

# Semantic Effects on Pronouns and Reflexives in Picture-NPs: Similarities and Differences

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## 1 Introduction

Research on Binding Theory shows that the syntactically-conditioned complementarity normally exhibited by pronouns and reflexives (e.g., Chomsky 1981) breaks down in certain syntactic environments, including picture-NPs (e.g., *picture of {her/herself}*, see Reinhart and Reuland 1993, Keller and Asudeh 2001, see also Runner, Sussman and Tanenhaus 2003). In picture-NPs, pronouns can—at least in some contexts—refer to the subject of the sentence, just like reflexives. In this paper, we report two psycholinguistic experiments that investigate how complete the breakdown of complementarity really is, thereby contributing to our understanding of so-called exempt anaphora. More specifically, we test what kinds of factors influence how pronouns and reflexives in picture-NPs are interpreted, given that their antecedents are not determined by Binding Theory.

In prior work, Kaiser, Runner, Sussman and Tanenhaus (2009) found that pronouns and reflexives in English picture-NPs are guided by contrasting syntactic and semantic preferences. Kaiser et al. (2009) tested (i) a claim by Kuno (1987) that reflexives have a preference for antecedents that are *sources-of-information* and (ii) a complementary suggestion by Tenny (2003) that pronouns prefer antecedents that are *perceivers-of-information*. Kaiser et al. used sentences with ‘told’ and ‘heard’ to manipulate whether the subject or the object was the source/perceiver, as in (1).

- (1) a. Peter<sub>SOURCE</sub> told John<sub>PERCEIVER</sub> about the picture of {him/himself} on the wall.  
b. Peter<sub>PERCEIVER</sub> heard from John<sub>SOURCE</sub> about the picture of {him/himself} on the wall.

Their results showed that in these kinds of sentences, reflexives are guided by a strong subject preference and a weaker source-of-information preference, and pronouns are guided by two more evenly weighted constraints: an anti-subject preference and a perceiver preference. Thus, although pronouns and reflexives are not in strict complementary distribution, they nevertheless exhibit complementary/opposed biases: On the syntactic level, reflexives prefer subjects and pronouns prefer objects, and on the semantic level,<sup>1</sup> reflexives prefer sources and pronouns prefer perceivers.

However, the opposed biases found by Kaiser et al. (2009) seem to be at odds with observations pointing to greater parallelism in the behavior of pronouns and reflexives, in particular regarding point-of-view effects. Kuno (1987) claims that reflexives in picture-NPs are sensitive to logophoric properties such as point-of-view (see also Zribi-Hertz 1989, Sells 1987 and many others). The idea that reflexives in picture-NPs tend to refer to the entity whose point-of-view is being represented seems to fit intuitively with the source preference, i.e., a bias to refer to the person whose words/thoughts are being conveyed (cf. Sells’ notions of SELF, SOURCE).

Strikingly, a similar claim regarding point-of-view has been made for pronouns: Tenny (2003) suggests that pronouns in picture-NPs also have a preference for the person whose point-of-view is being represented: She suggests that pronouns “improve when bound by the POV [point-of-view] anchor” (Tenny 2003:13). Together, these observations about pronouns and reflexives yield the unidirectional prediction that *both pronouns and reflexives prefer the entity whose point-of-view is being represented*.

This unified prediction creates an interesting juxtaposition with Kaiser et al.’s findings that pronouns and reflexives in picture-NPs are sensitive to opposite/complementary properties. Kaiser et al.’s findings are compatible with a situation where pronouns and reflexives, normally in strict complementary distribution, maintain some level of complementarity even in picture-NPs. How-

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<sup>1</sup>When discussing the effects of the source/perceiver manipulation, we refer to the difference between source and perceiver as a ‘semantic/thematic factor’ for ease of exposition. However, we leave open whether the source/perceiver manipulation is a semantic, thematic role manipulation or a pragmatic manipulation.

ever, this kind of ‘persistent complementarity’ does not fit well with the idea that pronouns and reflexives are guided by a shared set of preferences, namely a shared sensitivity to point-of-view.

To gain a better understanding of these issues and to test experimentally whether pronouns and reflexives exhibit shared biases, we conducted two studies. We chose to conduct experiments because judgments concerning reference resolution in picture-NP constructions can be rather murky and variable, and an experimental approach allows us to collect a set of data from a large group of speakers and analyze it statistically. To test whether pronouns and reflexives in picture-NPs are sensitive to point-of-view, we manipulated the *referential specificity* of the potential antecedents. The logic is as follows: If someone’s identity is unspecified/indefinite, then that entity is not a good point-of-view anchor (e.g., Kuno 1987): We cannot assume the perspective of someone else if we don’t know who that someone is. If an anaphor has a bias to refer to the person whose point-of-view is being represented, that form should *disprefer referentially unspecified entities*. (This is admittedly a very simplified approach to perspective-taking; we are using it as a starting point and plan to use more complex manipulations in the future.)

In the two experiments reported here, we manipulated potential antecedents’ referential forms (and their suitability to act as point-of-view anchors) in two ways. In Experiment 1, the potential antecedents were either names (referentially specific) or the word ‘someone’ (existential, referentially nonspecific, see discussion in Section 2.2). In Experiment 2, we again used names and compared them to wh-expressions, namely bare ‘who’ and partitive ‘which of the X’ constructions. The structure of the paper is as follows. The design and results of Experiment 1 are in Section 2. In Section 3, we report the outcomes of Experiment 2. In Section 4, we discuss the implications of the results, as well as alternative interpretations of our findings. Section 5 concludes the paper.

## 2 Experiment 1

Experiment 1 has two related aims. First, we wanted to test whether point-of-view (implemented as referential specificity) influences the interpretation of pronouns and reflexives in picture-NPs. Second, we wanted to find out how potential point-of-view effects interact with the complementary biases observed for pronouns and reflexives in earlier work (source/perceiver and subject/object). In particular, can we observe pronouns and reflexives showing sensitivity both to opposing biases and to shared biases at the same time?

### 2.1 Participants, Materials, Design, Procedure

Twenty-four native English speakers from the University of Southern California community participated. In a pen-and-paper questionnaire, participants read sentences and answered questions about them (24 targets, 32 fillers). On target trials, the questions probed the referent of the reflexive or the pronoun in the picture-NP by asking who was in the picture ((2)a.-b.). The participants were given two choices and had to select one of them. The order of the choices corresponded to the linear order in which the entities were mentioned in the sentence. The names in the targets were common male and female names, and each name was only used once. Half of the targets had male names and anaphors (*him/himself*), and half had female names and anaphors (*her/herself*).

- (2) a. Jeff was told by Nick about the picture of himself.  
 Who was in the picture?  
 (a) Jeff  
 (b) Nick
- b. Someone was told by Nick about the picture of himself.  
 Who was in the picture?  
 (a) The unnamed ‘someone’  
 (b) Nick

On target trials, we manipulated (i) the referential form in the picture-NP (pronoun vs. reflexive), (ii) the source/perceiver status of the subject (*X told Y* = source subject vs. *X was told by Y* = perceiver subject), and (iii) the form of the perceiver (name vs. ‘someone’). This resulted in eight conditions (2x2x2), summarized in (3). A Latin-Square design was used to create eight lists.

- (3) a. Nick told Jeff about the picture of {him/himself} [act/name+name]  
 b. Nick told someone about the picture of {him/himself} [act/name+someone]  
 c. Jeff was told by Nick about the picture of {him/himself} [pass/name+name]  
 d. Someone was told by Nick about the picture of {him/himself} [pass/someone+name]

We used the active/passive alternation to manipulate the source/perceiver roles. In the active voice, *X told Y* ((3)a.-b.), the subject is the source and the object is the perceiver. In the passive voice, *X was told by Y* ((3)c.-d.), the subject is the perceiver and the object of the by-phrase is the source. This set-up differs from Kaiser et al. (2009) who used ‘tell’ and ‘hear from’ in the active voice. Thus, the current study allows us to test whether the source/perceiver effects extend to passives.

## 2.2 Predictions

Based on Kaiser et al.’s findings, we expect that *reflexives* will show a subject preference as well as a weak source preference. In other words, we should mostly see subject choices, but with a boost in the rate of object choices when the object is the source-of-information. For *pronouns*, based on Kaiser et al.’s earlier findings, the prediction is that we should see an object preference as well as a clear perceiver preference. According to these predictions, pronouns and reflexives should show *complementary/opposed preferences*: In terms of grammatical role, reflexives should prefer subjects while pronouns should prefer objects. In terms of thematic role/semantic role, reflexives should prefer sources while pronouns should prefer perceivers.

In addition to these divergent preferences, we also tested whether reflexives and pronouns pattern alike when it comes to referential (non-)specificity. Based on the existing claims regarding perspective-taking (see Section 1), the prediction is that both pronouns and reflexives should show a bias for names over the existential ‘someone’. This is because ‘someone’ simply indicates that a referent exists but does not provide any more information about this entity. A finding that both pronouns and reflexives exhibit a shared dislike of nonspecific antecedents would fit with the claims that both forms are sensitive to point-of-view.

It is important to note that ‘someone’ can be epistemically specific and can be used in a situation where the speaker has a specific referent ‘in mind’ (e.g., Karttunen 1976, Fodor and Sag 1982). The target sentences in our study did not disambiguate between epistemically specific and non-specific uses of ‘someone’, but one might expect participants’ default interpretation to be epistemically non-specific. Crucially, the possibility of epistemically specific interpretations works *against* our intended goal of using ‘someone’ to denote a referentially underspecified antecedent. If people interpret ‘someone’ as being epistemically specific, then the referent is known/specified (at least to the speaker) and thus it is presumably a better point-of-view anchor than an underspecified referent (see Kuno 1987:155). Thus, the potential ambiguity of ‘someone’ could *weaken* our expected results. If we nevertheless find that both pronouns and reflexives dislike ‘someone’ antecedents, this is evidence for effects of referential specificity.

## 2.3 Results

### 2.3.1 Pronoun Results

Let us first consider the results for pronouns in this section, and then turn to reflexives in Section 2.3.2. Figure 1 shows on what proportion of trials participants chose the subject vs. the object as the antecedent of the *pronoun*. In the [name+name] conditions, we observe a striking grammatical-role difference between actives and passives: In the actives, the pronoun was mostly interpreted as referring to the object, but in the passives, the pronoun was mostly interpreted as referring to the subject. One-sample t-tests reveal that in the active [name+name] conditions, the proportion of object choices is significantly higher than chance ( $p's < .01$ ) and in the passive [name+name] conditions, the proportion of subject choices is significantly higher than chance ( $p's < .005$ ). Furthermore, paired t-tests show that the proportion of subject choices is significantly higher in the passive voice (where the subject is the perceiver) than in the active voice (where the subject is the

source,  $t(23)=5.169$ ,  $p<.0001$ ,  $t(22)=6.582$ ,  $p<.0001^2$ ). In sum, we can conclude that, as in the Kaiser et al. 2009 study, pronouns show a significant perceiver preference (though we did not find a clear object preference).

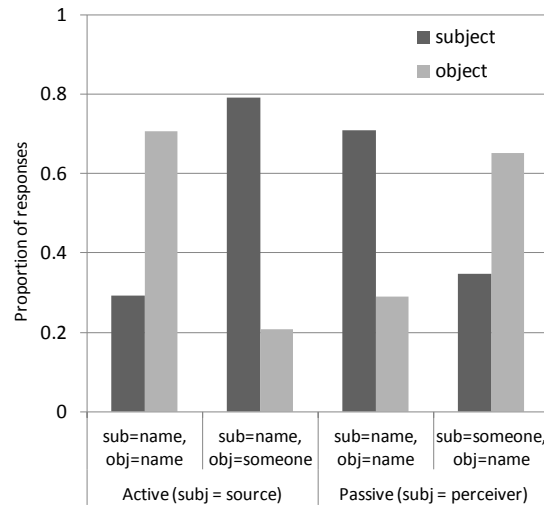


Figure 1: Experiment 1: Proportions of subject and object choices in the *pronoun conditions*.

Let us now consider the [name+someone] conditions with pronouns, which differ from the [name+name] conditions only in the form of the perceiver (object). When we look at the *active voice* and compare [name+name] and [name+someone], we find that the strong object preference in the [name+name] conditions is replaced by a subject preference in the [name+someone] conditions. The proportion of subject choices in the active [name+someone] condition is significantly higher than in the active [name+name] condition ( $t(23)=6.356$ ,  $p<.0001$ ,  $t(23)=8.108$ ,  $p<.001$ ). Not surprisingly, the rate of subject choices in the [name+someone] condition is significantly higher than chance ( $p's<.001$ ). Thus, when the object is referentially nonspecific ('someone'), it is no longer the preferred antecedent, and people switch to the subject. This indicates that pronouns dislike nonspecific referents. (In Section 4, we discuss possible effects of salience/accessibility.)

When we look at effects of referential specificity in the *passive voice* pronoun conditions, we see a similar pattern: The subject preference (perceiver preference) that is clearly visible in the passive [name+name] conditions vanishes in the passive [someone+name] conditions, where the object is the preferred antecedent of the pronoun: The proportion of object choices in the passive [someone+name] condition is significantly higher than chance ( $p's<.05$ ). Comparing the 'someone' and the 'name' conditions directly, we find significantly less subject choices in the passive [someone+name] condition than in the passive [name+name] condition ( $t(23)=-5.057$ ,  $p<.001$ ,  $t(23)=-5.126$ ,  $p<.0001$ ). Thus, in the passives as in the actives, we find that pronouns exhibit a dislike of referentially underspecified antecedents.

### 2.3.2 Reflexive Results

Turning now to the *reflexive conditions*, we see in Figure 2 overall indications of a subject preference. In fact, in three out of the four conditions the proportion of subject choices is significantly higher than chance ( $p's<.001$ ), but in the passive [someone+name] condition, the proportion of subject choices (or object choices) does not differ from chance ( $p's>.18$ ). However, if we compare the [name+name] conditions in the active and the passive voice, we see that there is a significantly higher rate of object choices in the passive voice, when the object is the source ( $t(23)=-2.505$ ,  $p<.05$ ,  $t(23)=2.827$ ,  $p<.01$ ). Thus, as in Kaiser et al. 2009, reflexives have a source preference.

Now, turning to referential specificity, when we compare active [name+name] and

<sup>2</sup>The by-items paired t-test has one missing datapoint due to a data entry error with one of the lists.

[name+someone], we find that the subject preference becomes even stronger when the object is ‘someone’: In the *active* [name+name] condition, there were about 7% object choices, but in the [name+someone] condition, there are no object choices at all. This suggests that when the object is referentially underspecified, it is even less likely to be interpreted as the antecedent. Further evidence that reflexives dislike referentially underspecified elements comes from the *passive*. The subject preference seen in the passive [name+name] condition is absent in the passive [someone+name] condition: When the subject is ‘someone’, it is chosen significantly less often than when it is a name ( $t(23)=-2.509$ ,  $p<.05$ ,  $t(23)=-3.238$   $p<.01$ ), and—as mentioned above—the proportion of subject choices does not differ from chance when the subject is ‘someone’.

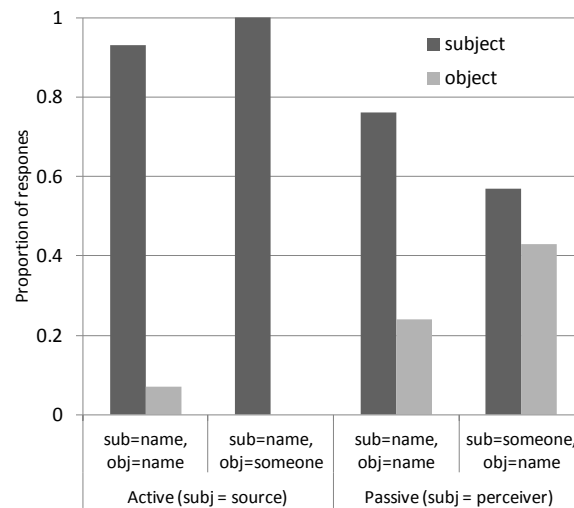


Figure 2: Experiment 1: Proportions of subject and object choices in the *reflexive conditions*.

## 2.4 Experiment 1 Discussion

Experiment 1 has two key findings. First, we replicated Kaiser et al.’s (2009) findings that pronouns in picture-NPs exhibit opposed biases: one is attracted to the perceiver and the other to the source. Experiment 1 shows that these effects also extend to the passive voice.

The second key finding of this study goes beyond the complementary biases found by Kaiser et al. In the current study, we found that pronouns and reflexives also have *shared biases*: Both pronouns and reflexives dislike the referentially underspecified form ‘someone’. The shared, unidirectional preference for names over ‘someone’ is interesting, especially when coupled with the other results showing that pronouns and reflexives have opposing biases. In essence, we have a situation where pronouns and reflexives are in some respects the opposite of each other but in other respects they pattern the same. This has implications for our understanding of the reference resolution system, and fits well with the form-specific approach posited by Kaiser and Trueswell (2008, see also Kaiser et al. 2009). According to the form-specific multiple-constraint framework, different anaphors can be influenced by different ‘antecedent properties’ and can also differ in how sensitive they are to various properties of the antecedent (e.g. grammatical role vs. semantic role).

The finding that ‘someone’ is a dispreferred antecedent for both pronouns and reflexives provides experimental support for the idea that both reflexives and pronouns in PNPs prefer the person whose point of view is being represented (e.g., Kuno 1987, Tenny 2003). Since the referent of ‘someone’ is unknown, we cannot assume that person’s point of view, which should render it a dispreferred antecedent—and this is indeed what we saw with both pronouns and reflexives. (In Section 4, we discuss whether the behavior of ‘someone’ could be linked to salience/accessibility.)

### 3 Experiment 2

Experiment 1 shows that both pronouns and reflexives are sensitive to whether the antecedent is a name or existential ‘someone’: Both prefer names over ‘someone’. We suggested above that this may be due to the referentially underspecified nature of ‘someone’. If this reasoning is on the right track, then we expect that other underspecified forms should pattern in the same way. To assess the generality of these effects, in Experiment 2 we investigated the interpretation of pronouns and reflexives when one of the potential antecedents is a wh-expression (as in (4)):

- (4) {Who/Which of the boys} told John about the picture of {him/himself}?

We investigated two kinds of wh-expressions: bare wh-words, and presuppositional partitive which-phrases (‘which of the X’). If pronouns and reflexives prefer the character whose point-of-view is represented, they should disprefer wh-expressions, because (at least from the perspective of the speaker), the precise referent of the wh-word is unknown. It is worth noting that wh-expressions involve an asymmetry in the knowledge states of the speaker and the addressee: The speaker presumably does not know the referent of the wh-expression, and poses a question to the addressee because the addressee presumably *does know* who that person is. Thus, wh-expressions are underspecified from the speaker’s perspective but probably not the addressee’s perspective.

We tested bare wh-words and partitive ‘which of the X’ expressions, because we wanted to see whether pronouns and reflexives show a fine-grained sensitivity to different levels of underspecification. Definite partitive expressions of the type ‘which of the boys’ pick out a member from a presupposed set. In this regard, they differ from bare wh-words. Although researchers disagree as to whether bare wh-words carry an existential presupposition or merely an implicature (see e.g., Karttunen and Peters 1976 vs. Ginzburg 2004), it seems fair to say that definite partitives are more specific than bare wh-words: First, ‘which of the X’-phrases provide some information about the identity of the referent (delimit it to a particular set), and second, they are often judged to carry a clearer existence presupposition than bare wh-words.<sup>3</sup> Given these differences, one might predict that pronouns and reflexives will show less of a dislike of ‘which’ phrases than bare wh-words.

In addition to probing how wh-words affect the interpretation of pronouns and reflexives, in Experiment 2 we also included two conditions with ‘someone’: one where ‘someone’ is the perceiver (*X told someone*) and another condition where ‘someone’ is the source (*Someone told X*). Recall that Experiment 1 only tested ‘someone’ in the perceiver role. In Experiment 2 we wanted to see whether we could replicate the results of Experiment 1 and also to check that ‘someone’ in the source role also triggers the predicted avoidance effects for reflexives and pronouns.

#### 3.1 Participants, Materials, Design, Procedure

Thirty-two native English speakers from the University of Southern California community participated. (None had participated in Experiment 1.) The method was the same as Experiment 1: In a paper-and-pen survey with 32 targets and 35 fillers, participants read sentences and answered questions. Examples are given in (5)a.-b. As in Experiment 1, the target questions probed how participants interpreted the pronoun/reflexive, by asking who is in the picture.

- (5) a. Who told Nick about the picture of himself?  
       Who was in the picture?  
       (a) The unnamed ‘who’  
       (b) Nick  
   b. Which of the men told Nick about the picture of himself?  
       Who was in the picture?

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<sup>3</sup>Frazier and Clifton (2002) compared bare wh-words (‘who’) and d-linked which-phrases (‘which man’), and found that which-phrases are chosen as the antecedents of pronouns in sentences like “{Which guy/Who} did Bradley send a rifle to when he was threatened?” more often than ‘who’. They attribute this to which-phrases “requir[ing] the postulation of a discourse entity.” Although the which-phrases in our study were different, these results fit with the idea that which-phrases are more referential than ‘who’.

- (a) One of the men
- (b) Nick

In this study, we manipulated (i) the referential form in picture-NP (pronoun vs. reflexive) and (ii) the referential specificity of the subject and object (name, *who*, *which of the X*, *someone*). As can be seen in (6), we manipulated whether ‘who’, ‘which of the X’ or ‘someone’ were in subject or object position. The other argument was a proper name.

- |        |  |                |
|--------|--|----------------|
| (6) a. | Who told Nick about the picture of {him/himself}?                  | [who+name]     |
| b.     | Who did Nick tell about the picture of {him/himself}?              | [name+who]     |
| c.     | Which of the men told Nick about the picture of {him/himself}?     | [which+name]   |
| d.     | Which of the men did Nick tell about the picture of {him/himself}? | [name+which]   |
| e.     | Nick told someone about the picture of {him/himself}.              | [name+someone] |
| f.     | Someone told Nick about the picture of {him/himself}?              | [someone+name] |
| g.     | Jeff told Nick about the picture of {him/himself}.                 | [name+name]    |

### 3.2 Predictions

Similar to Experiment 1, we expect that pronouns will prefer perceivers and reflexives will prefer sources—i.e., that the semantic preferences for pronouns and reflexives will be divergent. In addition, we expect pronouns and reflexives to pattern alike when it comes to referential specificity: Both forms should have an overall preference for names and should disprefer bare *wh*-words, *which*-phrases and ‘someone.’ This is because with ‘someone’ and with *wh*-expressions, the identity of the referent is unknown (at least to some extent), which means that the referent is not a good point-of-view anchor. We may also find fine-grained differences between the three types of underspecified antecedents: We hypothesize that ‘someone’ may be a better antecedent than ‘which of the X’, which might be a better antecedent than ‘who.’ This is because ‘someone’ can be potentially interpreted as epistemically specific (see Section 2.2), and ‘which’ selects one referent out of a definite set. Thus, relatively speaking, the bare ‘who’ is the least referentially specific.

### 3.3 Results and Discussion

#### 3.3.1 Results: ‘Someone’ Conditions

The results for the ‘someone’ conditions and the baseline [name+name] conditions pattern as expected on the basis of Experiment 1: Pronouns prefer the perceiver (which in this case is the object), but this preference is eliminated when the object is ‘someone’. Conversely, reflexives prefer the source (which in this case is the subject), but this preference vanishes when the subject is ‘someone’. These findings provide further support for the claims that both pronouns and reflexives dislike referentially underspecified antecedents. (No graphs are provided due to space limitations.)

#### 3.3.2 Results: *Wh*-expressions and Pronouns

Let us now consider the findings for the *wh*-expressions. Figure 3a shows how people interpreted *pronouns* in picture-NPs when the preceding subject or object was a *wh*-word. It is immediately clear that changing the form of the subject or the object to a *wh*-word has a strong effect on participants’ responses. When the subject is a bare ‘who’ or a ‘which’-expression, we see a strong object preference (significantly more object choices than predicted by chance,  $p's < .001$ ). However, when the object is ‘who’ or ‘which’, the object preference vanishes and in fact the proportion of object choices vs. subject choices does not differ from chance ( $p's > .2$ ). In other words, when the object is a *wh*-expression, people are equally likely to interpret the pronoun as referring to the preceding subject or object. This shows that pronouns exhibit a significant dislike of *wh*-expressions.

When we compare the underspecified expressions in this experiment (‘someone’, ‘who’ and ‘which of the X’) to each other, we do not find clear distinctions in how they influence the interpretation of pronouns. Broadly speaking, it appears that all three forms are dispreferred at roughly equal rates. The only significant difference is found in the rate of subject choices in the [which+name] vs. [who+name] conditions, where we find that there are more subject choices with

‘who’ than with ‘which’ ( $t(31)=-2.239, p<.05$ ).<sup>4</sup> The reasons for this are not clear, and it goes against our predictions (Section 3.2). As a whole, in the pronoun conditions wh-words are dispreferred, which shows that the dislike of underspecified referents extends beyond ‘someone’.

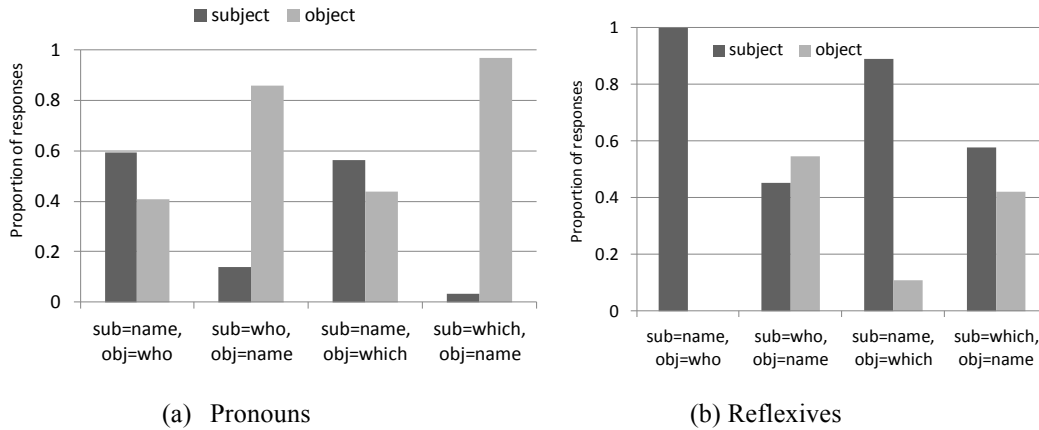


Figure 3: Experiment 2: Panel (a): Proportions of subject and object choices in the *pronoun conditions*, Panel (b): Proportions of subject and object choices in the *reflexive conditions*.

### 3.3.3 Results: Wh-expressions and Reflexives

Figure 3b shows that in sentences where the *object* is ‘who’ or ‘which’, reflexives exhibit a strong preference for the preceding subject. The [name+who] condition resulted in 100% subject choices, and the [name+which] condition had 11% subject choices (significantly more than expected by chance,  $p<.001$ ). This is expected, given that we know reflexives prefer subjects and sources.

The striking effects of referential specificity can be seen in the conditions where the subject is ‘who’ or ‘which’. In these conditions, as shown in Figure 4, we see no subject preference at all, and in both [who+name] and [which+name], participants are equally likely to choose either the preceding subject or object as the antecedent of the reflexive (i.e., the proportion of subject or object choices does not differ significantly from chance,  $p's>.2$ ). In other words, the slight differences between the subject and object bars are not significant. Thus, when the subject is a wh-expression, participants avoid choosing it, and reflexives no longer exhibit a subject preference.<sup>5</sup>

When we compare the three underspecified forms, we find some evidence that ‘which of the X’ is a better antecedent for reflexives than ‘who’. There are 0% object choices in the [name+who] condition, but 10.9% object choices in [name+which] (significantly higher than 0, ( $t(31)=2.521, p<.05$ ): Participants are more willing to choose the object when it’s ‘which’ than ‘who’. In addition, the [which+name] condition also resulted in a higher rate of subject choices than the [who+name] condition ( $t(31)=1.969, p=0.058$ ): Participants are more willing to choose the subject when it’s ‘which’ than ‘who’. The [which+name] condition also resulted in a higher rate of subject choices than the [someone+name] condition ( $t(31) = -3.304, p<.01$ ). However, [name+someone] and [name+which] do not differ, and ‘who’ and ‘someone’ do not differ in either subject or object position. As a whole, in the reflexive conditions we find a preference for names over wh-words, as well as some indications that ‘which’ is a better antecedent than ‘who’.

## 4 General Discussion

The two experiments reported in this paper explored the interpretation of pronouns and reflexives in picture-NP constructions without possessors. Possessorless picture-NPs have been argued to be exempt from Binding Theory, which raises the question of what factors influence the interpreta-

<sup>4</sup>Due to the design of Experiment 2, analyses are only conducted by-subjects.

<sup>5</sup>It is important to keep in mind that this dislike is not an absolute requirement. In a sentence with no other possible referents, e.g., ‘Who admires the picture of himself?’, the reflexive can corefer with the subject.



tion of pronouns and reflexives in this environment. Prior work by Kaiser et al. (2009), building on observations by Kuno (1987) and Tenny (2003), found that pronouns and reflexives are guided by opposing syntactic and semantic biases: Whereas pronouns prefer perceivers-of-information and antecedents in object position, reflexives prefer sources-of-information and antecedents in subject position. The two experiments reported here show that these divergent biases co-exist with shared biases: Both pronouns and reflexives dislike referents that are referentially underspecified, such as ‘someone’, ‘who’ and ‘which of the X’. This finding provides experimental support for the idea that both pronouns and reflexives are sensitive to perspective-taking phenomena (Kuno 1987, Tenny 2003)—more specifically, that they favor the referent whose point-of-view is being represented. The logic is that if a particular referent is unknown, then we presumably cannot assume the point-of-view of that unknown referent.

Thus, as a whole, the outcomes of the studies show that pronouns and reflexives cannot be adequately described as guided by opposed biases—they are also subject to a *shared dislike* of referentially underspecified entities. This dislike of unknown antecedents seems to fit well with the idea that both reflexives and pronouns are sensitive to point-of-view effects.

However, one might wonder whether the shared dislike for ‘someone’ and wh-expressions could stem from something other than perspective-taking. In particular, one important difference between names and indefinite ‘someone’ has to do with salience/accessibility, i.e., how prominently a particular entity is represented in the discourse participants’ mental models. Highly salient entities can be thought of as highly activated, at the center of attention. Although most salience-based approaches of reference resolution do not directly compare names to ‘someone’, it seems reasonable to assume that names are used for more salient entities than ‘someone’. Combining this with the well-known observation that pronouns in particular have a preference for highly-salient antecedents prompts the question of whether the results could be attributed to salience effects. Do pronouns and reflexives prefer names over ‘someone’ and wh-expressions because names refer to more salient entities? While the experiments reported in this paper do not focus specifically on the question of salience/accessibility, in our opinion the results of Experiment 2 suggest that a salience account is *not* sufficient.<sup>6</sup> With wh-expressions, the speaker asks the question because s/he wants to find out the identity of a particular individual, which suggests that—although its identity is not yet known—this individual is highly salient and at the center of attention. But in Experiment 2, we saw that despite this, wh-expressions are dispreferred as antecedents. This suggests that the dispreference effects reported here cannot be attributed to low salience (at least as defined here).

Crucially, whether the results are due to salience or not, the key point that we want to emphasize is that our studies show pronouns and reflexives responding in the same way to referential specificity: Both forms prefer more specific antecedents over underspecified/unknown antecedents. This unified bias, when combined with the opposing preferences for source/perceiver, shows that pronouns and reflexives cannot be satisfactorily described in terms of complementary biases.

## 5 Conclusions

The two experiments presented here found that the interpretation of pronouns and reflexives in picture-NPs is governed by multiple factors. On the one hand, we corroborated the results of prior work which found that pronouns and reflexives are subject to *opposing syntactic and semantic biases* (Kaiser et al. 2009). However, on the other hand, we provide evidence of *shared biases*: Both pronouns and reflexives dislike referentially underspecified antecedents, namely the indefi-

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<sup>6</sup>Could our results be derived from the bound variable/coreference distinction? Wh-expressions and quantified NPs are interpreted as *bound variables* (e.g., Reinhart 2000), because they are non-referential (do not point to a referent in the discourse model). Could it be the case that bound-variable interpretations are *not available* in picture-NPs, and that this is why picture-NP pronouns and reflexives cannot refer to ‘someone’ or wh-expressions? We claim this is unlikely: First, though researchers disagree whether reflexives in picture-NP-type environments can be interpreted coreferentially, it is agreed that they *can* be interpreted as bound variables (Reinhart and Reuland 1993, Sells 1987) and that pronouns can be interpreted as bound variables or coreferentially. I.e., there is no reason to think bound-variable interpretations are impossible. Second, this account predicts categorical patterns. In particular, ‘who’ should presumably be impossible as an antecedent, contrary to our findings (e.g., ‘Who told Mike about the picture of himself?’ >40% ‘who’ choices).

nite existential ‘someone’ and wh-expressions. This pattern seems to fit well with claims that both forms prefer to pick out the antecedent whose point-of-view is being represented (Kuno 1987, Tenny 2003), since referentially underspecified antecedents are not good point-of-view anchors.

As a whole, these results suggest that reference resolution is governed by multiple constraints, and that pronouns and reflexives are not simply opposites of each other. Broadly speaking, these kinds of findings fit well with the multiple-constraints approach to reference resolution proposed by Kaiser and Trueswell (2008, see also Sells 1987 regarding three dimensions of logophoricity).

In closing, let us turn to an open question that we have not yet addressed: Why should it be that pronouns and reflexives differ in their syntactic and semantic preferences (subject/object, source/perceiver), but pattern the same when it comes to referential specificity? Although a conclusive answer is beyond the scope of this paper, we speculate that this could be due to a division between ‘core’ linguistic representations on the one hand, and more general cognitive representations on the other hand: Syntactic and semantic factors, which can be argued to be part of the core linguistic representation, treat pronouns and reflexives differently. In contrast, referential specificity—which we suggest may be linked to perspective-taking in the case of picture-NP anaphora—ignores the pronoun/reflexive distinction, and treats both forms the same. This asymmetry could be a result of the point-of-view-related representations being more cognitively general and less tied to linguistic details—such as the distinction between two subtypes of anaphora—than syntactic or semantic representations. Future work can hopefully shed more light on this possibility.

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