

Two Assessments of American Usage Frequencies for Ninety-Seven Sentence Complement-Taking Nouns

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Two studies documented the American English usage frequencies for ninety-seven nouns that occur with sentence complements (e.g., "rumor," "The rumor that the student cheated . . ."). An established usage preference methodology was used (see Connine, Ferreira, Jones, Clifton, & Frazier, 1984; Kennison, 1999).² In Study 1, participants completed short fragments that did not contain the overt complementizer "that," as in "The rumor . . ." In Study 2, participants completed short sentence fragments that contained the overt complementizer, as in "The rumor that . . ." The results showed that when the complementizer was absent (Study 1), bare (i.e., unmodified) usages and prepositional phrase usages were frequently observed. In contrast, sentence complement and relative clause usages were rarely observed. When the complementizer was present (Study 2), the frequency of sentence complement and relative clause usages varied. The estimates of usage frequency obtained in these studies are intended to be a resource for language comprehension researchers.

An important part of each language user's knowledge of language is information about the possible usages of words. A great deal of attention has focused on documenting the possible usages of verbs (Hoover & Shaer, 1990; Levin, 1993) and the frequencies of those usages for specific verbs (Connine *et al.*, 1984; Garnsey, 1996; Kennison, 1999). Consider the verb "expected." As shown in example 1 a–c, there are at least three possible

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²This sentence completion method is not the only method for assessing frequency of usage. Some researchers have relied on calculating usage frequencies from samples taken from corpora (see Gibson & Pearlmutter, 1994; Hindle & Rooth, 1993). However, a recent comparison of the two methods by Merlo (1994) suggests that the sentence completion method is a better predictor of behavior. One possible reason is that usage frequencies obtained at a given University or vicinity are more representative of the population to be later studied in behavioral experiments than frequencies obtained from a corpora, which has been compiled using a variety of language samples, such as newspapers and other printed or spoken sources.

usages. According to usage frequency estimates reported in Kennison (1999), the verb “expected” occurs 26% of the time with noun phrase complements (1a), 9.5% of the time with tensed sentence complements (1b), and 38% of the time with infinitival complements (1c).

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| (1) a. | John expected <i>the money</i> . | Noun phrase complement |
| b. | John expected <i>that the party would be canceled</i> . | Tensed sentence complement |
| c. | John expected <i>to be elected to the council</i> . | Infinitival complement |

The role of verb-specific knowledge in language comprehension has been the focus of research since the late 1960s. One of the earliest proposals was that comprehenders use their knowledge of the possible usages of a specific verb to form expectancies about upcoming phrases in the sentence (Clark & Clark, 1977; Clifton, Frazier, & Connine, 1984; Fodor, 1978; Fodor & Garrett, 1967; Ford, Bresnan, & Kaplan, 1983; Mitchell, 1987; Tanenhaus & Carlson, 1989). Consider the examples in 2, the verb “pushed” can occur with a noun phrase complement, but the verb “fainted” cannot. This knowledge may lead comprehenders to expect a noun phrase complement following the verb in 2a, but not in 2b. As a result, comprehenders would likely experience more difficulty resolving the remainder of the sentence in 2a than in 2b, as the intended interpretation is one in which the noun phrase “the patient” is the subject of the main clause, rather than the NP complement of the preceding verb.

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| (2) a. | When the doctor pushed the patient laughed. |
| b. | When the doctor fainted the patient laughed. |

More recently, researchers have focused on the possibility that comprehenders use information about the relative frequencies of possible usages to resolve ambiguous phrases. It is suggested (MacDonald, 1994; MacDonald, Pearlmutter, & Seidenberg, 1994) that when verbs are comprehended, all possible usages of the verb are activated in parallel and are considered as potential analyses of the sentence being comprehended. The activation levels of the potential analyses are believed to correspond directly to the frequency with which the specific verb occurs with the different usages. Prior and following sentence context can be used by comprehenders to activate the most appropriate analysis and to further inhibit competing analyses.

Consider the example in 3. The usage frequencies of NP complements and tensed sentence complements differ for the verbs “accepted” and “acknowledged.” According to Kennison (1999), “accepted” occurs approximately 48% of the time with NP complements and approximately 2% of the time with tensed S complements; “acknowledged” occurs approximately

12% of the time with NP complements and approximately 29% of the time with tensed S complements. When each

- (3) a. The student accepted the answer . . .
 b. The student acknowledged the answer . . .

verb is comprehended, both NP complement and tensed S complement analyses would become activated. However, the activation levels of these analyses would differ for the two verbs. The NP complement analysis would be the higher activated analysis for “accepted,” but the lower activated analysis for “acknowledged.” As a result, when the following NP “the answer” is comprehended, it would be initially analyzed as an NP complement in 3a, but as the subject NP of a tensed S complement in 3b. There has been several empirical investigations providing support for claims set forth in the PAH. This support comes from a growing number of experiments, the results of which indicate that ambiguous phrases following verbs are interpreted as being consistent with their most frequent usage (Gamsey, Pearlmutter, Myers, & Lotocky, 1997; Holmes, Stowe, & Cupples 1989; MacDonald, 1994; Mitchell, 1989; Mitchell & Holmes, 1985; Trueswell, Tanenhaus, & Kello, 1993; but see also Ferreira & Henderson, 1990; Kennison, 1995).

Despite the fact that the principles set forth in the PAH do not apply exclusively to the use of verb-specific knowledge in comprehension, very little attention has been paid to the use of knowledge of other syntactic categories, such as, nouns, adjectives, and adverbs. The purpose of the research described in this paper was to document that a certain class of nouns which occur in English have multiple usages and to assess the frequencies of these multiple usages in a way that would benefit language comprehension researchers. The class of nouns that was the focus of the present research was the class containing nouns like “rumor,” which can occur with prepositional phrase complements (4b and c) and sentence complements (4d), as well with as with relative clauses (4e) and without any modification (4a). This class of nouns refer to abstract concepts. Other examples of this type of noun are “fact,” “belief,” and “understanding.” In contrast, concrete nouns (e.g., “chair,” “car,” “fork.”) do not occur with either prepositional phrase complements (“* The car about the race . . .”) or sentence complements (“* The car that the driver died . . .”). Concrete nouns, like all others, can occur with relative clauses (“The cause that the driver crashed . . .”).

- (4) a. The *rumor* had been started by Maria. Unmodified
 b. The *rumor* about the Senator disturbed Prepositional phrase
 his supporters. complement

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| c. The <i>rumor</i> of war disturbed the citizens. | Prepositional phrase complement |
| d. The <i>rumor</i> that the Senator lied disturbed his supporters. | Sentence complement |
| e. The <i>rumor</i> that the Senator started disturbed his supporters. | Relative clause |

Not only do nouns have multiple usages, as do verbs, but it is also the case that nouns, like verbs, may be followed by temporarily ambiguous phrases. The knowledge of usage frequencies may aid comprehenders in resolution of such ambiguities. Consider the example in 5. Clauses following this special class of nouns (i.e., nouns that can occur with sentence complements) can be temporarily ambiguous between sentence complements (5a) and relative clauses (5b).

- (5) The rumor *that the actress had* . . .
- | | |
|---------------------------------------|---------------------|
| a. fallen disturbed many of her fans. | Sentence complement |
| b. denied disturbed many of her fans. | Relative clause |

There is been preliminary evidence that the resolution of this type of ambiguous clause is influenced by the frequency with which specific nouns are used with sentence complements versus relative clauses (Kennison, 1998).

The two studies that are reported in the paper were conducted to assess the usage frequencies for this class of nouns in English. Ninety-seven nouns, like “rumor,” “fact,” and “belief,” were initially identified. A considerable effort was made to identify all nouns of this class. Three steps were particularly useful. A first step involved surveying the nouns listed in Francis and Kucera (1982). A second step involved identifying verbs, which could be categorized as “thought” verbs (e.g., understand, believe, and know) and identifying the deverbal noun form (e.g., “understanding,” “belief,” and “knowledge”). A third step involved identifying semantically related nouns using a thesaurus. The usage frequencies were obtained using a usage preference methodology modeled closely on the one used initially by Connine *et al.* (1984) and employed, since then, by a number of others (Gamsey, 1996; Holmes *et al.*, 1989; Kennison, 1999; Trueswell *et al.*, 1993). This method involves providing participants with a list of words (verbs in Connine *et al.*, 1984, Kennison, 1999,) or short sentence fragments containing target words (also verbs in Gamsey, 1996; Trueswell *et al.*, 1993) and instructing participants to provide sensible sentences containing those words or sentence fragments. The resulting sentences are then coded according to type of usage. The frequencies of the different usages for each word are calculated.

For the studies reported in the present paper, participants were provided with a list of short fragments, a subset of which contained the target

nouns. In Study 1, target nouns were not followed by the complementizer “that” (e.g., “The rumor . . .”). Consequently, the frequency of unmodified and prepositional phrase usages could be obtained (as in 2a–c), as well as the frequencies of sentence complements, relative clauses, and other structures. In Study 2, target nouns were followed by the complementizer “that” (e.g., “The rumor that . . .”). As a result, the relative frequency of sentence complement and relative clauses usage could be obtained (see 2d–e). In both studies, participants were instructed to write a sensible completion for each sentence fragments.

STUDY 1

Method

Ninety-seven target nouns were divided into three sets and were intermixed with the same filler nouns. None of the filler nouns could be used with sentence complements. In list 1, 36 target nouns were intermixed with 64 filler nouns. In list 2, 35 target nouns were intermixed with 61 filler nouns. In list 3, 33 target nouns were intermixed with 62 filler nouns. The filler in lists 2 and 3 were taken from the set of fillers used in list 1. Each list was randomized. Participants were presented with each noun in a short sentence fragment (i.e., “The rumor . . .”). Each of the three lists was completed by fifty undergraduates from the University of Oklahoma. All participants were native speakers of America English, naive to the purpose of the studies, and received course credit in exchange for participation.

Results and Discussion

In Study 1, participants responses were classified into the following twelve categories:

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| (1) unmodified usage | The rumor was spread all over school. |
| (2) prepositional phrase (of) | The rumor of war shocked everyone. |
| (3) prepositional phrase (other) | The agreement between them was witnessed by a lawyer.
The story by the students was published in the paper.
The statement in the letter was very disturbing.
The acknowledgment for winning made him feel proud. |

	The acceptance from Harvard arrived yesterday.
	The amendment to the constitution was passed easily.
	The rumor about Mark intrigued his friends.
(4) relative clause (no that)	The rumor Mary heard upset her.
(5) relative clause (that)	The rumor that Mary heard upset her.
(6) relative clause (which)	The rumor which Mary heard upset her.
(7) relative clause (reduced)	The rumor heard by Mary upset her.
(8) sentence complement (that)	The rumor that Mary left Mark upset their parents.
(9) sentence complement (no that)	The fact Mary left Mark was discussed by everyone.
(10) noun compound	The rumor mill was busy today.
(11) infinitive	The resolution to improved Medicare was discussed by Congress.
(12) adjective	The secret passage was discovered by the teenagers.

Missing cases occurred when participants failed to provide a sentence for a noun. For these cases, “n” for the particular noun was reduced by one. For cases in which participants’ responses were illegible, of which there was a single occurrence, the trial was also coded as missing and the “n” for the particular noun was reduced by one. Table I displays a summary of noun usages obtained in Study 1.

The results indicated that although there were as many as six usages for most nouns, the most frequent usage was the unmodified (or bare) form. Clause usages (i.e., sentence complements and relative clauses) were infrequent.

Seven nouns appeared in more than one list. These nouns provided an opportunity to assess the reliability of the frequencies obtained in the study. Individual chi-square tests were carried out for these seven nouns. An alpha level of .007 was selected, as seven separate tests were carried out on the same data set (.05/7) (see Myers & Well, 1991). Six of these tests failed to approach significance (report: $\chi^2(6) = 4.43, p > .61$; research: $\chi^2(4) = 0, p > .99$; resolution $\chi^2(16) = 20.82, p > .18$ settlement: $\chi^2(16) = 15.15, p > .51$; and speculation: $\chi^2(7) = 12.35, p > .08$]. The only significant result occurred for “information” $\chi^2(6) = 10.75, p < .007$. These results indicate that the usage frequencies obtained in this study are reliable for multiple assessment of six of the seven nouns. Correlational analy-

Table I. The Number of Instances of the Different Noun Usages Generated by Study 1 (%)^a

Noun (list)	N	UM	PP _{of}	PP _{other}	RC _{no that}	RC _{that}	RC _{which}	RC _{reduced}	SC _{that}	SC _{no that}	NC	INF	ADI
1. Acceptance (1)	50	16 (32)	15 (30)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	14 (28)	0 (0)	0 (0)
2. Acknowledgment (1)	49	19 (39)	25 (51)	3 (6)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
3. Agreement (3)	50	34 (68)	0 (0)	8 (16)	3 (6)	2 (4)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)
4. Amendment (3)	48	39 (81)	0 (0)	7 (15)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5. Announcement (2)	50	42 (84)	5 (10)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
6. Argument (3)	50	44 (88)	0 (0)	2 (4)	3 (6)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7. Assertion (3)	41	25 (61)	5 (12)	0 (0)	7 (17)	0 (0)	0 (0)	1 (3)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)
8. Assumption (2)	50	39 (78)	1 (2)	0 (0)	5 (10)	2 (4)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)
9. Belief (2)	50	26 (52)	5 (10)	6 (12)	5 (10)	1 (2)	0 (0)	0 (0)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)
10. Claim (3)	45	28 (62)	1 (2)	7 (16)	0 (0)	3 (7)	0 (0)	2 (4)	3 (7)	0 (0)	1 (2)	0 (0)	0 (0)
11. Complaint (3)	50	41 (82)	1 (2)	6 (12)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
12. Conclusion (3)	50	33 (66)	2 (4)	11 (22)	1 (2)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)
13. Confession (3)	49	30 (61)	5 (10)	3 (6)	7 (15)	1 (2)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
14. Confidence (3)	50	20 (40)	6 (12)	3 (6)	16 (32)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)
15. Confirmation (2)	50	26 (52)	7 (14)	3 (6)	1 (2)	2 (4)	0 (0)	0 (0)	1 (2)	0 (0)	9 (18)	1 (2)	0 (0)
16. Conjecture (1)	27	19 (70)	5 (19)	1 (4)	2 (7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
17. Contention (3)	29	20 (69)	5 (17)	3 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	0 (0)
18. Deal (1)	50	41 (82)	0 (0)	4 (8)	2 (4)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
19. Decision (1)	50	37 (74)	1 (2)	0 (0)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)	0 (0)
20. Declaration (3)	49	18 (37)	29 (59)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
21. Demand (2)	50	29 (58)	3 (6)	15 (30)	1 (2)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)
22. Denial (1)	48	21 (44)	20 (42)	1 (2)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
23. Determination (2)	50	24 (48)	17 (34)	1 (2)	5 (10)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	1 (2)	0 (0)
24. Discovery (2)	50	30 (60)	14 (28)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)	1 (2)	0 (0)	3 (6)	0 (0)	0 (0)
25. Doubt (3)	45	23 (51)	5 (11)	9 (20)	3 (7)	2 (5)	1 (2)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)
26. Expectation (2)	50	26 (52)	17 (34)	0 (0)	2 (4)	1 (2)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)
27. Explanation (2)	50	41 (82)	3 (6)	1 (2)	1 (2)	1 (2)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

(Continued)

Table I. The Number of Instances of the Different Noun Usages Generated by Study 1 (%)^a (continued)

Noun (list)	N	UM	PP _{of}	PP _{other}	RC _{no that}	RC _{that}	RC _{which}	RC _{reduced}	SC _{that}	SC _{no that}	NC	INF	ADI
28. Fact (1)	50	29 (58)	15 (30)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)
29. Faith (2)	50	23 (46)	7 (14)	4 (8)	13 (26)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)
30. Fear (1)	50	24 (48)	20 (40)	3 (6)	2 (4)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
31. Feeling (2)	50	30 (60)	8 (16)	0 (0)	8 (16)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
32. Guarantee (3)	49	32 (65)	2 (4)	9 (19)	1 (2)	0 (0)	0 (0)	0 (0)	3 (6)	0 (0)	2 (4)	0 (0)	0 (0)
33. Guess (1)	50	37 (74)	0 (0)	2 (4)	6 (12)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)	3 (6)	0 (0)	0 (0)
34. Hint (2)	50	39 (78)	3 (6)	3 (6)	3 (6)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
35. Hope (3)	49	23 (47)	11 (23)	1 (2)	4 (8)	2 (4)	0 (0)	0 (0)	3 (6)	0 (0)	4 (8)	1 (2)	0 (0)
36. Hypothesis (3)	50	40 (80)	4 (8)	0 (0)	5 (10)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
37. Idea (1)	50	38 (76)	5 (10)	0 (0)	4 (8)	2 (4)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)
38. Illusion (3)	50	30 (60)	10 (20)	2 (4)	4 (8)	2 (4)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)
39. Implication (1)	47	32 (68)	9 (19)	1 (2)	1 (2)	1 (2)	0 (0)	1 (2)	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)
40. Impression (3)	49	18 (37)	5 (10)	1 (2)	17 (35)	7 (14)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
41. Indication (2)	47	21 (45)	13 (28)	1 (2)	4 (9)	1 (2)	0 (0)	0 (0)	4 (8)	0 (0)	3 (6)	0 (0)	0 (0)
42. Inference (3)	42	33 (79)	1 (2)	2 (5)	3 (7)	1 (2)	0 (0)	0 (0)	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)
43. Information (1)	50	36 (72)	1 (2)	2 (4)	4 (8)	1 (2)	0 (0)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
information (2)	50	33 (66)	0 (0)	3 (6)	7 (14)	1 (2)	0 (0)	3 (6)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)
44. Insinuation (2)	44	29 (66)	3 (7)	2 (4)	3 (7)	1 (2)	0 (0)	0 (0)	6 (14)	0 (0)	0 (0)	0 (0)	0 (0)
45. Insistence (1)	41	16 (39)	16 (39)	4 (10)	1 (2)	0 (0)	0 (0)	0 (0)	2 (6)	1 (2)	0 (0)	1 (2)	0 (0)
46. Intuition (2)	47	26 (55)	8 (17)	1 (2)	8 (17)	2 (5)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
47. Judgment (2)	50	44 (88)	2 (4)	1 (2)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
48. Message (1)	50	40 (80)	11 (23)	4 (8)	2 (4)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)
49. Misconception (1)	49	30 (61)	11 (23)	4 (8)	2 (4)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)
50. Notice (3)	50	40 (80)	2 (4)	7 (14)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
51. Notification (2)	50	29 (58)	16 (32)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	1 (2)	1 (2)	0 (0)
52. Notion (3)	45	21 (47)	2 (4.5)	1 (2)	7 (16)	2 (4.5)	0 (0)	0 (0)	6 (13)	0 (0)	0 (0)	6 (13)	0 (0)
53. Observation (3)	50	28 (56)	4 (8)	1 (2)	3 (6)	1 (2)	0 (0)	0 (0)	2 (4)	0 (0)	11 (22)	0 (0)	0 (0)
54. Opinion (3)	50	26 (52)	15 (30)	1 (2)	7 (14)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

55. Perception (1)	47	15 (32)	21 (45)	0 (0)	7 (15)	1 (2)	0 (0)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
56. Possibility (1)	50	15 (30)	29 (58)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
57. Prediction (1)	50	29 (58)	15 (30)	2 (4)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
58. Presumption (2)	50	32 (64)	4 (8)	2 (4)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
59. Problem (3)	50	38 (76)	0 (0)	8 (16)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
60. Promise (2)	50	33 (66)	0 (0)	0 (0)	13 (26)	1 (2)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)
61. Proof (3)	50	33 (66)	7 (14)	2 (4)	1 (2)	1 (2)	0 (0)	0 (0)	0 (0)	5 (10)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
62. Proposal (3)	50	31 (62)	3 (6)	5 (10)	4 (8)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5 (10)	0 (0)	0 (0)
63. Realization (2)	50	20 (40)	16 (32)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	12 (24)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)
64. Recognition (3)	49	19 (39)	18 (37)	1 (2)	10 (20)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
65. Recollection (2)	50	22 (44)	23 (46)	0 (0)	3 (6)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
66. Recommendation (2)	50	27 (54)	4 (8)	4 (8)	6 (12)	2 (4)	0 (0)	0 (0)	2 (4)	0 (0)	1 (2)	0 (0)	4 (8)	0 (0)	0 (0)
67. Regret (1)	49	24 (49)	11 (23)	2 (4)	11 (22)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
68. Remark (1)	50	40 (80)	0 (0)	1 (2)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
69. Report (1)	50	39 (78)	4 (8)	2 (4)	3 (6)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
report (2)	50	45 (90)	1 (2)	1 (2)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
70. Request (2)	50	39 (78)	0 (0)	2 (4)	3 (6)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	2 (4)	0 (0)	0 (0)
71. Requirement (1)	50	28 (54)	5 (10)	12 (24)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)
72. Research (1)	50	38 (76)	0 (0)	1 (2)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)
research (3)	50	38 (76)	0 (0)	1 (2)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)
73. Resolution (1)	47	33 (70)	2 (5)	10 (21)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
resolution (2)	50	37 (74)	1 (2)	7 (14)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)
resolution (3)	50	34 (68)	4 (8)	8 (16)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)
74. Relevance (1)	45	32 (71)	6 (13)	0 (0)	5 (11)	0 (0)	0 (0)	0 (0)	0 (0)	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
75. Rumor (1)	50	43 (86)	3 (6)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
rumor (3)	50	40 (80)	0 (0)	7 (14)	2 (4)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
76. Secret	50	36 (72)	2 (4)	1 (2)	4 (8)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	3 (6)	0 (0)	0 (0)	3 (6)	0 (0)

(Continued)

Table I. The Number of Instances of the Different Noun Usages Generated by Study 1 (%)^a (continued)

Noun (list)	N	UM	PP _{of}	PP _{other}	RC _{no that}	RC _{that}	RC _{which}	RC _{reduced}	SC _{that}	SC _{no that}	NC	INF	ADI
77. Sense (1)	50	10 (20)	26 (52)	1 (2)	7 (14)	2 (4)	0 (0)	0 (0)	3 (6)	0 (0)	1 (2)	0 (0)	0 (0)
78. Settlement (1)	50	40 (80)	0 (0)	7 (14)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
settlement (2)	50	41 (82)	2 (4)	2 (4)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)
settlement (3)	50	39 (78)	3 (6)	2 (4)	3 (6)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
79. Sign (1)	50	39 (78)	1 (2)	9 (18)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
80. Speculation (1)	47	28 (60)	12 (26)	3 (6)	2 (4)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
speculation (3)	47	25 (53)	5 (11)	5 (11)	4 (8)	0 (0)	0 (0)	1 (2)	7 (15)	0 (0)	0 (0)	0 (0)	0 (0)
81. Statement (1)	50	32 (64)	6 (12)	2 (4)	6 (12)	2 (4)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)
82. Stipulation (3)	40	30 (75)	3 (8)	4 (10)	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)
83. Story (1)	50	36 (72)	3 (6)	2 (4)	5 (10)	2 (4)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
84. Suggestion (2)	50	35 (70)	3 (6)	0 (0)	5 (10)	2 (4)	0 (0)	2 (4)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)
85. Suspicion (2)	50	28 (56)	10 (20)	1 (2)	6 (12)	1 (2)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)
86. Testimony (2)	50	37 (74)	1 (2)	0 (0)	9 (18)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
87. Theory (2)	50	36 (72)	12 (24)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)
88. Thought (3)	49	28 (57)	11 (23)	0 (0)	5 (10)	0 (0)	0 (0)	1 (2)	2 (4)	0 (0)	2 (4)	0 (0)	0 (0)
89. Threat (1)	50	30 (60)	14 (28)	2 (4)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
90. Trust (2)	50	24 (48)	2 (4)	10 (20)	7 (14)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	5 (10)	0 (0)	0 (0)
91. Truth (1)	50	46 (92)	2 (4)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
92. Uncertainty (3)	49	17 (35)	24 (49)	6 (12)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
93. Understanding (2)	50	28 (56)	9 (18)	4 (8)	5 (10)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
94. Verification (1)	50	21 (42)	23 (46)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	5 (10)	0 (0)	0 (0)
95. Warning (3)	49	28 (57)	0 (0)	1 (2.0)	1 (2.0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	19 (39)	0 (0)	0 (0)
96. Wish (2)	50	40 (80)	0 (0)	0 (0)	7 (14)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)
97. Worry (1)	48	27 (56)	10 (21)	2 (4)	6 (13)	1 (2)	0 (0)	0 (0)	1 (2)	0 (0)	1 (2)	0 (0)	0 (0)

^a Key to abbreviations: UM, unmodified; PP, prepositional phrase; RC, relative clause; SC, sentence complement; NC, noun compound; INF, infinitive; ADI, adjective.

ses were attempted, although these tests were likely influenced by a restriction of range problem (see Myers & Well, 1991). The only fruitful analyses were conducted for the frequency of unmodified usages for the five nouns that appeared in both lists 1 and 3 (i.e., “research,” “resolution,” “rumor,” “settlement,” and “speculation”) ($r = .97, p < .005$) and for the four nouns that appeared in both lists 1 and 2 (i.e., “information,” “report,” “resolution,” and “settlement”), the correlation failed to reach significance ($r = .52, p > .23$).

STUDY 2

Method

In Study 2, the three lists of target and filler nouns, which were used in Study 1, were modified for use in Study 2. Participants were presented with each noun in a short sentence fragment (i.e., “The noun that . . .”). In approximately 80% of the filler fragments, a word also followed the noun (e.g., “The gravel on . . .” “The truck with . . .,” and “The witness to . . .”). Each of the three lists was completed by fifty additional undergraduates from the University of Oklahoma. All participants were native speakers of American English, naive to the purpose of the study, and received course credit in exchange for participation.

Results and Discussion

In Study 2, participants’ responses were classified as either a sentence complement or a relative clause. Missing cases occurred when participants failed to provide a sentence for a noun. For these cases, “n” for the particular noun was reduced by one. For cases in which participants’ responses were illegible or ambiguous, the trial was also coded as missing and the “n” for the particular noun was reduce by one. Table II displays a summary of noun usages obtained in Study 2.

The reliability of usage estimates was also investigated for the seven nouns that appeared in more than one list. Correlational analyzes yield significant positive correlations between sentence complement usage and relative clause usage for the four nouns that appeared in both lists 1 and 2 (i.e., “information”, “report”, “resolution”, and “settlement”) ($r = .91, p < .05$) and for the five nouns that appeared in both lists 1 and 3 (i.e., “research”, “resolution”, “rumor”, “settlement”, and “speculation”) ($r = .96, p < .006$). Individual chi-square tests were carried out for these seven

Table II. The Number of Instances of the Different Noun Usages Generated by Study 2 (%)

Noun (list)	N	Tensed sentence complement	Relative clause
1. Acceptance (1)	50	28 (56)	22 (44)
2. Acknowledgment (1)	50	30 (60)	20 (40)
3. Agreement (3)	49	21 (43)	28 (57)
4. Amendment (3)	50	13 (26)	37 (74)
5. Announcement (2)	49	40 (82)	9 (18)
6. Argument (3)	49	15 (31)	34 (69)
7. Assertion (3)	47	30 (64)	17 (36)
8. Assumption (2)	50	43 (86)	7 (14)
9. Belief (2)	50	41 (82)	9 (18)
10. Claim (3)	47	38 (81)	9 (19)
11. Complaint (3)	50	35 (70)	15 (30)
12. Conclusion (3)	50	19 (38)	31 (62)
13. Confession (3)	50	21 (42)	29 (58)
14. Confidence (3)	50	16 (32)	34 (68)
15. Confirmation (2)	49	38 (78)	11 (22)
16. Conjecture (1)	41	12 (29)	29 (71)
17. Contention (3)	45	27 (60)	18 (40)
18. Deal (1)	50	2 (4)	48 (96)
19. Decision (1)	50	19 (38)	31 (62)
20. Declaration (3)	50	35 (70)	15 (30)
21. Demand (2)	49	32 (65)	17 (35)
22. Denial (1)	50	33 (66)	17 (34)
23. Determination (2)	49	26 (53)	23 (47)
24. Discovery (2)	50	40 (80)	10 (20)
25. Doubt (3)	49	37 (76)	12 (24)
26. Expectation (2)	50	28 (56)	22 (44)
27. Explanation (2)	48	16 (33)	32 (67)
28. Fact (1)	48	48 (100)	0 (0)
29. Faith (2)	50	15 (30)	35 (70)
30. Fear (1)	50	33 (66)	17 (34)
31. Feeling (2)	48	31 (65)	17 (35)
32. Guarantee (3)	50	35 (70)	15 (30)
33. Guess (1)	48	25 (52)	23 (48)
34. Hint (2)	49	28 (57)	21 (43)
35. Hope (3)	50	43 (86)	7 (14)
36. Hypothesis (3)	49	28 (57)	21 (43)
37. Idea (1)	50	32 (64)	18 (36)
38. Illusion (3)	48	24 (50)	24 (50)
39. Implication (1)	50	38 (76)	12 (24)
40. Impression (3)	50	18 (36)	32 (64)
41. Indication (2)	50	40 (80)	10 (20)
42. Inference (3)	49	29 (59)	20 (41)
43. Information (1)	50	2 (4)	48 (96)
information (2)	50	4 (8)	46 (92)
44. Insinuation (2)	49	35 (71)	14 (29)

(continued)

Table II. continued

Noun (list)	N	Tensed sentence complement	Relative clause
45. Insistence (1)	49	43 (88)	6 (12)
46. Intuition (2)	47	25 (53)	22 (47)
47. Judgment (2)	50	25 (50)	25 (50)
48. Message (1)	50	9 (18)	41 (82)
49. Misconception (1)	49	40 (82)	9 (18)
50. Notice (3)	50	37 (74)	13 (26)
51. Notification (2)	49	37 (76)	12 (24)
52. Notion (3)	48	32 (67)	16 (33)
53. Observation (3)	49	32 (65)	17 (35)
54. Opinion (3)	49	21 (43)	28 (57)
55. Perception (1)	49	44 (90)	5 (10)
56. Possibility (1)	50	50 (100)	0 (0)
57. Prediction (1)	50	45 (90)	5 (10)
58. Presumption (2)	50	37 (74)	13 (26)
59. Problem (3)	50	4 (8)	46 (92)
60. Promise (2)	50	21 (42)	29 (58)
61. Proof (3)	49	26 (53)	23 (47)
62. Proposal (3)	49	38 (78)	21 (43)
63. Realization (2)	50	45 (90)	5 (10)
64. Recognition (3)	49	27 (55)	22 (45)
65. Recollection (2)	49	29 (59)	20 (41)
66. Recommendation (2)	49	25 (51)	24 (49)
67. Regret (1)	50	31 (62)	19 (38)
68. Remark (1)	50	8 (16)	42 (84)
69. Report (1)	50	22 (44)	28 (56)
report (2)	50	19 (38)	31 (62)
70. Request (2)	49	34 (69)	15 (31)
71. Requirement (1)	50	43 (86)	7 (14)
72. Research (1)	50	8 (16)	42 (84)
research (3)	50	7 (14)	43 (86)
73. Resolution (1)	50	15 (30)	35 (70)
resolution (2)	48	18 (38)	30 (62)
resolution (3)	49	17 (35)	32 (65)
74. Relevation (1)	49	41 (84)	8 (16)
75. Rumor (1)	50	45 (90)	5 (10)
rumor (3)	50	32 (64)	18 (36)
76. Secret	49	11 (22)	38 (78)
77. Sense (1)	50	30 (60)	20 (40)
78. Settlement (1)	50	1 (2)	49 (98)
settlement (2)	50	9 (18)	41 (82)
settlement (3)	49	8 (16)	41 (84)
79. Sign (1)	50	8 (16)	42 (84)
80. Speculation (1)	50	44 (88)	6 (12)
speculation (3)	49	40 (82)	9 (18)

(continued)

Table II. The Number of Instances of the Different Noun Usages Generated by Study 2 (%) (*continued*)

Noun (list)	N	Tensed sentence complement	Relative clause
81. Statement (1)	50	16 (32)	34 (68)
82. Stipulation (3)	47	30 (64)	17 (36)
83. Story (1)	50	5 (10)	45 (90)
84. Suggestion (2)	49	36 (73)	13 (27)
85. Suspicion (2)	50	41 (82)	9 (18)
86. Testimony (2)	49	18 (37)	31 (63)
87. Theory (2)	49	32 (65)	17 (35)
88. Thought (3)	50	40 (80)	10 (20)
89. Threat (1)	50	29 (58)	21 (42)
90. Trust (2)	49	12 (24)	37 (76)
91. Truth (1)	50	22 (44)	28 (56)
92. Uncertainty (3)	49	32 (65)	17 (35)
93. Understanding (2)	50	34 (68)	16 (32)
94. Verification (1)	50	38 (76)	12 (24)
95. Warning (3)	50	30 (60)	20 (40)
96. Wish (2)	47	25 (53)	22 (47)
97. Worry (1)	49	36 (73)	13 (27)

nouns. An alpha level of .007 was selected, as seven separate tests were carried out on the same data set (.05/7) (see Myers & Well, 1991). Six of these tests did not approach significance (information: $\chi^2(1) = 7.1$, $p > .39$, report: $\chi^2(1) = .37$, $p > .54$; research $\chi^2(1) = 2.28$, $p > .13$; resolution: $\chi^2(2) = .63$, $p > .73$; settlement: $\chi^2(2) = 7.26$, $p > .02$; and speculation: $\chi^2(1) = .78$, $p > .38$). The only significant result occurred for “rumor” $\chi^2(1) = 9.54$, $p < .002$. These results indicate that the usage frequencies obtained in this study are reliable for multiple assessments of six of the seven nouns.

A comparison of the results of Study 2 with those obtained in Study 1 revealed that the presence of the complementizer in the sentence fragment significantly influenced how the nouns were used by participants. Significantly fewer sentence complements were produced when the overt complementizer “that” was absent from the sentence fragment (Study 1) than when the overt complementizer “that” was present (Study 2): [complementizer absent: 2% vs. complementizer present: 55%. $F(1, 105) = 578$, $p < .001$]. Significantly fewer relative clauses were also produced when the overt complementizer “that” was absent from the sentence fragment (Study 1) than when the overt complementizer “that” was present (Study 2): [complementizer absent: 2% vs. complementizer present: 44%, $F(1, 105) = 326$, $p < .001$].

GENERAL DISCUSSION

Two usage preference studies are reported that assessed the usage frequencies for ninety-seven complement-taking nouns (e.g., “The rumor that the student cheated . . .”). In Study 1, participants completed sentence fragments containing nouns that were not followed by the overt complementizer “that”. In Study 2, participants completed sentence fragments containing nouns followed by the overt complementizer “that.” The results indicated that when fragments did not contain the overt complementizer participants produced significantly fewer sentence complements and relative clauses than when fragments did contain the overt complementizer. Furthermore, the results document that there is variation in the usage preferences across nouns. These results are intended to be of use to researchers interested in the storage and the use of lexically-based knowledge in language processing.

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