Quantifier Polarity and Referential Focus during Reading

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We report the results of two eye-tracking experiments that examine how readers process sentences containing anaphoric pronouns when the referent is provided by a preceding quantified statement. Previous studies (Moxey & Sanford, 1987; Sanford, Moxey, & Paterson, 1996) have shown that positive and negative quantifiers (e.g., a few and few, respectively) cause subjects to focus on different aspects of the described situation and have direct consequences for the interpretation of subsequent anaphoric pronouns. In the present studies, we consider whether positive and negative quantifiers make different sets available as the referents of subsequent anaphora or if readers must infer the nature of these sets on encountering the anaphor. The results suggest that positives do make sets available as referents, whereas in the case of negatives, readers must infer the referent set. The findings are consistent with linguistic arguments concerning the differences between positive and negative quantifiers and add to our understanding of complex plural anaphora.

A major task in reading is to determine if expressions that appear in different parts of the text refer to the same persons or objects in the discourse. Such reference is frequently signaled by the use of anaphors, such as definite noun phrases (e.g., the man) and pronouns (e.g., he, she, they), which usually take their meaning from expressions that appeared earlier in the text. Quite often there is a simple coreferential relationship between an anaphor and its textual antecedent, such that the two expressions refer to the same person or object, and much effort has been expended on understanding the processes that enable a reader to identify an expression as an anaphor and recover a coreferential antecedent from the preceding text. In particular, studies have shown that the time spent reading a sentence containing an anaphor depends in part on the ease with which a reader can identify a coreferential antecedent (e.g., Haviland & Clark, 1974; Garrod & Sanford, 1977). Moreover, by monitoring subjects’ eye movements during reading, it has been possible to establish which factors have an immediate or early influence on the antecedent search process (Ehrlich & Rayner, 1983; O’Brien, Shank, Myers, & Rayner, 1988; Duffy & Rayner, 1990; Garrod, O’Brien, Morris, & Rayner, 1990; Garrod, Freudenthal & Boyle, 1994).

However, there are very many cases in which a pronoun does not bear a simple coreferring relation with a textual antecedent, including those in which either the anaphor or the antecedent expression is within the scope of quantification or negation. Examples of such
sentences are prevalent in the formal semantics literature (cf. Kamp & Reyle, 1993), yet there is little experimental research on how such sentences are interpreted. Many of the more complex cases are interesting because they pose serious problems about which aspects of a discourse become the focus of attention as a result of using different kinds of linguistic construction. The present paper is concerned with the claim that quantifiers (e.g., some, all, a few, few) can be differentiated in terms of a property of focus and that this can influence the interpretation that is assigned to an anaphoric pronoun during production or comprehension (Moxey & Sanford, 1987; Sanford, Moxey, & Paterson, 1994, 1996). We report two experiments that examine the resolution of anaphors that have a quantified antecedent.

Investigations of the patterns of focus induced by various quantifiers demonstrate differences between those which are negative and those which are positive (see Moxey & Sanford, 1993a, for a discussion of negativity). A difference in focus patterns is indicated by the patterns of pronominal reference which seem to be licensed by negative and positive quantifiers. In the simple case of a sentence quantified with the positive quantifier some x, such as Some of the fans went to the game, a satisfactory logical representation of the sentence requires a mental representation of the (necessary) set of fans who did go to the game, (which we shall call the Reference set), the (possible) set of fans who did not go (which we shall call the Complement set), and the possibility of things other than fans who might have gone (see, e.g., Johnson-Laird, 1983). Consideration of which of these sets might be referred to by a subsequent pronoun shows that the set of fans who went (the Reference Set) is licensed as a referent, as in (1’), while the set who did not go (the Complement Set) seems to be ruled out, as in (1’’):

(1) Some of the fans went to the game.
(1’) They watched it with enthusiasm.
(1’’) They watched it on television.

Moxey and Sanford (1987; Sanford, Moxey, & Paterson, 1996) showed that for negative quantifiers, such as not many X, few X, or less than 30% of X, reference to the set of fans who did not go to the match does seem to be possible and even preferable. Thus (2’’') is acceptable, and (2’’) seems to be less obviously acceptable than when it appeared as (1’’). It was argued that such a pattern of focus is typical of negative quantifiers.

(2) Not many of the fans went to the game.
(2’) They watched it with enthusiasm.
(2’’) They watched it on television.

The referent of They in (2’’) is argued by Moxey and Sanford (1987; Sanford et al., 1996) to be the Complement set. When subjects are invited to write continuations starting with the pronoun They in response to positive and negative quantified sentences, the results show just the kinds of bias described above. Positives almost invariably give rise to continuations in which They refers to the Reference set. With negatives, in a high proportion of continuations They is coreferential with the Complement set. There is, however, something of an asymmetry, in that the focus effects for the negatives are weaker. In the Sanford et al. (1996) data, for instance, where a total of 10 positive and 10 negative quantifiers were used, the Complement set rate for negatives was 62%, with 21% Reference set; the Reference set rate for positives was 90%, with only 0.5% Complement set. Thus, the focus pattern is more diffuse in the case of negatives than positives.

Although there are these asymmetries in the strength of focus effects revealed in continuations, Sanford et al. (1996) found that focus effects for both negative and positive quantifiers had an equivalent effect on the ease with which sentences were interpreted during reading when they contained references back to Reference set and Complement set. Subjects read a series of three-sentence passages in which the second sentence was either quantified by the positive expressions a few or many or the negative expressions few or not many (as shown in Table 1). The third sentence began with an anaphoric plural possessive noun phrase which referred to a property that was
TABLE 1

Example Material from Sanford et al. (1996)

A public meeting
Local MPs were invited to take part in a public enquiry about proposals to build a new nuclear power station.
# A few/Few of the MPs attended the meeting. #
Their presence/absence allowed the meeting to run more smoothly.

Example Material from Sanford et al. (1996)

(3) Eight of the ten marbles are in the bag.
(3’) They are under the sofa.

It is easy to show that They is typically used to refer to the marbles which are in the bag, as we argued for (1’). However, this demonstration of a failure of Complement set reference is restricted to positive quantifiers. There are two ways in which one might try to explain away Complement set phenomena: demonstrate that Complement set reference is not really a reference to the Complement set, but they spent longer reading a sentence that referred to a property of the unfocused set. This shows that readers found it difficult to integrate the anaphoric sentence with their understanding of the preceding text when the anaphor referred to a property of the unfocused set. Thus focus effects occur in comprehension as well as in production. Furthermore, these data suggest that during comprehension the Complement set is strongly preferred as the referent when the sentence is negatively quantified.

The observation of Complement set reference is at first sight at odds with formal linguistic theories, such as discourse representation theory (DRT; Kamp & Reyle, 1993). One of the central tenets regarding quantification within this framework is that Complement set reference per se cannot occur. DRT supposes that only supersets and explicitly introduced subsets are represented, this being sufficient for a truth-functional semantic account of quantifiers (e.g., Corblin, 1997; Geurts, 1997; Percus, Gibson, & Tunstall, 1997). There is no operation corresponding to “set-subtraction” in which the superset minus the Reference set comes to be represented. The standard argument (Kamp & Reyle, 1993) rests on the unacceptability of (3’) as a continuation of (3), which demonstrates that readers do not employ a set-subtraction operation to derive the Complement set. Readers cannot interpret the pronoun They in (3’) as referring to the two marbles that are not in the bag.

Either consistent with the Reference set (i.e., their presence) or the Complement set (i.e., their absence).

Readers spent more time on the sentence containing the anaphor when it referred to a property of the mismatched set. That is to say, they spent longer reading a sentence that referred to a property of the Complement set following quantification by either a few or many and longer reading a sentence that referred to a property of the Reference set following quantification by either few or not many. This shows that readers found it difficult to integrate the anaphoric sentence with their understanding of the preceding text when the anaphor referred to a property of the unfocused set. Thus focus effects occur in comprehension as well as in production. Furthermore, these data suggest that during comprehension the Complement set is strongly preferred as the referent when the sentence is negatively quantified.

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(3) Eight of the ten marbles are in the bag.
(3’) They are under the sofa.

It is easy to show that They is typically used to refer to the marbles which are in the bag, as we argued for (1’). However, this demonstration of a failure of Complement set reference is restricted to positive quantifiers. There are two ways in which one might try to explain away Complement set phenomena: demonstrate that Complement set reference is not really a reference to the Complement set, but rather a reference to the general set (e.g., Corblin, 1997) or show that Complement set reference relies on pragmatic factors rather than being strict anaphora (e.g., Dowty, 1994). Since Corblin’s approach cannot rule out all cases of Complement set anaphora (Sanford et al., 1996; see also the General Discussion), we shall concentrate more on Dowty’s suggestion, which is also partially compatible with DRT. This view is that positive quantifiers license Reference set anaphora (in DRT they make the reference set available in the listener’s representation of the discourse). In contrast, Dowty suggests that negative quantifiers do not license anaphora, but rather, if a pronounal reference is made following a negative quantifier, then a suitable referent set is determined pragmatically. This corresponds to the notion that Complement set reference may be a form of “mental deixis.” So on this view, the issue is not so much whether Complement set reference is possible; rather, it is how the pragmatic selection of a referent set for Complement set reference is established.

Sanford et al. (1996) considered two explanations of how readers process sentences that refer to the Reference and Complement sets of positively and negatively quantified statements. According to one of these accounts,
which we will refer to as the Set-Driven account, the quantifier causes one of the sets to become the focus of processing attention. Positive quantifiers cause the Reference set to become the focus of processing attention, while negatives cause the Complement set to become the focus of processing attention. Subsequent anaphora are evaluated with respect to the focused subset. Consequently, subjects perceived anaphoric sentences to be anomalous, resulting in a longer reading time, when they were incongruent with the focused subset. In the Set-Driven account, it was proposed that the focus pattern is selected when a quantifier is encountered; that is, the processor is tuned to accept linguistic input which relates to the Reference set in the case of positive quantifiers and to accept Complement set material in the case of negative quantifiers. The Set-Driven account captures the spirit in which DRT deals with positive quantifiers. It also suggests that negative quantifiers are treated in the same way. A process of set-subtraction causes the Complement set to be mentally represented and preferred as the referent of a subsequent pronoun.

An alternative account, which we will refer to as the Inference-Driven account, was introduced by Sanford et al. (1996) to account for negative quantifiers. According to this account, negative quantifiers do not directly isolate the Complement set as a focused antecedent. Rather, it takes as a starting point the idea that a negative quantifier, like other negatives, asserts a denial of a supposition (cf. Clark, 1976; Wason, 1965). Thus, given the sentence Not many fans went to the game, the statement effectively says “Someone expected ‘many’ fans to go, and less went,” a claim which has direct empirical support (Moxey & Sanford, 1993b). The argument here is that given a denial, a virtual question is induced in the mind of the reader/listener which is “Why did not more people go?” The answer to this question will often be found in the reasons why “they” could not go, which is focused on elements in the Complement set. However, it is important to note that an answer to the virtual question could be provided by elements of the Reference set or by a generalization about the superset (e.g., Corblin, 1997). Our claim is that these answers are most likely to be provided by elements of the Complement set and that this explains the preponderance, but not exclusive production, of Complement set continuations in production studies (Moxey & Sanford, 1993a; Sanford et al., 1996). The Inference-Driven account differs from the Set-Driven account in proposing that negatives do not cause the Complement set to become available on reading the quantified statement, but that a suitable Complement set can be inferred during integration of the anaphoric sentence.

A pure Inference-Driven account is sustainable if positive quantifiers also serve to raise a virtual question in the reader’s mind. An analysis of continuations to positive quantifiers shows two types to predominate: first, simple continuations of the type “what happened next,” and second, reasons, so that given X (a subset) did Y, the continuation is about why X did Y. It may be that positives cause the reader to anticipate continuations that explain why a particular state of affairs occurred or describe the consequences of that state of affairs taking place. These continuations would be consistent with focus on the Reference set. However, the Inference-Driven account requires that positive quantifiers do not cause the Reference set to become available on reading the quantified statement, but that it is inferred during integration of the anaphoric sentence.

Following Dowty (1994), it is also possible that anaphora are treated differently in positive and negative quantified contexts. Dowty’s claims are consistent with a processing account in which positives are treated according to the Set-Driven account and negatives are treated according to the Inference-Driven account. That is, negative quantifiers do not cause the Complement set to be mentally represented and therefore available as the referent of a subsequent pronoun. Rather, negative quantifiers are treated in the manner proposed by the Inference-Driven account, such that readers must infer a referent set on reading
the anaphoric sentence. The nature of this set (i.e., Reference set or Complement set) will depend on the content of the sentence containing the pronoun and how this content answers the virtual question raised by the negative quantifier.

The Set-Driven account proposes that readers process positives and negatives in the same way. Dowty proposes that readers process positives and negatives differently. Therefore, teasing apart these alternative accounts will depend on either demonstrating that negative and positive quantifiers are treated in the same manner or that they are treated differently.

The present paper reports two eye-movement experiments which further examine the influence of negative quantifiers on comprehension. Previous comprehension studies (Sanford et al., 1996) examined data for sentence reading times and these show equivalent effects for negatives and positives. The rationale here is that eye-tracking data will provide a finer instrument for detecting the appropriate distinctions.

There is considerable evidence that an analysis of eye movements can provide a detailed account of the sequence of processing events that occur during reading and are sensitive to short-lived effects that occur when processing anaphoric expressions (e.g., Ehrlich & Rayner, 1983; Duffy & Rayner, 1990; Garrod, Freudenthal, & Boyle, 1994; Rayner, Rayney, & Pollatsek, 1995). In particular, Garrod et al. (1994) found that subjects had a longer first pass reading time (i.e., had a longer reading time on the first encounter) for a pronoun and verb when this was inconsistent with a character who was the protagonist of a text but consistent with another character taking a subordinate role. These results suggest that, under some conditions at least, readers will immediately interpret a pronoun as referring to a focused antecedent and experience processing difficulty at the first point that this assignment appears anomalous. There are therefore good reasons to expect that an analysis of eye movements will enable us to detect any mismatch effects that occur on encountering an anaphoric expression that is inconsistent with the focus patterns generated by either positive or negative quantified statements.

The critical question is whether these mismatch effects show the same pattern for positives and negatives or if they differ. If Dowty is correct, then we would expect to find relatively early mismatch effects when positives are used, since according to the Set-Driven account, positives cause the reader to instantiate a Reference set and evaluate subsequent anaphora with respect to it. In contrast, we would expect to find relatively late mismatch effects for negatives, since the Inference-Driven account depends on the reader establishing a fit between the content of the anaphoric sentence and the virtual question raised by the negative quantified statement. Importantly, we would also expect mismatches to cause a different magnitude of disruption in positive and negative contexts. For positives, pronominal reference to the Complement set should be perceived as anomalous and cause massive disruption to sentence processing. For negatives, references to either the Reference or Complement sets will be acceptable if they provide an answer to the virtual question; therefore sentence processing should not be disrupted when the anaphoric sentence initially appears to contain reference to the Reference set. Rather, sentence processing difficulty should be experienced at a later point in the reading process, when the reader finds it difficult to infer a congruent relationship between the virtual question raised by the quantified statement and an anaphoric sentence that describes a property of the Reference set.

EXPERIMENT 1

Method

Materials and design. We used the 24 passages from Experiment 3 of Sanford et al. (1996). An example is shown in Table 1, with other examples in Appendix 1. Each passage had a title and began with a context-setting sentence. The following sentence began with a noun phrase that was quantified by either a few or few. The final sentence began with a plural anaphoric noun phrase that described a
property of either the Reference set (e.g., *their presence*) or Complement set (e.g., *their absence*) of the preceding quantified sentence. Passages were single line-spaced.

There were two experimental manipulations. The quantified sentence contained either a positive (*a few*) or negative (*few*) quantifier, whereas the immediately succeeding sentence contained an anaphor that referred to a property of either the Reference or Complement sets that represent the meaning of the quantified sentence.

**Procedure.** An SRI Dual Purkinje Generation 5.5 eye-tracker was used to monitor the gaze location and movement of subjects’ right eye during reading. The eye-tracker has an angular resolution of 10’ arc. A PC displayed materials on a VDU screen 60 cm from subjects’ eyes. The tracker monitored subjects’ gaze location every millisecond. The tracker’s output was sampled to produce a sequence of eye fixations, recorded as x and y character positions, with their start and finish times.

Before the start of the experiment, subjects read an explanation of the eye-tracking procedure and a set of instructions. They were instructed to read at their normal rate and to read to comprehend the sentences as well as they could. Subjects were then seated at the eye-tracker and placed on a chin rest and under forehead restraint to minimize head movements. Subjects then completed a calibration procedure.

Before each trial, a fixation cross appeared near the upper-left-corner of the screen. Immediately subjects fixated this cross, the computer displayed a target sentence, with the first character of this sentence replacing the fixation cross. This also served as an automatic calibration check, as the computer did not display the text until it detected a stable fixation on the cross. If subjects did not rapidly fixate the cross, the experimenter recalibrated the eye-tracker. Once subjects had finished reading each sentence, they pressed a key, and the computer either displayed a comprehension question or proceeded to the next trial. Comprehension questions followed 25% of the experimental and filler trials. Half of these questions had “yes” answers and half had “no” answers. Subjects responded to the comprehension questions by pressing a “yes” or a “no” response key. There was no feedback on their answers.

The computer displayed each experimental list in a fixed Latin Square order, together with 24 fillers that were materials for an unrelated experiment and an additional five filler passages that appeared at the beginning of the experiment and following three rest periods.

**Participants.** A total of 24 undergraduate students from the University of Glasgow were paid £5 for their participation in this experiment. All participants were native English speakers and had normal and uncorrected vision.

**Results**

**Regions.** The test sentences were divided into four scoring regions, as illustrated in Table 1. Region 2 contained the quantified sentence. Region 3 was the critical region that contained the anaphoric noun phrase (e.g. *their presence or their absence*), and Region 4 contained the remaining words in the anaphoric sentence.

**Analysis.** An automatic procedure pooled short contiguous fixations. Fixations of less than 80 ms were incorporated into larger fixations found within one character, and fixations of less than 40 ms that were not within three characters of another fixation were deleted. Prior to analyzing the eye movement data, we removed those trials where either subjects failed to read the passage properly or where there had been tracker loss. More specifically, those trials were removed in which a zero first pass reading time was recorded for any of the text regions. This accounted for 11.6% of the data.

We report three measures of eye movements: first pass reading time, total reading time, and first pass regressions. First pass reading time was defined as a sum of the duration of fixations made on first entering a region of text until an eye movement exits the region to either the left or right, providing an indication of the difficulty experienced when ini-
sentially processing a region of text. Total reading time is the sum of the duration of all fixations made within a region and provides an indication of the overall amount of time spent processing text in that region. First pass and total reading times are reported as ms/character as an adjustment for small differences in the character size of regions across experimental conditions. First pass regressions are a sum of regressive saccades made from the current most rightward fixation with a region of text, indicating the degree to which left to right movement was disrupted during the first sweep of the eyes through a region of text.

First pass and total reading times for Regions 2, 3, and 4 and first pass regressions from Regions 3 and 4 were subjected to two 2 (quantifier type) × 2 (reference type) ANOVAs, one treating subjects as the random variable and the other treating sentences as the random variable. Mean ms/character first pass and total reading times and mean first pass regressions are given in Table 2.

First pass reading times. At Region 2, the quantified sentence, there was no main effect of quantifier type ($F_1, F_2 < 1$), but there was a main effect of reference type ($F_1(1,23) = 6.25, p < 0.05; F_2(1,23) = 4.39, p < 0.05$), with a longer first pass reading time for this sentence when the subsequent anaphor referred to a property of the Complement rather than the Reference set. We consider this effect to be spurious, since it occurs prior to the reader encountering the region of text that would give rise to such an effect and has not been replicated in any other studies that we have conducted. There was no interaction of quantifier and reference type ($F_1, F_2 < 1$).

There were no differences in the first pass reading time for Region 3, the region containing the anaphoric expression, for any aspect of the experimental manipulation (all $Fs < 1$). In Region 4, the final region, there was no significant main effect of quantifier type ($F_1(1,23) = 1.25, p > 0.1; F_2(1,23) = 2.95,$

### Table 2

<table>
<thead>
<tr>
<th>Condition</th>
<th>A few / Reference set</th>
<th>A few / Complement set</th>
<th>Few / Reference set</th>
<th>Few / Complement set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 2</td>
<td>First pass reading time (ms/character)</td>
<td>29 (1.6)</td>
<td>31 (1.5)</td>
<td>30 (1.4)</td>
</tr>
<tr>
<td>Region 3</td>
<td>First pass reading time (ms/character)</td>
<td>24 (2.1)</td>
<td>25 (1.5)</td>
<td>25 (1.6)</td>
</tr>
<tr>
<td>Region 4</td>
<td>First pass reading time (ms/character)</td>
<td>30 (1.9)</td>
<td>31 (2.3)</td>
<td>32 (1.8)</td>
</tr>
<tr>
<td>Region 3</td>
<td>Mean first pass regressions</td>
<td>1.8 (0.3)</td>
<td>2.1 (0.2)</td>
<td>2.7 (0.4)</td>
</tr>
<tr>
<td>Region 4</td>
<td>Mean first pass regressions</td>
<td>8.2 (0.6)</td>
<td>10.4 (0.6)</td>
<td>8.6 (0.5)</td>
</tr>
<tr>
<td>Region 2</td>
<td>Total reading time (ms/character)</td>
<td>34 (1.4)</td>
<td>35 (1.4)</td>
<td>35 (1.2)</td>
</tr>
<tr>
<td>Region 3</td>
<td>Total reading time (ms/character)</td>
<td>32 (2.6)</td>
<td>42 (2.6)</td>
<td>40 (2.8)</td>
</tr>
<tr>
<td>Region 4</td>
<td>Total reading time (ms/character)</td>
<td>40 (1.7)</td>
<td>47 (2.6)</td>
<td>44 (2.7)</td>
</tr>
</tbody>
</table>
gressions were made following the use of few, $F_1(1,23) = 9.75, p < 0.01; F_2(1,23) = 8.11, p < 0.05$, such that more regressions were made following quantification by few. There was no main effect of reference type ($F_1 < 1, F_2 < 1.5$) or an interaction of these factors ($F_1, F_2 < 1$). It thus appears that there may be processing difficulty associated with the integration of any information with the representation set up by a statement quantified by few (as distinct from a few) which is detectable through first pass regressions.

Analysis of regressions originating in region 4 showed a main effect of quantifier that was significant by items only ($F_1(1,23) = 2.54, p > 0.05; F_2(1,23) = 4.50, p < 0.05$), a main effect of reference type that was marginal by items ($F_1(1,23) = 1.98, p > 0.05; F_2(1,23) = 3.97, p < 0.06$), and a significant interaction of these factors ($F_1(1,23) = 6.00, p < 0.05; F_2(1,23) = 5.30, p < 0.05$). Further simple effects analyses were conducted in order to determine the nature of this interaction and revealed that more regressions were made when the noun-phrase anaphor in Region 3 was congruent with the Reference set rather than the Complement set of a statement quantified by a few ($F_1(1,23) = 8.92, p < 0.01; F_2(1,23) = 7.80, p < 0.05$). However, there was no difference in the number of regressions made in Region 4 when the anaphor was congruent with either the Reference or Complement set following few ($F_1, F_2 < 1$). So, although there is some evidence of detection of quantifier focus mismatches during the first pass of the anaphoric sentence, this appears to be restricted to the case where the quantifier is a few. A further simple effects analysis was conducted in order to determine if more regressions were made following the use of few, as compared to the a few condition when the anaphor was congruent with the Reference set. There was no difference between these means ($F_1, F_2 < 1$). Therefore, first pass regressions indicated that readers did not experience disruption at Region 4 when the negative quantifier was used.

**Total reading time.** At Region 2, the quantified sentence, there was no main effect of quantifier type ($F_1 < 1, F_2 < 1$), no significant main effect of reference type ($F_1(1,23) = 2.64, p > 0.05; F_2(1,23) = 2.01, p > 0.05$), and no interaction of quantifier and reference type ($F_1, F_2 < 1$). No main effects were found at Region 3 ($F$s < 1). However, there was a significant interaction of quantifier and reference type ($F_1(1,23) = 20.58, p < 0.001; F_2(1,23) = 7.33, p < 0.05$). An analysis of the simple effects established that subjects spent a significantly longer amount of time in this region when it described a property of the Complement as compared to the Reference set following quantification by a few ($F_1(1,23) = 16.54, p < 0.001; F_2(1,23) = 5.60, p < 0.05$). There was also a numerical difference in the amount of time spent in this region when it described a property of the Reference as compared to the Complement set following quantification by few; however, this difference was only significant on the subjects analysis ($F_1(1,23) = 5.51, p < 0.05; F_2(1,23) = 2.14, p > 0.05$). This suggests that while subjects experienced difficulty in processing this portion of the anaphoric sentence when it mismatched with the pattern of focus set up by the quantifier, the disruption was only robust in the case of the positive quantifier.

At Region 4, there were no main effects of either quantifier ($F_1 < 1.7, F_2 < 1.3$) or reference type ($F_1, F_2 < 1$). However, there was a significant interaction of these two factors ($F_1(1,23) = 30.92, p < 0.001; F_2(1,23) = 14.71, p < 0.001$). An analysis of simple effects established that more time was spent on the region when the preceding region had described a property of the Complement as compared to the Reference set following quantification by a few ($F_1(1,23) = 21.51, p < 0.001; F_2(1,23) = 10.72, p < 0.01$) and when the preceding region had described a property of the Reference as compared to the Complement set following quantification by few ($F_1(1,23) = 10.66, p < 0.01; F_2(1,23) = 4.62, p <
0.05). This is consistent with the Sanford et al. (1996) findings, which used global self-paced reading time as a measure of integration difficulty.

Discussion

In this experiment, we monitored eye movements during reading to examine the resolution of a noun-phrase anaphor that had a quantified antecedent. Subjects read a series of short passages that contained either positive (a few) or negative (few) quantified statements and was followed by a sentence that began with a plural pronoun anaphor. The anaphor either referred to a property of the Reference set (i.e., their presence) or Complement set (i.e., their absence) of the quantified statement. We found no difference in the first pass reading time for either the region of text containing the critical anaphoric expression (i.e., their presence or their absence) or the region of text that contained the remainder of this sentence. So on the basis of this measure, it appears that readers found it as easy to initially process the anaphor and to initially process the remainder of the anaphoric sentence, regardless of whether it matched or mismatched the Reference or Complement sets and regardless of the form of prior quantification.

First pass regressions showed an interesting pattern. In Region 3, more regressions occurred when the preceding sentence had been quantified by few than by a few, regardless of the form of the current sentence. This suggests that the representation set up by a sentence quantified by few may be more difficult to process and that this difficulty is detectable during the initial sweep of the eyes through the anaphoric sentence. In Region 4, the evidence was for more regressions when the quantifier of the previous sentence had been a few rather than few and the content of the current sentence mismatched with the Complement set. This suggests that focus mismatches between an antecedent based on a few and the current sentence is detected during the initial analysis of the sentence containing the anaphor, but that this is not true for mismatches between the focus of few and the current sentence. Clearly, negative (few) and positive (a few) quantified statements do not produce an identical pattern of effects.

Sanford et al. (1996) found that global reading times showed a symmetrical focus mismatch effect for few and a few. In the present experiment, the total reading times for Regions 3 and 4 showed that readers had detected the mismatch between the set described by the anaphor and those licensed by the quantifiers and that this disrupted the reading process. Readers spent more time on Regions 3 and 4 when the anaphor described the Complement as compared to the Reference set of a statement quantified by a few and more time on Region 4 when the anaphor described the Reference as compared to the Complement set of a statement quantified by few. This demonstrates that although it is more difficult to process anaphoric sentences when they refer to a property of the unfocused set, this disruption was found in both regions of the anaphoric sentence when positives were used, but only in the final region when negatives were used.

In summary, we have found evidence for two things. First, there is no immediate effect of mismatches for either quantifier (at Region 3). Second, there is evidence for a stronger effect of anomaly with the positive quantifier, evident in both first pass regressions and in the distribution of total reading time differences over both regions of the anaphoric sentence. In contrast, the mismatch effect was restricted to total reading time for the final region of the anaphoric sentence when the negative quantifier was used.

Before relating these data to theory, we report Experiment 2. While the design used in Experiment 1 was sufficiently powerful to detect difficulty in integrating the anaphoric sentence with an understanding of the preceding text, we could not be certain that it was powerful enough to detect early mismatch effects. In Experiment 2 we used manipulations that should promote the early detection of mismatch effects. First, we conjoined the quantified and anaphoric sentences using the causal connective so. This connective takes a state of affairs and makes the second state of affairs
result from it. In addition, Moxey and Sanford (1987; 1993a) found that the use of causal connectives reinforced Complement set focus in negative quantifiers. Second, we localized the potential mismatch to an intransitive verb phrase rather than to a noun phrase. Previous work has shown that the main verb is a good site for detecting the results of pronoun assignments (e.g., Garrod et al., 1994). Taking these changes into account, an example of a mismatch material might be *A few of the men were careful with their winnings, so they gambled recklessly.* Finally, the target sentence was arranged to be the same over all four experimental conditions, so that comparisons could be made over identical regions.

**EXPERIMENT 2**

**Method**

*Materials and design.* We constructed 32 sets of passages such as those in Table 3; other examples are shown in Appendix 2. Each passage had a title and began with a context-setting sentence. The following sentence began with a noun phrase which was quantified by either *a few* or *few* and had a verb phrase which described one of two contradictory situations. For example, in Table 3 the verb phrase describes a situation in which the men were either careful or careless with money. In many of the materials, the distinction between the two situations was achieved by using morphologically marked verbs. That is, one verb was marked as the negative of the other. The final sentence of each passage began with a plural pronoun that referred to the preceding quantified noun phrase and was followed by a verb phrase (intransitive verb and adverb) that was congruent with one of the two situations described by the quantified sentence and incongruent with the other. For example, in Table 3 the verb phrase *gambled recklessly* is congruent with a situation in which the men were careless with their money, but incongruent with a situation in which they were careful with their money. For half the experimental materials the verb phrase was congruent with the unmarked version of the quantified statement and for other half the verb phrase was congruent with the marked version of the quantified statement. The sentence was completed by a temporal prepositional phrase. This had a similar construction across all of the experimental materials. The quantified and anaphoric sentences were conjoined using the causal conjunction *so* in order to mark a causal relation between the two sentences. The passages were double line-spaced.

There were two experimental manipulations. The quantified sentence contained either a positive (*a few*) or a negative (*few*) quantifier, while the verb phrase of the quantified sentence either matched or mismatched with the verb phrase of the subsequent sentence. This produced a fully crossed experimental design.

*Participants.* A total of 36 undergraduate students from the University of Glasgow were paid £5 for their participation in this experiment. All participants were native English speakers and had normal and uncorrected vision. No one who had participated in Experiment 1 also participated in Experiment 2.

*Procedure.* We followed the same procedure as Experiment 1, except that a bite-bar was used in place of a chin rest in order to restrict subjects’ head movements.

**Results**

*Regions and analysis.* The test sentences were divided into four scoring regions, as illustrated in Table 3. Region 2 contained the quantified sentence and the causal connective *so.* Region 3 contained the anaphor (*they*) and the critical intransitive verb phrase (e.g., *gambled recklessly*) at the start of the anaphoric
sentence, and Region 4 contained the temporal prepositional phrase which completed the anaphoric sentence. We followed the same preliminary analysis procedure as described in Experiment 1. Prior to analyzing the eye-movement data, we removed trials in which either subjects failed to read the passage properly or where there had been tracker loss. This was defined as those trials in which a zero first pass reading time was recorded for any of the text regions. This accounted for 3.5% of the data.

As in Experiment 1, first pass and total reading times for Regions 2, 3, and 4 and the first pass regressions from Regions 3 and 4 were subjected to two 2 (quantifier type) × 2 (reference type) ANOVAs, one treating subjects as the random variable and the other treating sentences as the random variable. Reading times are reported as ms/character to enable comparison with those reading times reported for Experiment 1. Mean ms/character first pass and total reading times and first pass regressions are given in Table 4.

**First pass reading time.** At Region 2, the quantified sentence, there was no main effect of quantifier type ($F_1 < 1.2$; $F_2 < 1.4$), no main effect of reference type ($F_1$, $F_2 < 1$), and no interaction of quantifier and reference type ($F_1$, $F_2 < 1$). At Region 3, the critical region, subjects had a significantly longer reading time when the verb phrase matched the Complement as compared to the Reference set of the preceding sentence ($F_1(1,35) = 6.14$, $p < 0.05$; $F_2(1,31) = 4.38$, $p < 0.05$). There were no other effects (all $Fs < 1$). At Region 4, there was a main effect of quantifier type ($F_1(1,35) = 4.79$, $p < 0.05$; $F_2(1,31) = 3.88$, $p < 0.06$), with a longer first pass reading time for this region following quantification by *a few*. There was no main effect of reference type ($F_1$, $F_2 < 1$) and no significant interaction of quantifier and reference type ($F_1(1,35) = 2.38$, $p > 0.05$; $F_2(1,31) = 2.04$, $p > 0.05$).

**First pass regressions.** At Region 3, there were no main effects of quantifier type ($F_1(1,35) = 2.17$, $p > 0.05$; $F_2 < 1$), reference

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**TABLE 4**

Mean First Pass and Total Reading Times (ms/Character) with Standard Errors for Regions 2, 3, and 4, and Mean First Pass Regressions with Standard Errors from Regions 3 and 4 of Materials Used in Experiment 2

<table>
<thead>
<tr>
<th>Region</th>
<th>Measure</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A few / Reference set</td>
</tr>
<tr>
<td>2</td>
<td>First pass reading time (ms/character)</td>
<td>28 (1.4)</td>
</tr>
<tr>
<td>3</td>
<td>First pass reading time (ms/character)</td>
<td>30 (1.5)</td>
</tr>
<tr>
<td>4</td>
<td>First pass reading time (ms/character)</td>
<td>31 (1.5)</td>
</tr>
<tr>
<td>3</td>
<td>Mean first pass regressions</td>
<td>5.8 (0.5)</td>
</tr>
<tr>
<td>4</td>
<td>Mean first pass regressions</td>
<td>9.1 (0.6)</td>
</tr>
<tr>
<td>2</td>
<td>Total reading time (ms/character)</td>
<td>36 (2.0)</td>
</tr>
<tr>
<td>3</td>
<td>Total reading time (ms/character)</td>
<td>37 (2.0)</td>
</tr>
<tr>
<td>4</td>
<td>Total reading time (ms/character)</td>
<td>38 (2.2)</td>
</tr>
</tbody>
</table>
type ($F_1, F_2 < 1$), or an interaction of these factors ($F_1, F_2 < 1$). At Region 4, there were no differences in the number of regressions due to either a main effect of quantifier type ($F_1, F_2 < 1$) or reference type ($F_1 < 1.6, F_2 < 1.7$). However, there was a significant interaction of these factors ($F_1(1,35) = 7.49, p < 0.01; F_2(1,31) = 6.84, p < 0.05$). There were significantly more regressions when the verb phrase of the anaphoric sentence matched the Complement set as compared to the Reference set following quantification by a few ($F_1(1,35) = 6.66, p < 0.05; F_2(1,31) = 6.54, p < 0.05$), but no difference following quantification by few ($F_1 < 1.7, F_2 < 1.2$).

**Total reading time.** At Region 2, there was a main effect of quantifier type ($F_1(1,35) = 7.94, p < 0.01; F_2(1,31) = 7.00, p < 0.05$). There was no significant main effect of reference type ($F_1(1,35) = 2.66, p > 0.05; F_2(1,31) = 1.05, p > 0.05$). There was a significant interaction of quantifier and reference type ($F_1(1,35) = 8.02, p < 0.01; F_2(1,31) = 5.70, p < 0.05$). An analysis of the simple effects showed that there was a significantly longer reading time for this region when the verb phrase of the anaphoric sentence matched the Complement set as opposed to the Reference set following quantification by a few ($F_1(1,35) = 9.29, p < 0.01; F_2(1,31) = 7.06, p < 0.05$). However, there was no difference in total reading time when the verb phrase matched either the Reference or Complement sets following quantification by few ($F_1, F_2 < 1$).

At Region 3, the critical region, there was no main effect of quantifier type ($F_1 < 1.8; F_2 < 1.2$), but there was a main effect of reference type ($F_1(1,35) = 5.46, p < 0.05; F_2(1,31) = 5.41, p < 0.05$). There was also a significant interaction of quantifier and reference type ($F_1(1,35) = 10.91, p < 0.01; F_2(1,31) = 7.35, p < 0.01$). An analysis of the simple effects established that there was a significantly longer time after reading for this region when the verb phrase matched the Complement as compared to the Reference set following quantification by a few ($F_1(1,35) = 14.68, p < 0.01; F_2(1,31) = 10.53, p < 0.01$). However, there was no difference in reading time when the verb phrase matched the Reference or Complement sets following quantification by few ($F_1, F_2 < 1$).

At Region 4 there was a main effect of quantifier type ($F_1(1,35) = 8.81, p < 0.01; F_2(1,31) = 7.51, p < 0.01$), but no main effect of reference type ($F_1, F_2 < 1$). However, there was a significant interaction of these two factors ($F_1(1,35) = 10.74, p < 0.01; F_2(1,31) = 12.84, p < 0.01$). An analysis of simple effects showed that more time was spent on this region when the preceding verb phrase matched the Complement as compared to the Reference set following quantification by a few ($F_1(1,35) = 7.40, p < 0.01; F_2(1,31) = 8.81, p < 0.01$). More time was also spent on this region when the preceding verb phrase matched the Reference as compared to the Complement set following quantification by few ($F_1(1,35) = 3.67, p < 0.07; F_2(1,31) = 4.41, p < 0.01$).

**Discussion**

In this experiment we compared reading times for regions of a text containing a pronoun and verb phrase that was congruent with an action expected of either the Reference or Complement set of a preceding quantified statement. A similar manipulation has been used to successfully demonstrate the early detection of focus mismatches in previous eye-tracking studies (Garrod et al., 1994). We obtained a robust effect on first pass reading time for the region containing the pronoun and intransitive verb phrase, such that more time was spent initially reading this region of text when the verb phrase was congruent with the Complement set. Therefore, it appears that readers found it difficult to initially process text that referred to the Complement set of the quantified statement, regardless of the quantifier used. This was an important finding because it demonstrated that the experimental manipulation could give rise to processing preferences at the critical region. This finding also suggests that the focus effects associated with negative quantifiers did not license an initial interpretation of the pronoun as referring to the Complement set. Rather, it is consistent with an account in which the pronoun
is initially attached with a referent that is described in the preceding text (i.e., the Reference set). This possibility is expanded upon in the General Discussion.

As with Experiment 1, there was evidence in the first pass regression pattern for detection of a focus mismatch in Region 4 when the quantifier was *a few*, but not when it had been *few*. Furthermore, the total reading times showed that in Regions 2 and 3 there was a mismatch effect with *a few*, but none with *few*, and a mismatch effect with both *a few* and *few* in Region 4. These effects again suggest that focus mismatch caused a greater disruption of sentence processing when *a few* was used than when *few* was used.

**GENERAL DISCUSSION**

Although there has been considerable work on the processing of simple anaphora, there has been relatively little on more complex plural anaphora, including those cases in which the textual antecedent is within the scope of quantification. The present paper explored how focus effects associated with positive and negative quantifiers influence the comprehension of sentences containing plural anaphora.

The examples we presented and the review of the work by Moxey and Sanford (1987; Sanford et al., 1996) demonstrate that positive and negative quantifiers can be differentiated in terms of a property of focus and that this has consequences for the interpretation of subsequent plural anaphora. However, different patterns of results have been obtained on production and comprehension tasks. According to production data, positives (e.g., *a few, many*) have a restricted pattern of focus and only license the Reference set as the referent of subsequent plural anaphora. In contrast, negatives (e.g., *few, not many*) have a more diffuse pattern of focus, such that both the Reference and Complement sets are possible referents of subsequent plural anaphora, although there is a statistical preference for producing sentence completions in which the anaphor refers to the Complement set. However, self-paced reading data reported by Sanford et al. (1996) indicated symmetrical effects for positives and negatives during comprehension. Subjects found sentences that referred to the Complement set of positive quantified statements as difficult to process as sentences that referred to the Reference set of negative quantified statements. The results suggest that positives and negatives have an equal but opposite effect on the comprehension of sentences containing plural anaphora.

The experiments reported in the present paper further examined the comprehension of plural anaphora in positive and negative quantified contexts. We monitored subjects’ eye movements to obtain a more detailed account of the reading process and so enable us to detect fine-grained differences in the processing of texts containing an anaphor that refers to the Reference or Complement sets of a preceding quantified statement. The results seem clear. There was a systematic difference between the pattern of results obtained when the context contained the positive quantifier *a few* and the negative quantifier *few*. Subjects experienced sentence processing difficulty when the anaphor matched the Complement set of positive quantified statements and the Reference set of negative quantified statements. However, *a few* yielded a more disruptive mismatch effect in the sense of producing detectable differences in total reading time for Regions 2, 3, and 4 (disruption was restricted to Region 4 for *few*), and first pass regressions to mismatches in Region 4 (but none for *few*) for Experiment 2. A comparable pattern of results was found in Experiment 1. There was evidence of a more disruptive mismatch effect for *a few*, with differences in the total reading time for Regions 3 and 4 (again disruption due to a mismatch effect with *few* was restricted to Region 4), and evidence of first pass regressions from Region 4 in response to the mismatch. There was no evidence that regressive saccades were made in response to mismatch when *few* was used, but more regressions were made from Region 3 when the preceding sentence contained *few* as opposed to *a few*, which most likely reflected general difficulties in sentence integration. Clearly, focus mismatches caused greater disruption to sentence
processing in positive than negative quantifier contexts.

The results are consistent with theoretical accounts in which there is an asymmetry in the processing of positive and negative quantified statements. Thus, the results are not consistent with the Set-Driven account, according to which positives cause the reader to focus on the Reference set and negatives cause the reader to focus on the Complement set. Following this account, we expected to obtain symmetrical mismatch effects for positives and negatives when anaphora were interpreted with respect to the focused subset. The results are consistent with an alternative account in which positives make available the Reference set as the referent of subsequent anaphora, but negatives do not license strict anaphora. That is to say, negatives do not cause the Complement set to become available as the referent of a subsequent anaphor, but are used to deny that a particular state of affairs in true. On this view, the reader’s principle task is not to compute a coreferential relationship between the anaphor and sets made available by the quantified statement, but to determine the congruency of the anaphoric sentence and the denial asserted by the negative quantified statement. Moxey and Sanford (1987; Sanford et al., 1996) have shown that when asked to produce a continuation to negative quantified statements, subjects tend to provide reasons for asserting the denial. These continuations predominantly concern the Complement set, therefore anaphoric sentences which refer to the Complement set are most likely to appear congruent with the quantified statement. However, subjects do not provide continuations that exclusively concern the Complement set. Both the Complement and Reference sets can in principle provide reasons for asserting the denial, and therefore initial references to either of these sets should not result in an immediate mismatch effect. Thus, the alternative account predicts an asymmetrical pattern of results for positives and negatives.

In Experiment 2, we obtained a short-lived first pass processing advantage when the anaphor and following verb phrase described an action that was congruent with the Reference set, regardless of the polarity of the quantifier used. This suggested that there was a default preference for Reference set perspectives. This is an important finding, because it demonstrated that subjects did attempt to rapidly evaluate the congruency of an anaphor and potential referents mentioned the preceding text, but that focus effects associated with the negative quantifier did not influence this process. Finding a first pass processing advantage for anaphors that refer to the Reference set is consistent with an account proposing asymmetric effects of positive and negative quantifiers. This finding is not consistent with the Set-Driven account, which claims that negatives cause the Complement set to be made available as the referent of a subsequent anaphor.

The short-lived processing advantage for Reference set anaphors is best explained in terms of a distinction between processes which establish an immediate bonding between an anaphor and potential referent in the preceding text and processes contributing to the ultimate resolution of the anaphor (Sanford & Garrod, 1989; Garrod & Sanford, 1994). During the initial bonding process, readers attempt to form a link between the anaphor and a focused referent on the basis of low-level information, including gender and number information. The ultimate resolution of the anaphor, however, depends on establishing a semantic match with the potential referent, taking account of information provided by the discourse context. Importantly, the immediate bonding may be short-lived, and the potential referent selected for immediate bonding may not be the same as the one that is ultimately assigned to the anaphor. In the present case, an immediate bonding is established between the pronoun and Reference set of the quantified statement. This immediate bonding is then evaluated in terms of the fit between the verb of the anaphoric sentence and Reference set properties, resulting in a reading time advantage when these are congruent. It appears that the focusing properties of the negative quantifier do not influence the
immediate bonding process, but do influence the ultimate resolution of the anaphor.

Several researchers have questioned the reality of Complement set focus and argued that those continuations which appear to refer to the Complement set are in fact generalizations about the superset (Corblin, 1997; Geurts, 1997; Percus et al., 1997). The generalization claim can be illustrated by the example below. Given (4), (4') could be considered a generalization about the set of cows:

(4) Few of the fans went to the game.

(4') They watched it on TV instead.

The argument is that (4') is about fans in general, as in They mostly watched it on TV instead. Sanford et al. (1996; Moxey & Sanford, in press) dismissed this argument, since it cannot hold for the case where the Complement set is very small compared to the Reference set. Had (4) been (5) instead, then (4') could not be a generalization:

(5) Not quite all of the fans went to the game.

Sanford et al. found that many continuations of a complement set type were made to quantified statements in which the Complement set was very near to zero. So we would argue that Complement set reference is a reality. We do not argue that generalizations never occur, however.

A related and more sophisticated version of the generalization argument is restricted to predicates which can take a collective reading (Percus et al., 1997; Geurts, 1997). Percus et al. considered the following type of example:

(6) Not quite all of the cows gave milk. Their unproductivity was a bad omen.

They argued that in this example unproductivity is a collective property of the herd of cows, meaning that while each and every cow need not be deemed unproductive, they are unproductive when considered as a group. This differs from the generalization argument in that the property (i.e., unproductivity) need not be true of the majority of the superset. For instance, it may be the case that only 2 out of 20 cows did not give milk in (6), but that might nonetheless mean that the herd of cows was unproductive. This is illustrated in (6) above where the expression Not quite all indicates that there was reason to expect all would give milk. Percus et al. argued that apparent reference to a property of the Complement set can be explained as cases of collective predication. They used this to claim that quantifiers never make the Complement set available as an antecedent. While we are certain that collective predication will occur under some conditions, and in itself is not inconsistent with the Inference-Driven account of negatives, it cannot account for all of the data. Critically, both the generalization and collective predicate arguments predict that subjects should judge anaphora that appear to refer to the Complement set actually referring to the superset, or the set in general. Yet, subjects rarely provide such a response when asked to make such a judgment in production experiments, but instead judge such anaphora to constitute reference to the Complement set (Moxey & Sanford, 1987; Sanford et al., 1996). Sanford et al. found that at most subjects perceived their responses as generalizations on only 11% of occasions. Furthermore, in almost all cases where there was a possible Complement set reference, subjects judged their responses to be Complement set references and not generalizations. Therefore it appears that while generalizations about the superset are an option in response to a negative quantifier, genuine Complement set reference predominates.

For some linguists, these alternatives are considered important in order to preserve the rule that the Complement Set is not singled out as an entity to support reference. We think that as a knock-down argument, this maneuver fails to be convincing. But in terms of our Inference-Driven account of negatives, we have no difficulty in accepting that each of these possibilities may occur. Our present experiments demonstrate that plural anaphora are processed differently when they appear in negative rather than positive quantified contexts. We have argued that negatives do not
directly license a coreferential relationship between an anaphor and sets that represent the meaning of a quantified statement. Instead we have argued that negatives are used to deny that a particular state of affairs is true, and subsequent anaphoric sentences are evaluated in terms of their congruency with the quantified statement. This entails a more diffuse set of referential possibilities than in the case of positives and may include generalizations or reference to the Complement set.

APPENDIX 1

Examples of Materials Used in Experiment 1

In a hospital.
The doctor needed permission from some of the patients before she tested a new drug on them. A few/Few of the patients agreed to act as guinea pigs. Their consent/refusal was noted by the hospital registrar.

Testing job applicants.
Prospective air traffic controllers had to fill in a personality questionnaire then sit a series of aptitude tests. A few/Few of the applicants passed. Their success/failure confirmed the organizer’s expectations.

In the court.
Some local youths were arrested during a police raid at a party and accused of drug-dealing. A few/Few of the youths were found guilty of the crime. Their acquittal/conviction was a relief to the whole neighbourhood.

At the gym.
Some weight-lifters from the gym competed to see who could lift a heavy dumbbell. A few/Few of the weight-lifters managed to lift it off the ground. Their strength/weakness surprised their friends.

In the office.
The insurance office had a new computer system installed over the Christmas holidays. A few/Few of the secretaries had previously used the system. Their experience/inexperience made the others feel more relaxed.

A public meeting.
Local MP’s were invited to take part in a public inquiry about proposals to build a nuclear power station. A few/Few of the MP’s attended the meeting. Their presence/absence helped the meeting run more smoothly.

APPENDIX 2

Examples of Materials Used in Experiment 2

In the classroom.
The teacher lectured the entire class about behaving properly. Q of the children were scolded/praised by the teacher so they wept tearfully until their parents arrived.

At the casino.
A group of men won a lot of money on the roulette wheel. A few/few of the men were careful/careless with their winnings, so they gambled recklessly until the money was gone.

After the accident.
Poor driving caused a major motorway pile-up. A few/few of the drivers admitted/denied responsibility for the accident, so they apologized profusely when the police arrived.

A student house.
A group of students moved into a new house. A few/few of students felt cold/warm in the house, so they shivered icily until the heating came on.
At the football match.
The local football fans found it difficult to get
tickets for the cup final.
A few/few of the fans were present at/absent
from the game,
so they cheered excitedly when the home team
scored.

After a hijacking.
The hijackers were trapped in the aircraft and
surrounded by police.
A few/few of the hijackers decided to con-
cede/resist defeat,
so they surrendered unconditionally before the
police attacked.

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