

Seemingly Indefinite Definites

Greg Carlson

Rachel Shirley Sussman

1 Introduction¹

From the time of Bertrand Russell, the semantics of the English definite article has been the object of continued semantic analysis. Most analyses make some use of the notions of uniqueness, or familiarity, however defined more precisely (see for instance Roberts, 2003, for one recent analysis and review). In this paper, though, we wish to motivate through both experimental and non-experimental methodologies the claim that there is a sub-class of English definite articles which function differently, being much more akin to indefinites in their interpretations than the much larger and more general class of definite articles that is the primary focus of continued study. Recognizing this distinction may prove useful in future work on the semantics of the definite article, as the class of “indefinite definites”, or “weak definites,” represents a class of examples constituting the greatest challenge to uniqueness or familiarity-based accounts. Setting them aside and treating them as a separate group for different treatment may prove a fruitful research strategy.

2 The phenomenon

Our contention is that there is a subtle but perceptible contrast between the examples of (1) and those (2):

- (1)
- a. Mary went to *the store*.
 - b. I'll read *the newspaper* when I get home.
 - c. Open *the window*, will you please?
 - d. Fred listened to the Red Sox on *the radio*.
- (2)
- a. Mary went to *the desk*.
 - b. I'll read *the book* when I get home.
 - c. Open *the cage*, will you please?
 - d. Fred listened to the Red Sox over *the headphones*.

In the examples of (1), intuitively, the particular identity of the store, newspaper, window, or radio is not thought to be especially important, in contrast to the desk, book, cage, or headphones in the examples in (2). This contrast, so put, is a vague intuition which nevertheless we find most English speakers agree with. This distinction, though, can be considerably sharpened by embedding such examples in constructions making use of VP-ellipsis, and asking whether the identity of the denotation of the NP must be preserved under anaphora. As a lead-in, consider the example in (3):

- (3) Mary heard about *the riot* on *the radio*, and Bob did, too.

Here, Mary and Bob did have to hear about the very same riot. However, they clearly could easily have heard about it on different radios. This is because, our claim goes, “the riot” has no weak or indefinite reading, whereas “the radio” does. Note that this is the same judgment that would appear if “the radio” were replaced by the indefinite “a radio”. The contrast in (4) further sharpens this distinction.

- (4)
- a. Fred went to *the store*, and Alice did, too. (OK as different stores)
 - b. Fred went to *the desk*, and Alice did, too. (must be the same desk)

“The store” has a weak reading, whereas “the desk” has only the regular definite interpretation.

To substantiate these results, we presented materials of this sort in a judgement survey to 16 native speakers of English speakers. Participants read a short description of a situation where two separate characters acted upon two separate items of the same type, and then were asked whether a target sentence containing VP ellipsis and a suspected weak indefinite provided an accurate depiction of the events described (see table 1).

	context sentence	target sentence
Regular Definites	Bill read Jane Austen's <i>Pride and Prejudice</i> , and Joe read <i>The Hitchhiker's Guide to the Galaxy</i> , by Douglas Adams	Bill read the book, and Joe did too.
Indefinite Definites	At breakfast, Samantha read the New York Times. Across the table from her, Frances was reading the Democrat and Chronicle.	Samatha read the newspaper, and Frances did too.

Table 1: Examples of survey materials.

For weak definites, participants accepted the elided sentence as an accurate description 73% of the time, while for regular definites, the sentence was accepted only 24% of the time, which constituted a statistically significant difference between the two definite types ($t_1(15)=5.93$, $p<.001$, $t_2(5)=6.14$, $p<.001$)². Thus, speaker judgements reflect a reliable and robust difference in the availability of the weak definite reading.

3 Distributional properties of weak definites

What is it that accounts for the difference between, e.g. “the store” vs. “the desk” in examples such as (4)? To get a handle on this, we are going to examine the distributional properties of bare singular count nouns in English, and then show that the class of weak definites shares this same class of restrictions. What we mean by “bare singulars” is exemplified in (5a), and we are going to basically be claiming that the examples in (5b) exhibiting definite articles should be analyzed similarly.

- (5) a. Sue took her nephew *to college/to prison/to class*

- b. Sue took her nephew *to the hospital/to the store/to the beach*

Very approximately, both the bare singulars and the weak definites are used in constructions which designate typical or habitual activities, but this is an extremely weak characterization that is intended only as an intuitive guide.

English bare singulars, though commonly noted in descriptive grammars of English, have received limited attention in the theoretical literature (though bare singular count nouns in other languages have received more attention, such as Kallulli (1999) for Albanian, Borthen (2003) for Norwegian, or Munn and Schmidt (1999) for Brazilian Portuguese, among many others). One recent major work we are relying on which devotes itself to the subject of English singulars is Stvan (1998). In the following we are concentrating on the class of singulars which do not appear in adjuncts or conjunctions (Heycock and Zamparelli (2003) suggest a treatment of these as definites) and, to a reasonable degree of convincingness, are not parts of idioms (as e.g. being “with child” or told to “take heart”), among other subpatterns.

The class we are currently interested in is exemplified in (6):

- (6) a. They found him in *bed*.
 b. The ship is at *sea/at port*.
 c. He’s in *jail/in prison/in church*.
 d. Mimi attended *college/class/school*.

First of all, this class is lexically restricted—it is a lexical feature of the noun itself that determines whether it can function as a bare singular. Even near synonyms of bare singular nouns do not necessarily function this way; the examples of (6) contrast with those in (7):

- (7) a. *They found him in *couch/cot/hammock* (even if he sleeps there all the time)
 b. *The ship is at *ocean/lake*
 c. *He’s in *penitentiary/brig/mosque*
 d. *Mimi attended *seminar/institution/ university(AmE)*³

Bare singulars do not admit of any modification, whether prenominal or postnominal⁴. The nouns of (8) are some found in (6), but the addition of modification renders them in need of an article or quantifier:

- (8) a. *She traveled on sore foot
 b. *He was found in silk-sheeted bed.
 c. *Mimi attended class taught by Prof. Linskowski.
 d. *The ship is now in port that's being dredged.

Another features of these bare singulars is that a certain degree of “semantic enrichment” is added.

- (9) a. Being in prison is not simply being in *a* prison, but that and more...
 b. Being in bed is not simply being in *a* bed, but that and more...

For instance, being “in bed” is not simply a locative statement, though it is that in part, but also at least strongly implies that the individual is there for the purpose of resting, sleeping, that is, using a bed for its intended design purpose. For instance, one would not say of a person lying on a bed who is actively writing a dissertation on her laptop that that person is “in bed”. Or a person who is “in prison” isn’t just there, but also, e.g. incarcerated. Similar intuitions are found pretty much across-the-board with this class of bare singulars.

A fourth feature of the distribution of bare singulars is that they must be ‘lexically governed’—or, more neutrally, cooccur with a designated class of other lexical items. In English this is most often a preposition but verbs can govern them as well. Which items may serve as governors is specific to the lexical identity of the noun⁵. The examples in (10) have inappropriate governing lexical items and hence are not grammatical:

- (10) a. *They found him on bed.
 b. *The ship is in sea (OK in port)
 c. *He’s next to jail/prison/church
 d. *Mimi destroyed college/class/school.

From a semantic point of view, it is somewhat difficult to determine if bare singulars are definite or indefinite—their distributional properties preclude application of the standard tests. However, it is very clear that, like bare singulars in other languages or existential readings of bare plurals in English, bare singulars appear to take narrowest possible scope with respect

to other operators in the same sentence. If one considers them existentially quantified, then the existential quantifier does not have variable scope. So, for instance, in (11) there appear no readings where an existential quantifier takes scope over the quantifier in the subject or the negation.

- (11) a. Each mobster went to prison.
 b. Most of them are in class.
 c. My seven sons attended college.
 d. Bob is not in bed.

Let us now return to the topic of weak definites. It turns out that this class of definites, once appropriately identified shares precisely the same set of restrictions as the bare singulars. This is demonstrated in the examples below. We are not going to take the time here to establish that each instance of what we claim to be a weak definite is one; we are implicitly relying upon VP-ellipsis tests of the type described above in each instance. It is vital to note that, for the most part any noun or construction which allows for a weak reading also allows for a regular definite reading—there is a systematic ambiguity in other words (though a few highly colloquial exceptions to this have been identified, such as “the pokey” meaning “prison”, which has no regular definite reading). For instance, “the newspaper” has a weak reading but alongside it there is the possibility of a regular definite reading in all constructions. The weak reading only occurs under certain conditions whereas the regular reading may occur under all circumstances.

Like bare singulars, weak definites are lexically determined by the noun itself—it is a lexical property.

- (12) a. He went to the hospital (wk) vs He went to the building (no wk)
 b. Scarface is in the pen (wk) vs. Scarface is in the cage (no wk).
 c. They listened to the radio (wk) vs. They listened to the tape recorder (no wk).

Like bare singulars again, the weak reading disappears in the presence of modification⁶:

- (13) a. He went to the 5-story hospital(no wk).

- b. They both checked the calendar that was hanging upside down (no wk).
- c. Each man listened to the red radio on the picnic table (no wk).

There is typically a certain amount of “semantic enrichment” associated with weak readings, in contrast to the regular definite readings.

- (14) a. Going to the store is going to *a* store and more...(shopping)
- b. Being in the hospital is being in *a* hospital, and more...(healing)
- c. Looking at the calendar is looking at *a* calendar, and more...(gathering information)

And, like bare singulars, for a weak reading to appear the noun phrase must be appropriately “governed” by a set lexical item or a class of items determined by the identity of the noun. This is most often a preposition though verbs too may serve as governors.

- (15) a. Kenneth is at the store (wk) vs. behind the store (no wk)
- b. They took the crash victims to the hospital (wk) vs. past the hospital (no wk)
- c. Sally checked the calendar (wk) vs. tore the calendar (no wk)

As with the bare singulars, distributional restrictions preclude the usual tests for definiteness and indefiniteness. We do note, however, that weak readings of definites appear to take narrowest scope (if one considers them existentially quantified) with respect to other operators in the sentence. In (16) we clearly see the possibility of distributed readings, in contrast to the examples in (17) which do not allow weak readings:

- (16) a. Each man listened to the radio.
- b. Every professor went to the store.
- c. Four students were busy reading the newspaper.

- (17) a. Each man scratched the radio.
- b. Every professor pulled the cart.

- c. Four students were busy watching the lawn mower.

4 Preliminary conclusions

At this point we claim to have isolated a class of noun phrases with definite articles which share the distributional and semantic properties of bare singulars in English⁷. Obviously, a detailed syntactic and semantic analysis is called for at some point. However, our aims in this paper are limited to establishing that there is a distinct subclass of definites in English. In the next section we turn to the question of whether this distinction can be behaviorally established, and as we will shortly see the experimental evidence supports this distinction as well. We are also going to experimentally evaluate a question which we could not resolve in the discussion above. One possible suggestion is that the weak definites are in fact indefinites NP's in disguise. That is, in "John read the newspaper" on the weak reading, the semantics is just that of "John read *a* newspaper". This idea is not as strange as it may seem at first sight, for from a *strictly* truth-conditional point of view the two are actually equivalent. If one says of John that he is "in bed", for instance, his presence in any bed with the intended purpose of rest will be sufficient. Or, if Mary went to the store (to shop), it need only be true that she went to some store or other. While one normally uses constructions to indicate a bed, store, etc., which figure in the individual's habitual pattern of behavior, this is not a part of the assertion's actual truth conditions, and it ends up being truth-conditionally identical to an indefinite--modulo semantic enrichment if indeed this is a part of the semantics and not just a (strong) implicature.

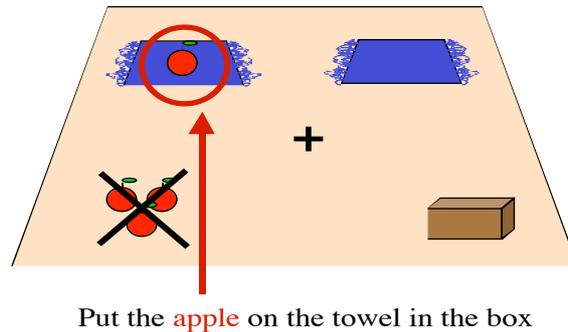
We now turn to the experimental evaluation of this hypothesis. In the following sections, we will present empirical evidence for on-line processing differences between weak, or indefinite definites and their more commonplace regular definite counterparts.

5 Experimental work

5.1 Background

Spivey, Eberhard, Sedivy, and Tanenhaus (2002) present a study elucidating the referential assumptions that are introduced by normal definite noun phrases beginning with the article “the.” In this study, participants were seated before a real-world display containing a group of three apples, an single apple sitting by itself on a towel, an empty towel, and an empty box. They were then given the spoken instruction to “put the apple on the towel in the box.” As they performed this task, their eye movements were monitored. Analyses of these eye movements revealed that upon hearing the definite determiner and the noun, participant attention was naturally drawn to the singleton apple, in spite of the fact that at this point, the instruction is still fully ambiguous as to which apple will be referred to (see figure 1). For example, the instruction may well have continued, “put the apple that’s the furthest to the left in the group of apples in the box.” Nevertheless, participants consistently (and correctly) ignored the group of three apples in favour of the singleton apple as soon as they had heard the definite NP.

Figure 1: Example from Spivey, Eberhard, Sedivy, and Tanenhaus (2002)



The results of this experiment confirm the function of the definite article as put forth in Roberts, (2003) – that is, that definite articles serve to pick out some sort of unique entity in the context. In light of their results, the Spivey et. al. work can be seen as evidence that a normal definite article is automatically interpreted as referring to a “unique” entity in the context.

Thus we should expect to see looks to items that can easily be isolated as having some unique property, which in the Spivey et. al. experiment would be the apple that was separated from the group and sitting by itself. Thus, the Spivey et. al. experiment has provided us with a well defined set of expectations of how regular definites will be processed on-line with respect to a certain context. However, given the consistent failure of indefinite definites to pick out a unique referent outlined in the previous section, we might expect them to behave differently in on-line tasks. Namely, we would expect that for indefinite definites, the tendency for a noun-phrase of the form “the [noun]” to draw attention to singleton referents in the context should be lessened.

5.2 Our experiment

Our experiment was designed to determine whether indefinite definites would behave differently from regular definites during online referential processing. Specifically, we hypothesize that regular definites should draw participant attention to singleton targets, while indefinite definites will not.

5.2.1 Materials

We selected six nouns that often function as indefinite definites and matched them with comparable nouns that were obligatorily regular definites. The noun pairs were matched with verbs that were known to support the indefinite definite reading (as verified in our off-line judgement survey, described above) and placed into a sentential frame. This yielded a set of 6 pairs of matched experimental sentences: one version that contained an indefinite definite, and one version that contained a regular definite, but was otherwise identical (see table 2 for a full list of experimental materials).

	Regular Definite version	Indefinite Definite version
1.	When she gets back from jazz-ercise class, Tammy will listen to the record.	When she gets back from jazz-ercise class, Tammy will listen to the radio.
2.	Later this afternoon, Marilyn will open the box.	Later this afternoon, Marilyn will open the window.
3.	Before she finalizes her plans, Tina will consult the map.	Before she finalizes her plans, Tina will consult the calendar.
4.	Before she has to go to school, Lisa will answer the letter.	Before she has to go to school, Lisa will answer the phone.
5.	When he is ready to go, Trevor will slam the lid on his way out	When he is ready to go, Trevor will slam the door on his way out
6.	After she finishes her breakfast, Lydia will read the book.	After she finishes her breakfast, Lydia will read the newspaper.

Table 2: Experimental materials.

For each sentence pair, we constructed a visual context meant to depict the scene just before the action depicted in the sentence is carried out. The scene showed a human actor, and three tokens of the object that was to serve as the patient of the action. Two of these were clustered near each other in a group, while the third was alone and isolated from the group by some distance. Additionally the scenes contained 3 distractor items that were not mentioned in the sentence, also presented in the form of a singleton and a small group of two (see figure 2).

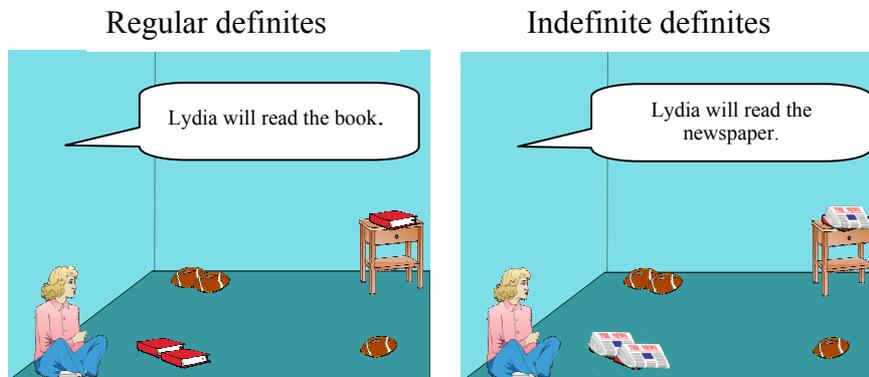


Figure 2: Scenes and spoken materials from the experiment

The arrangement of the items in the scenes was counterbalanced across items so as to avoid the possibility of participants coming to expect targets to appear in a particular location. This also served to avoid building participant expectations based on some interaction of object arrangement and actor eye gaze, body posture, etc. Crucially, however, the position of the actor and objects in the scenes remained constant across noun type conditions; that is, the indefinite definite version of an instruction was presented with exactly the same scene configuration as for the regular definite version. In this way we insure that any differences observed in the processing and comprehension of indefinite vs. regular definites cannot be due to variations across conditions in target salience or proximity to the depicted actor.

5.2.2 *Procedure*

Participants saw the visual displays on a computer screen while they heard a pre-recorded spoken version of the sentence matched to the display from a nearby speaker. They had been instructed that after hearing the sentence, their task was to choose the item in the display that they thought was most likely to be involved in the upcoming action. By involving them in a task that forced them to referentially link the spoken materials to the provided visual context, we hoped to get an idea of the particular item that participants interpreted our nouns of interest as referring to. Given the referential properties of indefinite definites as well as the results of the Spivey et. al. work, we expected that while regular definites would result in more participants choosing the singleton target as most likely to be involved in the action, indefinite definites should exhibit less of a tendency to be interpreted as referring to the singleton item.

As participants were performing this task, we monitored their eye movements. A large body of work has established that eye movements are closely time-locked to spoken language comprehension and thus provides a useful tool for observing processes of reference resolution (Tanenhaus, Spivey-Knowlton, Eberhard and Sedivy, 1995, Eberhard et. al., 1995, Arnold et al, 2000, Runner, Sussman, and Tanenhaus, 2003, inter alia). By analyzing the time-course of eye-movements participants make as the spoken instructions unfolds, we can get an idea of which items in the display are being considered at any given moment as referents for our target noun.

A total of sixteen members of the University of Rochester community took part in the experiment. All had normal or corrected to normal vision. None of the participants had taken part in any of the earlier pilot versions of this experiment, or in the pen-and-paper survey reported above.

5.2.3 Results

This experiment yielded two types of results: target choice (member of the group target or the singleton target) and eye movements.

For the indefinite definites, participants were much more likely to guess that a member of the group target would be involved in the upcoming action, choosing one of these items on 61% of trials. For regular definites, participants chose a member of the group target as involved in the action on only 33% of trials. This result illustrates two important aspects of indefinite definites. Firstly, target choice for indefinite definites and regular definites was significantly different, with indefinite definites eliciting more choices of group targets ($t_1(15)=4.66$, $p<.001$, $t_2(5)=3.45$, $p=0.09$). The second aspect to note is that for indefinite definites, choice of target item was equally distributed among the three available compatible targets, with each individual target being selected on a third of trials. For regular definites, a target item that was a member of the group target had only a 17% chance of being selected as the item most likely to be involved in the action described, while the singleton target had a 66% of being selected. In this way, regular definites exhibit a marked preference for the singleton target item, while indefinite definites fail to give rise to any specific expectation of which target item will be involved in the action.

The analysis of the eye-movement data revealed a similar story. Here, during the window of time when the participant would be hearing the target noun of the spoken materials, they were (marginally) significantly more likely to fixate the group target if they were hearing an indefinite definite noun phrase than if they were hearing a regular definite ($t_1(15)=1.09$, $p=.14$, $t_2(5)=2.15$, $p<.05$).

The experimental evidence thus far supports the existence of two separate classes of definites; both target choice and eye-movements revealed a systematic difference between the regular and indefinite definites. This evidence is in accordance with the observations of semantic difference put forth in the first half of this paper. In addition to the hypothesized difference between regular and indefinite definites, a certain affinity between

normal indefinites and indefinite definites had been predicted. In the interests of testing this prediction, the current experiment included a third condition, namely, one where the experimental materials contained a normal indefinite phrase (see figure 3).

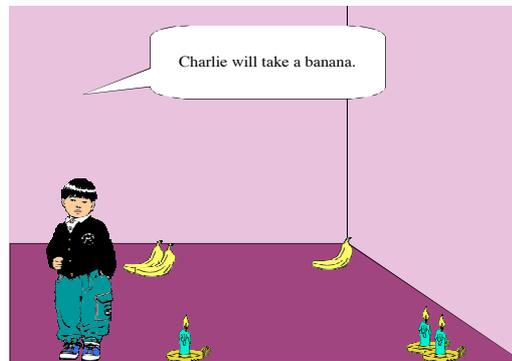


Figure 3: Scene and spoken materials for trials testing regular indefinites.

Trials involving regular indefinites did not differ in form from the trials described above; participants were presented with a scene while they heard a sentence about an event that was about to occur. Their task was to select the item that they believed would be most likely involved in the upcoming event.

Contrary to expectation, the results of the regular indefinite trials were markedly different from the indefinite definite trials. Participants were much more likely to select the singleton item as involved in the event for regular indefinites than for indefinite definites; while this target was chosen for regular indefinites on 89% of trials, for indefinite definites participants chose the singleton on only 39% of trials ($t_1(15)=6.89$, $p<.001$, $t_2(5)=2.36$, $p<.05$). Eye-movements also revealed a striking difference between the two conditions. During the region corresponding to the pronunciation of the noun in the experimental materials, participants were much more likely to be looking at the singleton target for regular indefinites ($t_1(15)=3.92$, $p<.001$, $t_2(5)=2.87$, $p<.05$), and at the group target for indefinite definites ($t_1(15)=5.65$, $p<.001$, $t_2(5)=2.69$, $p<.05$).

6 Conclusions

The experiments reported here demonstrate that regular definites and indefinite definites constitute two separate and empirically distinguishable classes of noun phrase. It furthermore strongly suggests that the class of indefinite definites is also distinguishable from regular definites. Recognizing this subclass (and characterizing its boundaries), and pursuing a syntactic and semantic analysis for them can now proceed on firmer ground than we might otherwise have had, with possible consequences for the overall treatment of definites. We also found out something that we could not easily evaluate using the direct evidence from grammaticality and meaning judgements; that is, that the weak or indefinite definites should not be accorded an analysis which identifies them with ordinary indefinite noun phrases. While the data we have worked with here has been exclusively from English, there are strong indications that similar subgroups can be found in other languages with definite articles.

References

- Arnold, Jennifer, Eisenband, J., Brown-Schmidt, Sarah, and Trueswell, John
2000 The rapid use of gender information: Evidence of the time course of pronoun resolution from eyetracking. *Cognition* 76, 247-264.
- Borthen, Kaja
2003 Norwegian Bare Singulars. Doctoral dissertation, NTNU, Trondheim.
- Eberhard, Kathleen, Spivey-Knowlton, Michael, Sedivy, Julie., and Tanenhaus, Michael
1995 Eye movements as a window into real-time spoken language comprehension in natural contexts. *Journal of Psycholinguistic Research*, 24, 409-436.
- Heycock, Caroline and Zamparelli, Roberto
2003 Coordinated bare definites, *Linguistic Inquiry* 34, 443-69.
- Kallulli, Dalina
1999 The comparative syntax of Albanian: On the contribution of syntactic types to propositional interpretation. University of Durham dissertation.
- Munn, Alan, and Schmidt, Cristina
1999 Bare nouns and the morpho-syntax of number. Proceedings of the Linguistic Symposium on Romance Languages 1999.
- Roberts, Craige

- 2003 Uniqueness in definite noun phrases. *Linguistics and Philosophy* 26, 287-350.
- Runner, Jeffrey, Sussman, Rachel, and Tanenhaus, Michael
2003 Assignment of reference to reflexives and pronouns in picture noun phrases: evidence from eye movements. *Cognition* 89, B1-B13.
- Spivey, Michael, Tanenhaus, Michael, Eberhard, Kathleen, and Sedivy, Julie
2002 Eye movements and spoken language comprehension: Effects of visual context on syntactic ambiguity resolution. *Cognitive Psychology* 45, 447-481.
- Stvan, Laurel
1998 The semantics and pragmatics of bare singular noun phrases. Ph.D. dissertation, Northwestern University.
- Tanenhaus, Michael Spivey-Knowlton, Michael Eberhard, Kathleen and Sedivy, Julie
1995 Integration of visual and linguistic information during spoken language comprehension. *Science*, 268, 1632-1634.

Greg Carlson
Department of Linguistics
University of Rochester
Rochester, NY 14627
USA

Rachel Sussman
Department of Linguistics
University of Rochester
Rochester, NY 14627
USA

Notes

- ¹ This material was previously presented to the Linguistics Department at the University Of Maryland, and we thank the audience for their helpful comments. Special thanks are due Paul Pietroski and Michael Israel for extended discussion. This material is based upon work supported by the NSF under Grant No. 0328849 (first author) and by NIH under Grant R01 HD27206 (second author).
- ² t and t refer to statistical analyses that treat participants as the random factor, and experimental items as the random factor, respectively
- ³ American and British English differ at least in the use of “university” and “hospital”. Both are unacceptable in American English as bare singulars.
- ⁴ One reviewer note the possibility of “He heard the program on local radio”, which sounds just fine. We’re not certain what is going on here, as in American English “?He heard the program on radio” has a marginal status that the reviewer’s example does not. We also note that “local” does not generalize to other bare singulars as a modifier; “*The ship is in local port”, “*Mary attended local class”, etc.
- ⁵ While the “governing” item is typically adjacent, there examples with certain nouns where matters are less clear
- i) Prison is no place to make friends.
 - ii) Class was really boring today.
- Such example contrast with:
- iii) *Port is a good place for ships to arrive at.
 - iv) *Foot is a hard way to travel long distances.
- ⁶ Purely affective modifiers, however, may appear:
- i) He’s reading the ol’ newspaper again.
 - ii) So check the blasted/doggone... calendar again, OK?
- Even these, however, do not at all easily appear with bare singulars.
- ⁷ Chris Barker (pc) has independently noted that relational nouns function in the same ‘weak’ way. For instance, if a house is on “the corner”, it is on one of four corners of which three need have not already needed to be eliminated from the discourse—it’s truth-conditionally simply on *a* corner. One distinction we do note is that such relational nouns do not seem to distribute: to say ‘Every house is on the corner’ the same corner must be involved for each, and not different corners, in contrast to the examples we are considering here.

Department of Linguistics
University of Rochester
Rochester, NY 14627
USA

carlson@ling.rochester.edu
rss@ling.rochester.edu

