in the lexical level hypothesis. We entertain this possibility toward the end of this discussion.

The second hypothesis—the unfilled node hypothesis—appears supported by our data at first glance. According to this hypothesis, agrammatic Broca patients represent the presence of a determiner, but not its specific identity. Because the identity of the determiner ("a" vs "the") is relevant to the mass noun/count noun distinction, but not to the proper noun/common noun distinction, the mass/count distinction should be more difficult, even under printed stimulus presentation, than the proper/common distinction. This is the pattern of data obtained.

But the story is not so clear-cut. The unfilled node hypothesis suggests that whenever performance depends on distinctions represented within a minor lexical category node (e.g., determiner, auxiliary, inflection), such performance should be random (Grodzinsky, 1984). For example, because the [DET] node can be filled by ø, indefinite, and definite articles, any of the three possibilities can, in principle, be chosen by the agrammatic Broca patient. However, performance was not random on count nouns. Quite to the contrary, the agrammatic patients performed with 85% accuracy on these items. A partial explanation may be that because count nouns can be signalled by both "a" and "the," the patients simply acted probabilistically when they were unable to represent the difference. That is, they chose on the basis of likely probabilities of occurrence given the presence of an article—*any* article. Another possibility is that when confronted with two choices subjects simply tended to "default" to their preferred choice. In fact, a later assessment of noun preference in neurologically intact subjects revealed a preference for the count meanings of these nouns. We asked college students to provide us with the first meaning they could think of for each of our homographic nouns, and most often—80% of the time—they chose the count meaning.

In addition, there is a more damaging problem for the unfilled node hypothesis. According to it, the mere absence of an article should always be acknowledged because this depends only on the representation of the determiner node itself. But a condition in which noun subcategorization is signalled by simply the absence of a determiner—mass nouns—yielded significantly worse performance than a condition in which an article node is represented—count nouns. The unfilled node hypothesis cannot account for this pattern. Thus, although it may not be difficult to understand why there are significantly more errors on the mass nouns than on the count nouns, this pattern is inconsistent with the unfilled node hypothesis.

Indeed, the unfilled node hypothesis is weakened by data from other sources as well. For example, Bates, Friederici, Miceli and Wulfeck (1986) observed that Italian agrammatic patients do not behave in a totally random fashion when accessing items within a particular minor lexical category. Specifically, although they sometimes inflect articles incorrectly for gender or number, they rarely inflect articles incorrectly for both gender and number.

We conclude that no single hypothesis will explain the data from the lexical subcategorization studies (Grossman et al., 1986) and the indefinite/definite references studies (Goodenough et al., 1977, Zurif & Garrett, 1984). We offer a tentative explanation for the fact that the proper noun/common noun distinction is more intact in our agrammatic patients than is the mass noun/count noun distinction. The proper/common distinction maps perfectly onto a fundamental semantic contrast—individual versus class or type. Reference to an individual is semantically different from reference to a class or type, and all languages mark this fundamental semantic distinction syntactically. Children whose speech is still in the one-word stage distinguish proper from common nouns, and can use the presence or absence of an article to assign a newly heard noun to the correct subcategorization (Katz, Baker & Macnamara, 1974). By contrast, the mass noun/count noun distinction is only roughly correlated with a semantic distinction, that between stuff and things, and not all languages mark the count/mass distinction syntactically. Abstract nouns, which are neither things nor stuff, nonetheless must be subcategorized as mass or count (e.g., "justice" and "loyalty" are mass nouns in English). Even nouns for physical entities are not always subcategorized according to the rough correlation between mass nouns and substances, count nouns and objects. There are many superordinate level object terms that are mass nouns (e.g., "jewelry," "furniture"). Although this is true in every language that marks the mass/count distinction, which superordinate terms are subcategorized as count nouns and which as mass nouns varies from language to language. Indeed, even at a basic level, languages differ in their subcategorizations. For example, "spaghetti" is a mass noun in English and a count noun in Italian.

These facts attest that the mapping between the syntactic distinction (mass/count) and the semantic distinction (stuff/things) is very rough. Compared to the proper/common subcategorizaton, the mass/count subcategorization is more purely a syntactic distinction. Further, Gordon (1982) has shown that for young children, syntactic context dominates over semantic properties of the mass/count referent to determine the syntactic subcategorization of a newly heard word, as would be expected if it is basically a syntactic distinction.

We suggest, therefore, that agrammatic Broca subjects are impaired in their ability to apprehend some subcategorizations of major lexical categories, as well as some details of grammatical function word (closed class) morphology. These would include those distinctions that are relatively syntactic and that play no systematic semantic role in their language, such as the mass/count distinction.

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APPENDIX A
NOUNS AND DESCRIPTIONS OF THEIR CORRESPONDING PICTURES

Noun	*Pictures*	
	Proper	*Common*
Cliff	male	a rocky cliff
Carol	female	a sheet of music
Peg	female	a round peg
Penny	female	a coin
Fern	female	a plant
Bee	female	an insect
Jack	male	a car jack
Ruby	female	a jewel
Van	male	a type of auto
Violet	female	a type of flower
Bill	male	a dollar bill
Rose	female	a type of flower
Robin	female	a kind of bird
	Mass	*Count*
Fish	cooked and on a plate	live in water
Corn	vegetable	irritation on toe
Toast	slice of bread variety	cocktail glasses clinking
Marble	slab of stone	round, shiny toy object
Duck	cooked and on a plate	live, on water
Pipe	building material	smoking implement
Chicken	cooked and on a plate	live, in pen
Glass	slab of glass	a drinking glass
Lamb	cooked and on a plate	live, in field
Punch	liquid in bowl	fist hitting chin
Pepper	ground up variety	bell pepper
Spring	season with flowering plants	metal coil
Batter	cookie batter in bowl	baseball player

APPENDIX B
INDIVIDUAL SUBJECT DATA: PERCENTAGE CORRECT FOR NOUN TYPE AND PRESENTATION MODE

	Proper		*Common*		*Mass*		*Count*	
	Spoken	*Printed*	*Spoken*	*Printed*	*Spoken*	*Printed*	*Spoken*	*Printed*
				Broca's				
DF	100	100	100	100	77	69	92	85
LD	77	100	92	100	69	69	69	85
WL	69	92	100	100	62	77	100	100
JM	77	92	92	92	46	46	69	77
RB	85	100	92	100	62	77	85	92
				Fluent				
JL	85	85	77	77	77	77	92	85
HB	46	62	77	54	54	62	77	62
ES	85	77	54	69	77	62	62	62
FF	62	69	77	69	77	54	69	62
CJ	77	85	69	69	85	77	77	70