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BRIEF REPORT

The Time Course of Plausibility Effects on Eye Movements in Reading: Evidence From Noun–Noun Compounds

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Readers' eye movements were monitored as they read sentences containing noun–noun compounds that varied in frequency (e.g., *elevator mechanic*, *mountain lion*). The left constituent of the compound was either plausible or implausible as a head noun at the point at which it appeared, whereas the compound as a whole was always plausible. When the head noun analysis of the left constituent was implausible, reading times on this word were inflated, beginning with the first fixation. This finding is consistent with previous demonstrations of very rapid effects of plausibility on eye movements. Compound frequency did not modulate the plausibility effect, and all disruption was resolved by the time readers' eyes moved to the next word. These findings suggest (contra Kennison, 2005) that the parser initially analyzes a singular noun as a head instead of a modifier. In addition, the findings confirm that the very rapid effect of plausibility on eye movements is not due to strategic factors, because in the present experiment, unlike in previous demonstrations, this effect appeared in sentences that were globally plausible.

Keywords: language comprehension, eye movements, semantic processing

Several decades of research on eye movement control in reading (Rayner, 1998) have demonstrated that the time the eyes spend on a word is reliably influenced by a range of orthographic and linguistic factors, most notably word length (Rayner & McConkie, 1976), word frequency (Inhoff & Rayner, 1986; Rayner & Duffy, 1986), and the predictability of the word in context (Ehrlich & Rayner, 1981; Rayner & Well, 1996). Recently, Rayner, Warren, Juhasz, and Liversedge (2004) and Warren and McConnell (in press) investigated the time course with which a word's plausibility in context affects eye movements (see also Braze, Shankweiler, Ni, & Palumbo, 2002; Joseph et al., in press; Ni, Fodor, Crain, & Shankweiler, 1998; Warren, McConnell, & Rayner, 2007). In these experiments, a target noun remained constant while the preceding context was varied so that this noun was either a plausible or an implausible theme argument for the preceding verb. An example set of materials used by both Rayner et al. and Warren and McConnell is in 1a and 1b:[1]

1a. John used a knife to chop the large carrots for dinner last night.

1b. John used a pump to inflate the large carrots for dinner last night.

Rayner et al. reported a significant increase in gaze duration (the sum of fixation durations on a word from the time the eyes first encounter the word to the time the eyes first leave the word, to the left or right) on the target word (*carrots*) in the implausible condition. Mean gaze durations in the plausible and implausible conditions were 286 ms and 306 ms, respectively. Both Rayner et al. and Warren and McConnell also reported a significant increase in go-past time (the sum of all fixation durations from when the eyes first encounter a word to when the eyes leave the word to the right, including time spent rereading earlier material and time

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[1] In both experiments, a third condition was also included that involved a less extreme semantic violation. The implausible condition in the experiment presented here is comparable to the more extreme violation conditions in these previous studies, so for simplicity we omit discussion of these additional conditions. But for comparison, it is important to note that Rayner et al. (2004) actually labeled this less extreme violation the *implausible* condition, whereas the condition exemplified in 1b is called the *anomalous* condition.

spent rereading the word itself) on the target word in the implausible condition. In addition, Warren and McConnell reported a significant increase in the duration of the reader's first fixation on the target word, which is the earliest possible processing measure (259 ms in the plausible condition, 273 ms in the implausible condition). In sum, it is clear that the plausibility manipulation had a reliable effect within about 300 ms of the eyes' first encounter with the target noun, with mixed evidence for an even earlier effect. The authors of both studies also reported a sizable reading time penalty on the subsequent material when the critical noun was implausible.

These findings suggest that as readers' eyes move through a text, semantic interpretation, like syntactic parsing (Frazier & Rayner, 1982; Just & Carpenter, 1980), is highly incremental, proceeding on a more or less word-by-word basis (Rayner, Cook, Juhasz, & Frazier, 2006). Furthermore, semantic interpretation is very fast, with plausibility having an effect only slightly later than the factors that are generally regarded as influencing lexical access itself, such as word frequency (Rayner, 1998). Plausibility could only have a reliable effect on gaze duration on the word *carrots* in 1a–1b if, within about 300 ms of encountering this word, the reader has recognized the word, attached it into the syntactic phrase marker, constructed the semantic interpretation on which carrots are being chopped or inflated, and noted (at some level) that the event being described is plausible or implausible. Indeed, all this must happen well before 300 ms: The delay in making an eye movement to the next word, when the fixated word is implausible in context, is likely to reflect cognitive events that actually occur at least 150 ms earlier, as the process of planning and executing a saccade is thought to require at least this much time (see, e.g., Rayner, Slowiaczek, Clifton, & Bertera, 1983; Reichle, Rayner, & Pollatsek, 2003; Sereno, Rayner, & Posner, 1998). This effect of implausibility on eye movements therefore appears to be faster than the observed response to similar violations in event-related potential research (Bornkessel & Schlesewsky, 2006; Sereno & Rayner, 2003). A word that is incongruent with the preceding sentence context typically elicits an increase in the amplitude of the N400 component, a negative-going waveform that reaches its maximal amplitude about 400 ms after word onset (Kutas & Federmeier, 2000; Kutas & Hillyard, 1980; van Berkum, Hagoort, & Brown, 1999). The very earliest sign of this modulation of the N400 typically appears no earlier than about 250 ms after word onset. As Bornkessel and Schlesewsky (2006) have noted, this discrepancy suggests that the N400 may not reflect implausibility detection itself but rather a later event such as phase resetting of underlying oscillatory activity (Roehm, Schlesewsky, Bornkessel, Frisch, & Haider, 2004).

In this article, we present an experiment that was designed to investigate potential explanations of and limits on the early plausibility effects obtained by Rayner et al. (2004) and Warren and McConnell (in press). We had two main goals in the experiment. The first was to rule out an artifactual explanation. It is likely that participants in the Rayner et al. and Warren and McConnell experiments were aware of the presence of implausible sentences in the set of materials. Furthermore, it is possible that prior to encountering the target word in the critical sentences, readers were aware that this word might be implausible in context. Although filler sentences were used, all of the critical sentences in these experiments used the same structure (i.e., [*noun phrase*] *used* [*noun phrase*] *to* [*verb*] [*noun phrase*]. . . .), and the target word always appeared in the same position: as the final noun in this sequence. Thus, on reading the first few words of one of the experimental sentences (e.g., *John used the pump. . . .*), readers could have anticipated the arrival of a purpose clause and could have anticipated that the theme within this purpose clause might be implausible. If so, this might explain the finding that plausibility has an early effect in the eye movement record. In the present experiment, the materials were designed to rule out potential strategic effects arising from participants' anticipation of implausibility.

The second goal was to further investigate the timing of the plausibility effect. In two word-by-word self-paced reading experiments, Kennison (2005) manipulated the number of a critical noun and its suitability as a head noun given a preceding adjective (e.g., *ancient castle*[*s*] vs. *careful castle*[*s*]). When the critical noun was plural, there was a significant effect of the semantic manipulation on the noun itself, with longer reading times when the adjective–noun combination was implausible. But when the critical noun was singular, a significant effect of the semantic manipulation did not appear until the next word. Kennison interpreted these results as suggesting that the possibility of a modifier analysis of a singular noun results in a delay in the reader's commitment to an implausible semantic interpretation. In English, a singular noun, but not a (regular) plural noun, can serve as the left constituent of a noun–noun compound (e.g., Gordon, 1985; Haskell, MacDonald, & Seidenberg, 2003).

Although Kennison's (2005) results are interesting, it is not obvious whether they reflect the processes involved in normal reading. In self-paced reading, the participant is required to make a conscious decision to move on to the next word by pressing a button and is therefore able to set a task-specific criterion for moving on. We argue that it is simply unknown whether the decision to move on to the next word in the self-paced reading task reflects the same factors that control eye movements in normal reading. Furthermore, as is typically the case in self-paced reading, the time that readers spent on each word in Kennison's experiments was much longer than the time they would spend on the same word in normal reading: The mean reading time for the singular nouns was about 550 ms, which, given the length and frequency of these words, would be about twice the reading time (i.e., gaze duration) expected in normal reading.

In the present experiment, we asked whether the plausibility effect is delayed with singular nouns in normal reading. We assumed, contra Kennison (2005), that it would not be delayed. The original Rayner et al. (2004) and Warren and McConnell (in press) experiments each used 30 items, and, in both studies, only 7 of them had a grammatically plural target noun. The remaining 23 had either singular count nouns or mass nouns (the latter function like singular count nouns with respect to compounding). Thus, it would be surprising if the early plausibility effects obtained in these studies were due entirely to items with plural target nouns. Moreover, a post hoc analysis of the data from the Rayner et al. study found no evidence that the early plausibility effects were restricted to the seven items with plural target nouns.

The critical sentences in the present experiment were ultimately plausible in all conditions. The target noun in this experiment was the left constituent of a compound, and the compound as a whole was fully plausible in context. However, the plausibility of the

head noun analysis of the initial noun was manipulated. For example, 2a below is implausible, on the head noun analysis of *cafeteria*, but when the next word is encountered, as in 2b, the implausibility is eliminated:

2a. The new principal talked to the cafeteria . . .

2b. The new principal talked to the cafeteria manager at the end of the school day.

Thus, readers were likely to be unaware of any implausibility when reading. These sentences were compared with similar sentences in which the target noun was plausible as a phrasal head, as in 3a, although it turned out to be the left constituent of a compound:

3a. The new principal visited the cafeteria . . .

3b. The new principal visited the cafeteria manager at the end of the school day.

In addition to varying the plausibility of the target noun as a phrasal head, the experiment also varied, between items, the familiarity of the compound. Thus, in addition to relatively novel compounds like *cafeteria manager*, the materials also included familiar compounds, like *mountain lion* in 4a and 4b:

4a. Jenny heard the huge mountain lion pacing in its cage.

4b. Jenny looked out on the huge mountain lion pacing in its cage.

If it is assumed that a modifier analysis of the critical noun is more easily accessible when there is a relatively familiar compound in which this word could appear, then the plausibility effect might be delayed (or might be absent altogether) when the critical noun could be the left constituent of a compound that is both familiar and plausible.

Method

Participants

Forty-two native speakers of American English, who were members of the University of Massachusetts community, were given course credit or were paid $7 to participate in the experiment. All had normal or corrected-to-normal vision, and all were naive to the purpose of the experiment.

Materials

The materials for this experiment consisted of 24 pairs of sentences containing relatively novel compounds like 2b and 3b above, repeated here as 5a and 5b, and 24 containing relatively familiar compounds like 4a and 4b above, repeated here as 6a and 6b. The full set of materials is printed in the Appendix.[2]

5a. The new principal talked to the cafeteria manager at the end of the school day. (implausible head analysis, novel compound)

5b. The new principal visited the cafeteria manager at the end of the school day. (plausible head analysis, novel compound)

6a. Jenny heard the huge mountain lion pacing in its cage. (implausible head analysis, familiar compound)

6b. Jenny looked out on the huge mountain lion pacing in its cage. (plausible head analysis, familiar compound)

Frequency counts were obtained for each of the compounds using the Google search engine (http://www.google.com; November 30, 2006). Google returned an average of 1,774,375 hits for the familiar compounds and an average of 89,872 hits for the novel compounds, with mean log frequencies of 6.19 and 4.16, respectively; $t(46) = 7.80$, $p < .01$. Thus, the compounds that were categorized as familiar were about 20 times as frequent as the compounds that were categorized as novel. The two distributions were nonoverlapping, with the exception of a single familiar compound (*weight lifter*; 297,000 hits) that was just lower in frequency than the most frequent novel compound (*elbow injury*; 305,000 hits). We allowed this to stand, noting that *weightlifter* is also quite frequently an unspaced compound (with 393,000 Google hits).

The plausibility of the head noun analysis of the critical noun was assessed through offline norms. We provided participants with one version of each sentence up through the critical noun and asked for a rating on a scale of 1 to 5 of the fit of this noun in the sentence, with 5 denoting a good fit and 1 denoting a very poor fit. This procedure did not explicitly state that the noun was to be treated as a head noun, and therefore the procedure was, if anything, biased against the finding of significant differences between conditions. No participant rated more than one version of each sentence; each version was rated by 10 participants. The mean fit ratings of the nouns were as follows: implausible head analysis, novel compound, 2.18; plausible head analysis, novel compound, 4.64; implausible head analysis, familiar compound, 2.67; plausible head analysis, novel compound, 4.33. There was no effect of compound type on the fit ratings (Fs < 1). There was a significant effect of plausibility, $F_1(1, 29) = 359.90$, $p < .001$; $F_2(1, 46) = 169.48$, $p < .001$. There was also a significant interaction between compound type and plausibility, $F_1(1, 29) = 42.04$, $p < .001$; $F_2(1, 46) = 6.53$, $p < .02$. As the condition means indicate, this interaction was driven primarily by higher fit ratings in the implausible condition when the word was taken from a familiar compound than when it was taken from a novel compound.[3]

Because we were not interested in main effects of compound type, the target nouns in the two conditions were allowed to vary with respect to length and frequency. In fact, there was little difference in length between the two conditions, as the initial nouns in the novel and familiar compounds had mean lengths of 6.92 and 6.67 characters, respectively; $t(46) = 0.81$, $p = .43$. However, the initial nouns in the novel compounds were less frequent, with a mean frequency of 25,184 in the 131-million-word HAL corpus (Burgess & Livesay, 1998), compared with a frequency of 44,986 for the initial nouns in the familiar compounds. The mean log frequencies of the initial nouns in the two types of compounds were 8.84 and 9.81, respectively; $t(46) = 2.13$, $p <$

[2] A third condition was also included, which was intended to fall midway between the other two with respect to the plausibility of the head noun analysis. However, the results of an offline norming study, which is described below, suggested that we did not achieve this objective for many of the items. Therefore, we do not discuss the results obtained with this third condition.

[3] One possibility is that participants in the norming study were in fact able to retrieve the familiar compounds when rating the fit of an ostensibly implausible word.

.05. Thus, although the familiar compounds were about 20 times as frequent as the novel compounds, the initial nouns in the familiar compounds were less than twice as frequent as the initial nouns in the novel compounds.

The items were separated into three lists (see footnote 2), arranged so that one version of each item appeared on each list. Eight items in each of the conditions represented in 5a, 5b, 6a, and 6b appeared on each list. Each participant was randomly assigned to one of the three lists. The 48 experimental sentences (see footnote 2) were intermixed with 94 unrelated filler sentences of various types, none of which involved implausibility. The 142 sentences were presented in an individually randomized order to each participant after eight practice trials.

Procedure

Participants' eye movements were recorded using a Fourward Technologies (Buena Vista, VA) Dual Purkinje Image eye tracker with an angular resolution of 10 min of arc and a sampling rate of 1000 Hz. Viewing was binocular, but only the right eye was monitored. A bite bar was used to stabilize the head. Stimuli were displayed on a 15-in. (38.1-cm) monitor, with a maximum line length of 80 characters. Participants were seated 61 cm from the computer screen; 3.8 characters subtended 1° of visual angle.

On arrival at the laboratory, participants were instructed to read the sentences for understanding and to read at a normal rate. Comprehension was checked after 30% of trials by presenting the participant with a yes–no question; they averaged 93% correct, with no participant scoring below 77%. The duration of the experiment was approximately 30 min.

Results and Discussion

For the purpose of analysis of the data, each sentence was divided into four regions: a precompound region; a region consisting of the initial noun in the compound (i.e., the target word), which we refer to as the *modifier region*; a region consisting of the head noun of the compound; and a postcompound region:

> 7. The new principal talked to the/ cafeteria/ manager/ at the end of the school day.

For each region, we computed first fixation duration, first pass time (which is referred to as *gaze duration* when discussing single-word regions), and go-past time, which are described above. We also computed the percentage of trials on which a reader made a regressive eye movement out of a region during the first pass through the region (see Staub & Rayner, 2007, for further discussion of eye movement measures).

Prior to all analyses, sentences with track losses were excluded (1.6% of trials) and fixations less than 80 ms in duration and within one character of the previous or subsequent fixation were incorporated into this neighboring fixation. Remaining fixations less than 80 ms were deleted, as were fixations longer than 800 ms (see Rayner & Pollatsek, 1989). Fewer than 2% of fixations were eliminated on the basis of these criteria.

The participant means on each measure for each of the analysis regions are presented in Table 1. For each test of differences between means, analyses of variance (ANOVAs) were performed with participants (F_1) and items (F_2) as random effects variables. For all effects reported as not significant, the values of both F tests were less than 1.5. Counterbalancing group was included as a between-participants or between-items factor (Pollatsek & Well, 1995).

Because no attempt was made to equate the sentences with novel and familiar compounds on factors such as length and word frequency, we do not report main effects of compound type in what follows for any region. Although there were, for example, very large effects of compound type on reading times on the head noun, these are not interpretable in terms of the experimental manipula-

Table 1
Participant Mean Reading Times, in Milliseconds, and Percent Regressions, by Condition on Each Analysis Region

Measure	Precompound	Modifier	Head noun	Postcompound
First fixation duration				
Implausible, novel	200 (4)	278 (6)	289 (6)	276 (8)
Plausible, novel	202 (5)	261 (7)	290 (5)	270 (5)
Implausible, familiar	208 (5)	270 (7)	269 (5)	270 (7)
Plausible, familiar	209 (5)	262 (5)	259 (5)	268 (5)
Gaze/first pass time				
Implausible, novel	936 (24)	331 (10)	326 (9)	985 (40)
Plausible, novel	957 (30)	307 (11)	327 (8)	1,007 (40)
Implausible, familiar	1,033 (34)	309 (12)	284 (6)	1,109 (44)
Plausible, familiar	993 (34)	289 (7)	276 (6)	1,139 (46)
Go-past time				
Implausible, novel	936 (24)	365 (15)	361 (17)	1,125 (54)
Plausible, novel	957 (30)	337 (15)	355 (12)	1,111 (48)
Implausible, familiar	1,033 (34)	347 (17)	301 (9)	1,237 (59)
Plausible, familiar	993 (34)	310 (9)	293 (10)	1,244 (61)
Percent regressions				
Implausible, novel		7.8 (1.8)	5.9 (1.5)	9.6 (2.3)
Plausible, novel		6.2 (1.9)	4.1 (1.2)	10.9 (2.8)
Implausible, familiar		7.9 (2.2)	5.7 (1.3)	9.7 (1.7)
Plausible, familiar		6.7 (1.7)	4.6 (1.4)	8.0 (2.5)

Note. Standard error of the mean is in parentheses.

tion because the average length of the head nouns in the novel compounds was almost two characters greater than that of the head nouns in the familiar compounds.

No effects of plausibility approached significance on the precompound region. To investigate the possibility that parafoveal viewing of an implausible word had an effect on reading times before the eyes fixated this word directly, we also computed the duration of the last fixation before fixating the target word. The duration of this fixation was 4 ms greater in the implausible conditions than in the plausible conditions, a difference that did not approach significance. For the modifier region, there were significant effects of plausibility on all three reading time measures, with longer reading times when this modifier was implausible as a head noun: first fixation 13 ms: $F_1(1, 39) = 4.22$, $p < .05$, $F_2(1, 42) = 7.10$, $p < .02$; gaze duration 22 ms: $F_1(1, 39) = 7.74$, $p < .01$, $F_2(1, 42) = 8.11$, $p < .01$; go-past time 33 ms: $F_1(1, 39) = 8.60$, $p < .01$, $F_2(1, 42) = 10.64$, $p < .01$. However, the 1.4% effect of plausibility on percent regressions from the modifier region was not significant. Consistent with the fact that the sentences as a whole were plausible, there were no significant effects of plausibility on either the head noun or the postcompound region.

There were no fully significant effects of the Compound Type × Plausibility interaction on any region. On the precompound region, the interaction effect was significant in first pass/go-past time in the participants analysis, but it did not approach significance in the items analysis, $F_1(1, 39) = 5.2$, $p < .05$, $F_2(1, 42) = 0.90$, $p = .35$. Critically, there were no interaction effects on the modifier itself.

As an additional means of assessing the role of plausibility in driving the reading time effects on the target noun, we performed a correlational analysis relating the norming results to the reading time data. The correlation between an item's mean rating in the implausible condition in the offline norms and the size of the reading time penalty for that item (reading time in the implausible condition – reading time in the plausible condition) was computed. The results were as follows: first fixation duration, $r = -.34$, $p < .02$; gaze duration, $r = -.30$, $p < .05$; go-past time, $r = -.24$, $p = .10$. Thus, the poorer a word's fit in the implausible condition as assessed by the offline norms, the larger the reading time penalty on that word in the eye movement data.

In sum, there were three main findings. First, the implausibility of a singular noun as a head noun led to inflated reading times on this noun on all three reading time measures. Second, there was no sign that these effects were modulated by the frequency of the compound in which the critical noun was, in fact, the initial word. Finally, as soon as a reader's eyes moved to the next word (i.e., the head noun of the compound), the reader recovered from the effects of the implausibility of his or her initial analysis.

These results strongly argue against strategic factors as an explanation of early plausibility effects. The experimental sentences were all ultimately plausible, and indeed they became plausible on the word that followed the critical noun; thus, the increase in reading time on the critical noun is unlikely to be due to participants' prior anticipation of an implausible thematic relation. The results also argue against Kennison's (2005) suggestion that plausibility effects are delayed with singular nouns because singular nouns can function as modifiers. In the present experiment, the critical singular nouns actually functioned as modifiers, and the earliest possible plausibility effect (i.e., on first fixation duration) was obtained. Thus, it appears that the parser has a strong initial preference to analyze a singular noun as a head noun rather than as a modifier.

The present experiment also allowed us to evaluate whether parafoveal information (i.e., information from the word to the right of fixation) has an effect on the time course or size of plausibility effects. If the effect of the apparent implausibility of a word with respect to its preceding context is either delayed or reduced in size when the next word eliminates the appearance of implausibility, this would suggest an important role for parafoveal semantic and/or syntactic information. But this was not the case, which is consistent with previous research suggesting that readers do not have access either to semantic information about the word to the right of their current fixation (Altarriba, Kambe, Pollatsek, & Rayner, 2001; Rayner, Balota, & Pollatsek, 1986) or to information about this word's syntactic category (Clifton et al., 2003).

Conclusion

The experiment presented here provided a stringent test of the claim that plausibility has an automatic and rapid effect on eye movements. The critical word was the left constituent of a compound that turned out to be plausible in context; only the incorrect head noun analysis of the critical word was implausible. This short-lived apparent implausibility had an immediate and sizable effect on reading time. Thus, it appears that early effects of implausibility in the eye movement record are not due to strategic factors, nor are they eliminated when a modifier analysis is possible.

In sum, this experiment indicates that semantic integration of a noun into its sentence context does occur very quickly indeed. A plausible interpretation of the early effects obtained here and by Rayner et al. (2004) and Warren and McConnell (in press) would emphasize the role of anticipation of verbal arguments (Altmann & Kamide, 1999; Kamide, Altmann, & Haywood, 2003). In most of the items in these experiments, readers could use their knowledge of the semantic restrictions a verb imposes on its arguments to anticipate an upcoming argument with rather specific properties. For example, in 5a and 5b above, a reader could anticipate an animate theme argument, and indeed a human one, whereas in 6a and 6b, a reader could anticipate that the theme role will be filled by something that makes noise. If readers predict a theme argument with the feature *+animate*, then as soon as they determine that the theme argument is actually *−animate*, a mismatch can be detected. In the absence of such anticipatory processing, however, detecting a violation upon reaching the theme argument would involve retrieving the verb's thematic requirements from memory and comparing these requirements with the features of the word currently being processed, a process that might be thought to take considerable time.[4]

[4] It may be noted that prediction has recently been argued to play an important role in other aspects of language comprehension such as syntactic parsing (e.g., Chen, Gibson, & Wolf, 2005; Lau, Stroud, Plesch, & Phillips, 2006; Staub & Clifton, 2006).

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(*Appendix follows*)

Appendix

Experimental Items

The material that varied between conditions is in parentheses, with the plausible head noun analysis condition listed first. Items 1–24 use novel compounds, whereas Items 25–48 use familiar compounds.

1. The zookeeper (picked up/spread out) the monkey medicine that was in the enclosure.
2. The hungry raccoon (ate/ripped) the muffin container while going through the garbage.
3. Kim (heard about/modeled) the party outfit that her mother had chosen.
4. George (spent time at/cleaned off) the library table so that he could sort through the books.
5. The new principal (visited/talked to) the cafeteria manager at the end of the school day.
6. Mr. Randolph (stirred/shook) the casserole spices into the pot.
7. The maid (caught/scolded) the elevator mechanic who was goofing off.
8. Lindsay (finished/counted) her homework essays before going to bed.
9. Veronica (heard/bumped into) the music salesman at the front door.
10. The mechanic (repaired/listened to) the automobile radio on his lunch break.
11. The editor (liked/planned) the author conferences to take place on Tuesday.
12. The camper (removed/read) the backpack label after leaving the store.
13. The dealer (polished/counted) the cabinet drawers before making the sale.
14. The astronaut (landed on/dropped into) the surface crater that had been rumored to exist.
15. The children (loved/attended) the elephant shows that took place on Tuesday.
16. The contractor (admired/ordered) the kitchen fixtures after the renovation.
17. The visitors (dirtied/folded) the bathroom towels on the first day of their stay.
18. The athlete (bandaged/suffered) his elbow injury while sitting on the sidelines.
19. Lucy (walked by/met) the school janitor on the first day of class.
20. Ricardo (painted/leaned against) the ceiling supports while he ate his lunch.
21. Captain Jones (ordered/whispered to) the platoon commander to discipline his men better.
22. Larry (dropped/emptied) the pencil shavings in the wastebasket.
23. The botany professor (fed/counted) the plant parasites that she was studying.
24. The electrician (laid out/drew) the wiring sketch at the construction site.
25. He (looked forward to/boxed up) the dinner table being shipped this week.
26. Jane (carefully examined/listened carefully to) the package deal to make sure it was a bargain.
27. Sam (tried out/stood behind) the shower curtain to be sure it was the right size.
28. Jenny (looked out on/heard) the huge mountain lion pacing in its cage.
29. David often (approached/sorted through) his office work with a feeling of dread.
30. The teacher (looked/read) over the nursery rhyme before reciting it to the class.
31. The kids (decided to move/started having) the pillow fight when the video was over.
32. Sam (went to/phoned) the funeral home so that they would send a limousine.
33. John (counted on/did business with) his savings bank because of the bad economy.
34. Arnie (enjoyed/bought) the season tickets though they cost more than last year.
35. The (last performance/graceful leap) of the ballet dancer was warmly applauded.
36. The new (suburb/office complex) had a family doctor with a degree from Harvard.
37. Cindy (smelled/heard) the garbage truck as it drove by her house.

38. John (went to/opened) the laundry basket and started to throw his dirty clothes in it.

39. Mary (was reassured about/bought) the safety belt because it was a big improvement.

40. Nora (was held up by/slowed at) the traffic light near the new mall.

41. Barbara went over (to/in) her station wagon and put some money in the parking meter.

42. The new taxi driver (needed/installed) the license plate for the cab he just bought.

43. Jane looked forward to (going to/visiting) the concert hall after it had been remodeled.

44. The teacher was unable to (understand/scold) the problem child in her class.

45. The anxious starlet (didn't have/hadn't met) a talent scout who would promote her.

46. It (required a great effort,/was a great event,) but the weight lifter finally won the competition.

47. The local police (worried about/minimized) security risks at the airport on the holidays.

48. Gordon (was annoyed by/calculated) the service charges at the local mortgage company.

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