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The puzzling nuanced status of *who* free relative clauses in English: A follow-up to Patterson and Caponigro (2015)[1]

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ABSTRACT

This squib challenges Patterson & Caponigro's (2015, this journal) claim that there are few acceptable free relative clauses with *who*. We show that free relatives with *who* are generally acceptable when they are 'transparent' free relatives or complements of a copula, and add further nuance to their findings concerning how the degree of acceptability of free relatives with *who* varies according to positional factors.

KEYWORDS

Standard Free Relatives

Transparent Free Relatives

Degradation of *Who* Free Relatives

Wh-words

Copular Clauses

1 Introduction

In a squib in this journal, Patterson & Caponigro (2015; hereafter P&C) claim based on an acceptability rating experiment that *who* free relatives (FRs) are rarely judged acceptable, and that the degree of unacceptability of *who*-FRs varies according to positional factors. This paper challenges the former claim by exploring circumstances in which *who*-FRs can be judged highly acceptable, and shows that positional factors have more nuanced effects on the status of *who*-FRs than P&C report.

Free relatives are embedded non-interrogative *wh*-clauses that have the distribution and interpretation of DPs (Caponigro 2003, 2004). To illustrate in (1), the embedded *wh*-clause *what Samir cooked* is an embedded interrogative in (a), but the FR complement of a DP-selecting predicate in (b), where it is interpreted like the definite DP in (c) (P&C: 341, ex.1):

(1) (a) Ana wondered what Samir cooked.

(b) Ana tasted what Samir cooked.

(c) Ana tasted the stuff Samir cooked.

There is a puzzling asymmetry in English between FRs introduced by *what* versus *who* (Caponigro 2003: 23). P&C found that *who*-FRs are always judged less acceptable than *what*-FRs, echoing passing claims in the literature that *who*-FRs are ungrammatical (Jespersen 1927: 62; Bresnan & Grimshaw 1978: 340). Compared against sentences containing *what*-FRs like (2a), for example, P&C

note that 'the acceptability of analogous sentences containing *who* FRs in [(2b)] is degraded, often to the point of ungrammaticality' (p. 341) (P&C 342: 2c, 3c):

(2) (a) [What Glenn said] didn't make much sense.

(b) [Who Glenn married] didn't make much money.

On the contrary, we show that *who*-FRs can be very highly acceptable; for instance, in some cases when a *who*-FR is the complement of a copula (3), or when *who* introduces a transparent free relative (TFR) (4):

(3) Looking through the mug shots, he suddenly proclaimed, 'That's [who broke into my house]!'

(4) The authorities are interviewing [who they believe to be international drug dealers].

In outline, the next section sets the scene with some attested examples of *who*-FRs from contemporary professional and scripted writing. The core of the paper discusses the results of a rating experiment designed to examine a wider range of *who*-FRs to explore how acceptable they can sound. Our experiment was inspired by P&C's and included their critical items, as outlined in section 3.1. Section 3.2 reports a new manipulation involving transparent free relatives (TFRs), which shows that *who*-TFRs degrade following a pattern analogous to P&C's standard *who*-FR items, while receiving higher ratings overall. Section 3.3 reports data on further factors that might affect the acceptability of *who*-TFRs – number and embedded subject position. Section 4 concludes. Appendix A reports ratings for

sentences containing *who*-FRs – both standard and transparent – inspired by naturally occurring examples from the Web (cf. section 2), which were rated even higher than most of the constructed examples.

2 ATTESTED EXAMPLES OF *WHO*-FRS

To begin, we observe that w*ho*-FRs are attested in contemporary professional writing. The following examples from magazines and novels are drawn from the Corpus of Contemporary American English (Davies 2008–):[2]

> For famous, wealthy Black women, the ratio is even more startling – about one man for every 100 women. 'You marry **[who's available]**,' emphasizes Dr. McAdoo, …
>
> (Lynn Norment, 'Guess Who's Coming to Dinner Now?', *Ebony* 47(11), 1992: 48)

> Once, before they came home, he dreamed that **[who took Ben]** was a witch, like in 'Hansel and Gretel.'

---

[2] Anonymous reviewers raise two further examples. Example (i) is routine in American retail establishments, but often incites complaints of ungrammaticality; while (ii) suggests *who*-FRs were not so problematic in historical English:

(i) I can help [who's next].

(ii) [Who steals my purse] steals trash. [Iago in *Othello* (III.iii.157)]

(Jacquelyn Mitchard, *The Deep End of the Ocean*, New York: Penguin, 1996: 148)

I should, I should. I have never been good about that word. You can't love **[who you should love]**, you can't stop loving **[who you shouldn't]**. (Louise Erdrich, 'Line of Credit', *Harpers Magazine* 284 (1703): 55, 1992)

'In my house, this man I called to serve me was poisoned in my house!' Pigeons in the cotes beneath the palazzo eaves fluttered as the great booming voice washed over them. Roused to anger, Il Cardinale was a marvel to behold, a true force of nature. 'I will find **[who did this]**.' (Sara Poole, *Poison: A novel of the Renaissance*, New York: St. Martin's Griffin, 2010: 5)

Who-FRs are also encountered in scripted television programming, including entertainment and news programming. (5a) is from the WB television series *7th Heaven*, episode *Monkey Business 1*, which originally aired on 9/16/2002. (5b) was part of a CNN news report on 4/18/2003 (Caponigro 2003: 23, exx. 34d, 34e):[3]

(5) (a) You are not gonna meet [who I am going out with].

[3] Like (4), (5b) is a transparent free relative – see §3.2.

(b) Abu Dhabi TV also released a separate audiotape of [who they claimed to be Saddam].

Given their attestation in professional writing – and our native speaker judgements that all the examples in this section are perfectly acceptable – there seems to be further nuance to (the puzzle of) the degraded status of *who*-FRs in English. The rest of this paper reports the results of an acceptability rating experiment inspired by P&C, designed to shed light on those nuances.

3 Position-dependent Acceptability in *Who*-FRs

3.1 P&C's original experiment

The first part of our experiment directly replicates P&C's finding that the relative (un)acceptability of *who*-FRs can depend on the internal and external distribution of the FR: both the configuration of the *wh*-dependency inside the FR and the position of the FR in the containing clause.

P&C used Amazon Mechanical Turk to collect acceptability judgments from native speakers on a scale from 1 ('completely unacceptable') to 7 ('fully acceptable'). The relevant part of their experiment manipulated three factors:[4]

[4] P&C included object of preposition as a third level of factor (i) and stated factor (ii) in terms of whether the trace position and the FR position were parallel (e.g., subject–subject) or non-parallel (e.g., subject–object).

(i) the *wh*-word introducing the FR (*who*, *what*); (ii) the syntactic position of the FR clause in the matrix clause (subject, direct object); and (iii) the syntactic position of the trace of the *wh*-word within the FR (subject or direct object). They tested three items like (6) containing *who*-FRs, with the combinations of factors (ii) and (iii) creating four conditions, each represented by one sentence token per item.[5]

(6) (a) The young woman kissed [$_{FR}$ who she met t_{ACC} at the party].

(b) The young woman kissed [$_{FR}$ who t_{NOM} met her at the party].

(c) [$_{FR}$ Who the young woman met t_{ACC} at the party] kissed her on the way home.

(d) [$_{FR}$ Who t_{NOM} met the young woman at the party] kissed her on the way home.

As shown in figure 1, P&C found when averaging over the items that condition (a), where the *who*-FR is the matrix object and the trace of *who* is the object of the relative clause, was rated much more acceptable than (b) and (c), which were in turn rated better than (d). *What*-FRs, by contrast, did not show any significant position-related pattern of degradation, and were all rated more acceptable than

[5] FRs are enclosed in square brackets. Subject position traces of the *wh*-word are marked t_{NOM}, object position t_{ACC}; the relevance of this will become clear in §3.3.

even the best *who*-FRs (e.g., (6a)):

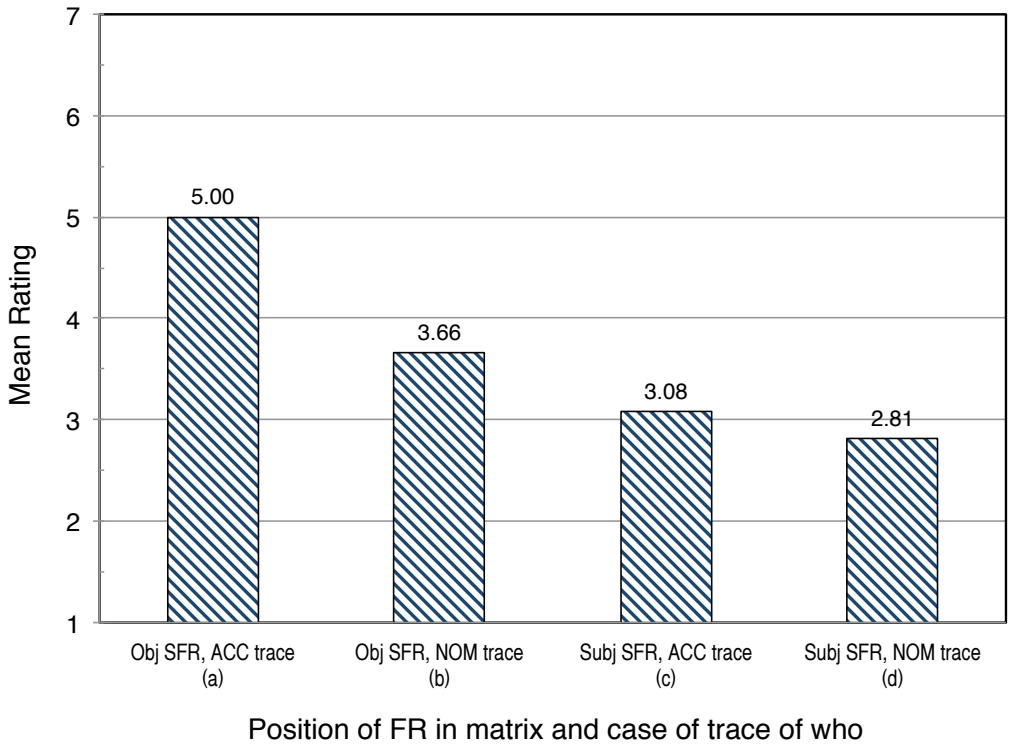

Figure 1: P&C's ratings for their configurational manipulation of *who*-FRs

Using P&C's materials like (6), we replicated this general pattern for *who*-FRs as part of our own acceptability rating experiment, likewise conducted on Amazon Mechanical Turk using a 1–7 rating scale (and detailed in Appendix B). This replication establishes that our experiment was sensitive to the same sorts of factors as P&C's – our subjects were not doing something wildly different from theirs. The mean ratings from our experiment are plotted in figure 2.

P&C reported a significant main effect of position, with object FRs ((a) and (b)) being rated higher than subject FRs ((c) and (d)), which we replicated: means

4.11 vs. 2.94, $t(178) = 4.39$, $p < .001$. As for the effect of trace position, they reported that the difference between conditions (a) and (b) was significant, while the difference between conditions (c) and (d) was not. In our replication, both of these comparisons were significant: (a) vs. (b): $t(88) = 4.40$, $p < .001$; (c) vs. (d): $t(88) = 2.59$, $p < .02$.[6] Our finding a significant (c) vs. (d) contrast where they did not does not reflect greater power in our design – P&C had 25 subjects rating each token in each condition while we had 15. It seems rather to reflect the lower mean rating attributed to (d) by our subjects.

[6] Except where explicitly noted, *t* statistics represent independent samples Student's *t*-tests.

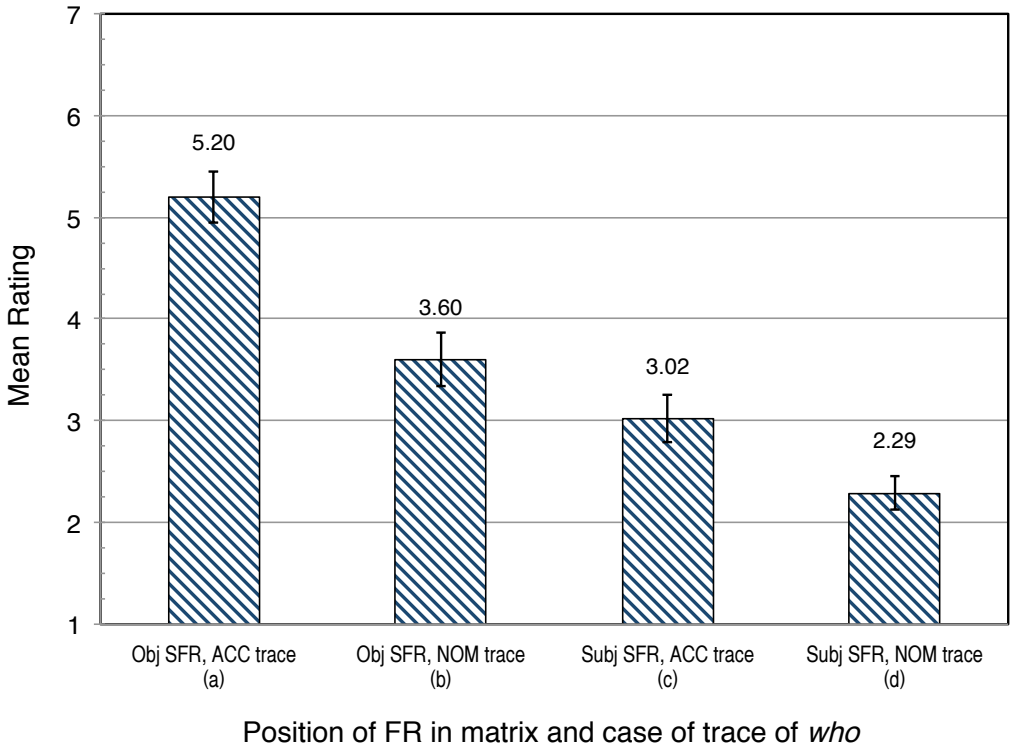

Figure 2: Our ratings for P&C's configurational manipulation of *who*-FRs[7]

Aside from (a), these ratings are quite low. However, all of P&C's stimulus sentences deliberately included 'past tense, episodic verbal predicates in order to try to induce a specific interpretation of the FR, so avoiding the potential confounding factor of free choice readings (i.e. *who* FRs interpreted as *whoever* FRs), and thereby reducing the number of variables to be controlled in the study'

[7] Here and in figure 3, error bars represent standard errors.

(p. 343).[8] Tense was one thing we changed in constructing our own experimental items, as introduced in the next subsection.

3.2 Transparent Free Relatives

We examined whether a wider range of *who*-FRs would reveal a wider range of acceptability.[9] We constructed four of our own quartets analogous to (6) that avoided (episodic) past tense, while still taking care to exclude *whoever*-type readings – by our native speaker judgements, all of the critical items sound unacceptable with *whoever* in place of *who*. Our sentences received overall higher ratings than P&C's, while still conforming to their position-related pattern.

These items contained so-called 'transparent' free relatives (TFRs). There is

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[8] *Whoever*-FRs show none of the degradation of *who*-FRs, as P&C (p. 342, ex. 4) confirmed. Still, simply putting *who* in a present tense non-episodic clause where *whoever* would sound perfect does not *ipso facto* make it sound good:

(i) Whoever/?*Who pulls the sword from the stone will be the true king.

[9] It is important to establish that our subjects were not simply giving high ratings across the board. Catch trials consisting of ungrammatical sentences not involving FRs, e.g. (i), received appropriately low mean ratings (essentially at floor):

(i) (a) *The was examined patient carefully. 1.15

(b) *They consider of teacher a Chris geeky. 1.20

debate as to the precise criteria distinguishing transparent from standard free relatives (SFRs) (see van Riemsdijk 2017 for an overview). For our purposes, TFRs can be defined as FRs with the additional properties in (7):[10]

(7) Transparent Free Relatives

(a) have the *wh*-word base-generated as a small clause subject

(b) can trigger plural verbal agreement

(c) can receive an 'indefinite' interpretation

First and foremost, the base trace of the *wh*-word in a TFR must be in the subject position of a small clause (SC), as indicated in (8):

(8) John is watching [$_{TFR}$ what$_i$ he believes t_i to be [$_{SC}$ t_i raccoons]].

Second, TFRs can trigger plural verbal agreement, while SFRs cannot (9) (cf.

[10] The properties in (7) are widely agreed to be necessary for TFR-hood, though perhaps not sufficient. Further to the syntactic signatures of TFR-hood in (7) and other morphological/inflectional properties that cannot be tested in English (van Riemsdijk 2017), Grosu (2016) claims there are interpretive requirements. For him, true TFR-hood is semantically and pragmatically delineated, including aspects of interpretation (e.g., speaker commitments) that cannot be assessed out of context. We use the label 'TFR' with the caveat that the TFR status of our examples may be indeterminate for Grosu (2016).

McCawley 1988: 733). The SFR in (b) disallows a plural matrix verb even in a context where we know that I see multiple things that scare me:

(9) (a) [$_{TFR}$ What seem to be [$_{SC}$ *t* raccoons]] are/*is eating our garbage.

(b) [$_{SFR}$ What I see *t*] scares/*scare me.

Third, while SFRs can receive only definite interpretations (recall (1)), TFRs receive 'indefinite' interpretations (Grosu 2016: 1247–8): they can be used in contexts where a headed relative paraphrase with an indefinite article sounds felicitous while one with a definite article does not. For example, out of the blue (8) seems to mean 'John is watching (*some*) creatures he believes to be raccoons', not 'John is watching *the* creatures he believes to be raccoons'. Our experimental items use present tense to bring out such indefinite construals. Moreover, TFRs can appear as the associates in existential *there* sentences (10a), while SFRs

generally give rise to 'definiteness effects' (10b):[11]

(10) (a) There were [$_{TFR}$ what could best be described [$_{SC}$ *t* as pebbles]] strewn across the lawn.

(b) *There is [$_{SFR}$ what you ordered *t*] on the desk. (Wilder 1999)

A fourth, widely assumed property of TFRs is that they can be introduced only by *what* (van Riemsdijk 2017; cf. Wilder 1999), whereas SFRs can be introduced by the full range of *wh*-words (except *why*) (Caponigro 2003). This supposed property of TFRs is challenged by the high acceptability of *who*-TFRs reported below and attested examples like those in section 2 – for additional

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[11] It should be acknowledged that the precise property excluded by the existential *there* frame is not strictly definiteness (cf. *There was the most amazing documentary on TV last night*). Although there is little dispute that SFRs are always interpreted as definites, there is nonetheless a subclass of SFRs that can appear in such sentences (Wiltschko 1999, Hinterwimmer 2008):

(i) There was [$_{SFR}$ what Mary likes to wear *t*] in the closet.

In (i) the SFR is interpreted as 'the kind of thing that Mary likes to wear', which differs from 'the stuff Samir cooked' in (1c) in not referring to an individual that must be assumed to be familiar in the context. Thus, in using existential sentences to diagnose TFRs it is important that the FR not receive a kind interpretation.

counterarguments, see Schütze & Stockwell (2019).

While it is a defining syntactic property of TFRs that the base trace of the *wh*-word is a small clause subject, the structure above the small clause can render the chain of the *wh*-word more subject- or object-like. This is achieved in (11) using a raising-to-object structure in (a/c) and a raising-to-subject structure in (b/d). Thus the TFR item in (11) is broadly parallel to the one for P&C's SFRs in (6); in particular, the case features of the traces are the same:

(11) (a) In a highly classified operation, the Secret Service is tracking [$_{\text{TFR}}$ who it suspects t_{ACC} to be [$_{\text{SC}}$ *t* a female assassin]].

(b) In a highly classified operation, the Secret Service is tracking [$_{\text{TFR}}$ who t_{NOM} is suspected to be [$_{\text{SC}}$ *t* a female assassin]].

(c) In a highly classified operation, [$_{\text{TFR}}$ who the Secret Service suspects t_{ACC} to be [$_{\text{SC}}$ *t* a female assassin]] is being tracked.

(d) In a highly classified operation, [$_{\text{TFR}}$ who t_{NOM} is suspected to be [$_{\text{SC}}$ *t* a female assassin]] is being tracked by the Secret Service.

As displayed in figure 3, our subjects rated the four items containing TFRs like (11) higher overall than they did P&C's SFR items: this main effect was significant: means 4.56 vs. 3.53, $t(418) = 5.73$, $p < .001$. Still, the condition ratings conformed to the same configurational pattern as in the previous subsection. Specifically, the same comparisons were significant. Object FRs ((a) and (b)) were rated higher than subject FRs ((c) and (d)): means 4.40 vs. 2.66,

$t(178) = 7.05$, $p < .001$. Trace position was likewise significant: (a) vs. (b): $t(88) = 4.40$, $p < .001$; (c) vs. (d): $t(88) = 2.59$, $p < .015$.[12]

Figure 3: Ratings for our configurational manipulation of *who*-TFRs

[12] A referee asks why these comparisons were chosen for analysis, rather than (a) vs. (c) and (b) vs. (d), or other possibilities. The primary reason is that P&C did not report other comparisons, so they would not help us to establish replication and hence the comparability of our subject populations. That said, by inspection of the figures it is very likely that the suggested comparisons would come out significant.

An analysis using a linear mixed effects model, conducted on *z*-scores, was performed on the data sets discussed in this and the previous subsection, with condition (a–d) as the fixed effect and subjects (intercepts only) and items (slopes and intercepts) as random effects, using the lme4 package (Bates et al. 2015) in R (R Core Team 2018). We calculated *p*-values using the lmerTest package, which uses the Satterthwaite approximation for degrees of freedom (Kuznetsova et al. 2017). For our TFRs, the (a) vs. (b) comparison was marginal (means 0.614 vs. 0.061, $p = .071$, while the (c) vs. (d) comparison was significant (means −0.010 vs. −0.727, $p < .05$). For P&C's SFRs, the (a) vs. (b) comparison was marginal (means 0.291 vs. −0.493, $p = .068$) and the (c) vs. (d) comparison was also marginal (means −0.686 vs. −1.106, $p = .082$). Full details of these analyses can be found in Appendix B.4.

The reliability of the (c) versus (d) comparisons seriously challenges P&C's claim that 'when *who* FRs are in subject position in the matrix clause, the position of the gap does not make a difference' (p. 344). Furthermore, the mean rating of 4.55 for examples of type (11c) challenges P&C's conclusion that 'subject position *who* FRs are crashingly bad, that is, they are deprecated below a minimal level of acceptability' (p. 344).

For additional insight, we plotted the distribution of individual responses in each of the conditions represented by a bar in figures 2 and 3. The results in figures 4 and 5, respectively, show an absence of bimodal distributions, hence the

absence of a dialect split. That is, it is not true that sentences receiving mean ratings in the 2–5 range are the result of two underlying populations, one of which rates them fully acceptable and the other of which rates them fully unacceptable; rather, most subjects assigned an intermediate rating to these sentences. (For a more fine-grained examination, see Appendix C.)

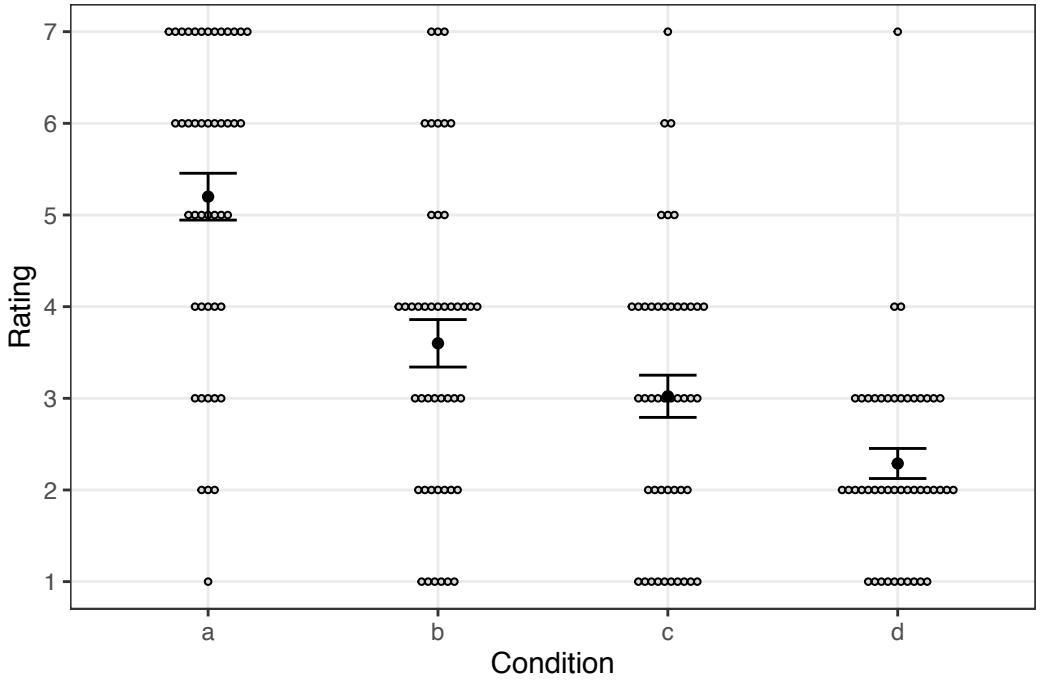

Figure 4: Distribution of our subjects' responses to P&C's configurational manipulation of *who*-FRs[13]

[13] Here and in figure 5, the dark black circles connected to lines replicate the means and standard errors plotted in figures 2 and 3, respectively.

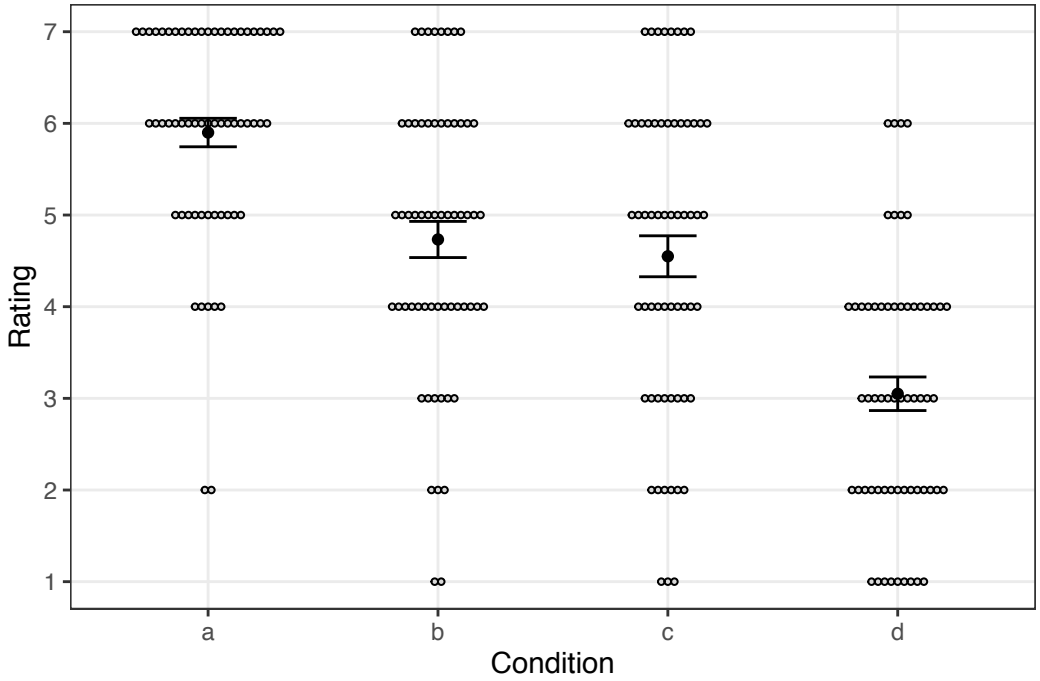

Figure 5: Distribution of our subjects' responses to
our configurational manipulation of *who*-TFRs

In sum, TFRs exhibit a parallel pattern of degradation to SFRs in terms of the position of the FR in the clause, and the configuration of the *wh*-dependency inside the FR. This finding bears on the theoretical debate regarding the nature of TFRs. According to Grosu (2003, 2016), TFRs and SFRs have fundamentally the same structure. According to opposing views, TFRs have radically different structures from SFRs, involving amalgams with multiple dominance (cf. van Riemsdijk 2006) or parentheticals with ellipsis (Wilder 1999; cf. Schelfout et al. 2004). The similar positional sensitivities of TFRs and SFRs are more consistent with Grosu's unified view.

Consequently, TFRs can be brought to bear on the acceptability of *who*-FRs. The ratings for *who*-TFRs in object position, especially with an ACC trace, suggest that *who*-FRs can be highly acceptable. This point is explored more thoroughly in the final subsection, which steps beyond P&C's positional manipulations to illustrate other cases of acceptable *who*-FRs.

3.3 Further factors potentially affecting who-*TFRs*

Having established *who*-TFRs as candidates for relatively acceptable *who*-FRs, we considered two further manipulations beyond the configurational paradigm inspired by P&C. First, we asked whether *who*-TFRs triggering singular versus plural agreement might be systematically more acceptable. We constructed four minimal pairs like (12) that were identical except for the number of the predicate in the small clause and the agreeing verb. These sentences all consisted of an introductory clause followed by a *there*-existential clause of which the *who*-FR was the associate – we suspected that the sequence 'There BE who' at the beginning of a sentence might be jolting for the parser, so we avoided it:

(12) (a) This show is a must-see; there's [$_{\text{TFR}}$ who critics have proclaimed t_{ACC} to be [$_{\text{SC}}$ *t* a future star]] performing in it.

(b) This show is a must-see; there are [$_{\text{TFR}}$ who critics have proclaimed t_{ACC} to be [$_{\text{SC}}$ *t* future stars]] performing in it.

Among these four pairs, one was rated higher in the singular version, while three were rated higher in the plural version. [14] As a group, there was no significant difference: singulars mean 3.79, plurals mean 3.99, $t(148) < 1$. Thus, there is no reason to think number systematically affects ratings of (at least existential) *who*-TFRs.

A second question concerned *who*-TFRs as subjects. In seeking to explore whether matrix subject position might be particularly awkward, we tested two sentences like (13) where a *who*-TFR (with an ACC trace) is subject of an embedded clause – otherwise comparable to condition (c) of (11).

---

[14] Having seen in pilot data containing uncontrolled existential *who*-TFR pairs that singulars were being rated substantially lower than plurals, we checked for a couple of possible confounds: first, whether singulars were being degraded by the intervention of a plural embedded subject (e.g. *critics* in (12a)) between the singular verb (*'s*) and the associate; and second, whether participants might prefer uncontracted *there is* in a written acceptability questionnaire. We therefore constructed a minimal quartet crossing number of the embedded subject with (non)contraction. Evidently, these suspicions were off the mark, since the version with contraction and a plural subject received the highest rating (see Appendix C for details).

(13) It is well known that [$_{TFR}$ who teachers deem t_{ACC} to be [$_{SC}$ *t* good students]] are eligible for special prizes.

These TFRs received a mean rating of 5.23, as compared to 4.55 for the (11c) condition, a significant difference: $t(58) = 2.93$, $p < .005$. Thus there are exceptions to P&C's claim – based on their best subject position *who*-FRs having a mean of 3.08 – that '*who* FRs in subject position ... are deemed to be particularly unacceptable by native speakers' (p. 343); see also their 'crashingly bad' comment in the previous subsection.

4 Conclusion

In sum, this paper replicated P&C's finding that configurational factors can lead to variation in the acceptability of *who*-FRs: in certain circumstances, *who*-FRs sound better as objects than subjects (though the designs preclude rigorously confirming this) and better with ACC than NOM traces – significantly so even in subject position, we found.[15]

As P&C note, the (positional) degradation of *who*-FRs is specific to English and to the word *who* and does not easily submit to a syntactic, semantic, or processing explanation. Cross-linguistically, *who*-FRs are attested in many

[15] However, see Appendix A for demonstration that there are fine-sounding *who*-FRs that are not direct objects and ones that have NOM traces.

languages, including Italian, Spanish, and German (P&C: p. 342, ex. 5). Further, *who* exhibits almost identical syntactic behavior to *what*, while any semantic or processing problem – perhaps based on the animacy difference between *who* vs. *what* – would be expected to extend cross-linguistically.[16]

With this paper, we have reached a more nuanced picture of when *who*-FRs are degraded in English. The fact to be explained is not why all *who*-FRs are degraded in English, but why only a subset of *who*-FRs are. This may make an explanation easier or harder to find – a task we leave for future research.

[16] P&C speculate that diachronic considerations might be at play. Absent specifics, this amounts only to an acknowledgement of the observation in fn. 2 that *who*-FRs were previously less restricted in English.

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APPENDIX A: NATURALISTIC *WHO*-FRS

Echoing the attested examples presented in section 2, this appendix reports ratings for sentences containing *who*-FRs – both standard and transparent – inspired by naturally occurring examples from the Web. These were averaged across two pilots of the experiment reported in section 3 whose stimuli included a number of free relatives, similar and in some cases identical to those in the current experiment, and many of the same fillers from an unrelated experiment. Each sentence was rated by a total of 120 participants; standard deviations are in parentheses. We did not include these stimuli in later runs because the ratings were all above 6 – higher than the vast majority of constructed examples.[17] Where P&C claimed that there are 'few cases of *who* FRs that do approach acceptability' (p. 345), these sentences approach the top of the rating scale. Interestingly, most

[17] Across the two pilots and the main experiment, the only constructed examples to rate above 6 were one *who*-SFR among the P&C stimuli, one of our earlier *who*-TFRs (which did so in the two pilots), and two of our *who*-TFRs from the main experiment (26a) and (28a) in Appendix C), all from condition (a). Ironically, the example from P&C readily lends itself to an *-ever* reading: 'The skilled sniper hit who he was targeting,' whether construed episodically or habitually.

contain a NOM trace, as was also true of the literary examples in section 2. This challenges P&C's claim that object position *who*-FRs with ACC traces are unique in being (marginally) acceptable: 'Acceptability improves if (i) the *who* FR occurs as the direct object … rather than in subject position of the matrix clause…; and (ii) the gap in the relative clause is also in object position' (p. 344). As a point of reference, the best of the examples below was rated just 0.08 below our best grammatical catch item – the simple monoclausal (14):

(14) She was the winner of the grand prize. 6.97 (0.18)

First, *who*-TFRs:

(15) After the collision, Rhonda was rescued by [$_{TFR}$ who she assumes t_{NOM} was [$_{SC}$ *t* a highway patrol officer]].[18] 6.39 (0.96)

(16) I once saw [$_{TFR}$ who I thought t_{NOM} was [$_{SC}$ *t* Robert Redford]] at a Starbucks.[19] 6.28 (1.17)

[18] Cf. 'She was rescued by who she believes to be an American security team', https://enewsdaily.info/bendita-malakia-kenya-mall-shooting-survivor/.

[19] https://www.chasechat.com/archive/index.php?thread-10085-2.html

(17) I was chilling at the bar when I looked over and saw [$_{TFR}$ who I was sure t_{NOM} was [$_{SC}$ *t* my ex]] staring at me.[20] 6.08 (1.09)

Second, *who*-SFRs that are complements to a copula (and are incompatible with an *-ever* meaning):

(18) Looking through the mug shots, he suddenly proclaimed, 'That's [$_{SFR}$ who t_{NOM} broke into my house]!'[21] 6.86 (0.44)

(19) He's not necessarily [$_{SFR}$ who you want t_{ACC}] if you're trying to get the job done quickly.[22] 6.44 (1.13)

Third, *who*-SFRs that are complements to non-copulas, which may be compatible with one of the two readings of *-ever* FRs (Dayal 1997) – the 'identity' reading in

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[20] Cf. 'I was chilling at the bar when I looked across the bar and saw who I thought was Lance staring at me.' *No perfect affair: Renaissance collection* by Charmaine Galloway, ch. 39, Farmingdale, NY: Urban Books, 2017 (available on Google Books).

[21] https://www.10tv.com/article/news/crime/crime-tracker/muddy-footprints-witnesses-lead-police-burglary-suspect/530-fa175e72-aa64-4858-b81f-f5afa7dcb699

[22] Cf. the last line of the penultimate entry of http://cynthiacampi.com/testimonials/.

(20), where the FR refers to a unique person whose identity is unknown; and the 'free choice' reading in (21) and (22), where there is indifference as to any characteristics of the applicants beyond the one defined by the FR predicate:

(20) I hope that the authorities find [$_{SFR}$ who t_{NOM} killed her].[23] 6.78 (0.54)

(21) I didn't bother with interviews, I just hired [$_{SFR}$ who you told me to ~~hire t_{ACC}~~].[24] 6.54 (0.97)

(22) I selected [$_{SFR}$ who I thought t_{NOM} was most qualified for the job].[25] 6.88 (0.35)

[23] Cf. the last line of https://bakersfieldnow.com/news/local/defendant-acquitted-in-la-model-murder-trial.

[24] Cf. 'I simply did exactly what Tim told me to do, paid who he told me to pay, and disclosed what he told me to disclose.' http://archive.knoxnews.com/news/local/mayor-tim-burchetts-campaign-fund-reports-misstated-ep-360487927-356910051.html/. Strikethrough indicates elided structure.

[25] Cf. https://twitter.com/BibliotecariaRR/status/935009888865886209

APPENDIX B: EXPERIMENTAL DETAILS

B.1 Participants

The data in this paper are from 60 self-reported native speakers of American English recruited via Amazon Mechanical Turk. Subjects were paid $5.00 (US) for their participation. (Data from an additional twelve subjects were excluded due to high ratings (≥ 5) on two or more of the eight ungrammatical catch trials.)

B.2 Procedure

Subjects were presented with instructions, followed by five example sentences accompanied by suggested ratings, intended to anchor the response scale. Each subject then rated 54 sentences on a scale from 1 (‘very bad’) to 7 (‘very good’). Most subjects completed the experiment in 15–20 minutes.

B.3 Materials

The 54 sentences consisted of 10 catch trials (8 ungrammatical), one token each from 17 relative clause (RC) items, and one token each from 27 filler items

representing other experiments.[26] Each subject saw one of four lists, whose order was individually randomized. Catch trials were the same across all lists, but RC and filler trials differed so that a subject did not see different conditions of one item. The 17 RC items included 13 critical items reported in the main text and listed in Appendix C, consisting of 3 quartets containing *who*-SFRs from P&C; 4 quartets containing *who*-TFRs from a paradigm modeled on that of P&C; 4 pairs testing the effect of number; and 2 additional items containing *who*-TFRs in embedded subject position.

B.4 Analyses

All Student's *t* tests reported in the main text were conducted on raw ratings, but the same tests have also been conducted on *z*-scores, calculated based on each subject's responses to all 54 sentences in the experiment. This procedure eliminates some potential confounds that could arise from subjects using the response scale differently; the results (significance or non-significance) were the same as those reported in the main text in all cases.

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[26] There is no a priori answer to how many of our RC items were (un)grammatical, and thus what the overall balance of grammatical to ungrammatical stimuli was; the same is true of the fillers from other experiments. The mean ratings by subject for the full set of 54 items ranged from 2.95 to 5.5.

These *z*-scores also constituted the data on which the linear mixed effects analyses reported in section 3.2 were conducted. Details of those analyses are presented in tables 1–4.

Table 1: Lmer Model Summary for Our TFRs, Conditions a vs. b

Fixed effect						
		Estimate	Std.Err.	*t*	df	*p*
Condition	Intercept	0.6145	0.0891	6.899	3.00	0.006
	Slope	0.5539	0.2015	−2.748	3.00	0.071
Random effects						
			Std.Dev.	Correlation		
Subject	Intercept		0.0000			
Item	Intercept		0.1096			
	Slope		0.3508	0.17		
Residual			0.5439			

Table 2: Lmer Model Summary for Our TFRs, Conditions c vs. d

Fixed effect						
		Estimate	Std.Err.	*t*	df	*p*
Condition	Intercept	−0.0099	0.1253	−0.079	0.942	0.942
	Slope	−0.7170	0.1881	−4.861	−3.812	0.046
Random effects						
			Std.Dev.	Correlation		
Subject	Intercept		0.2526			
Item	Intercept		0.1946			
	Slope		0.3163	–0.93		
Residual			0.5576			

Table 3: Lmer Model Summary for P&C's SFRs, Conditions a vs. b

Fixed effect						
		Estimate	Std.Err.	*t*	df	*p*
Condition	Intercept	0.2785	0.2799	0.995	1.99	0.425
	Slope	−0.7802	0.1605	−4.861	1.50	0.068
Random effects						
			Std.Dev.	Correlation		
Subject	Intercept		0.3466			
Item	Intercept		0.4564			
	Slope		0.1854	–0.65		
Residual			0.5326			

Table 4: Lmer Model Summary for P&C's SFRs, Conditions c vs. d

Fixed effect						
		Estimate	Std.Err.	*t*	df	*p*
Condition	Intercept	−0.6928	0.1383	−5.008	2.13	0.0331
	Slope	−0.4223	0.1158	−3.647	1.76	0.0819

Random effects			
		Std.Dev.	Correlation
Subject	Intercept	0.3622	
Item	Intercept	0.2012	
	Slope	0.1318	–1.00
Residual		0.3681	

APPENDIX C: CRITICAL STIMULI AND PLOTS

§3.1

(23) (a/b) The young woman kissed who {she met/met her} at the party.

(c/d) Who {the young woman met/met the young woman} at the party kissed her on the way home.

(24) (a/b) The music teacher married who {he dated/dated him} at college.

(c/d) Who {the music teacher dated/dated the music teacher} in college married {her/him} yesterday.

(25) (a/b) The {skilled sniper/angry teenager} hit who {he was targeting/insulted him}.

(c/d) Who {the angry teenager insulted/insulted the angry teenager} at the party hit him {back/afterwards}.

Figure 6 shows the distribution of individual responses by our subjects to each of P&C's SFR quartets. While the small sample sizes make any conclusions highly speculative, the plots do at least raise questions that could be pursued in future research. For one, they show an occasional hint of bimodality, e.g. for (23c) between total rejection and middling acceptance. They also show much greater inter-item variability in object versus subject position.

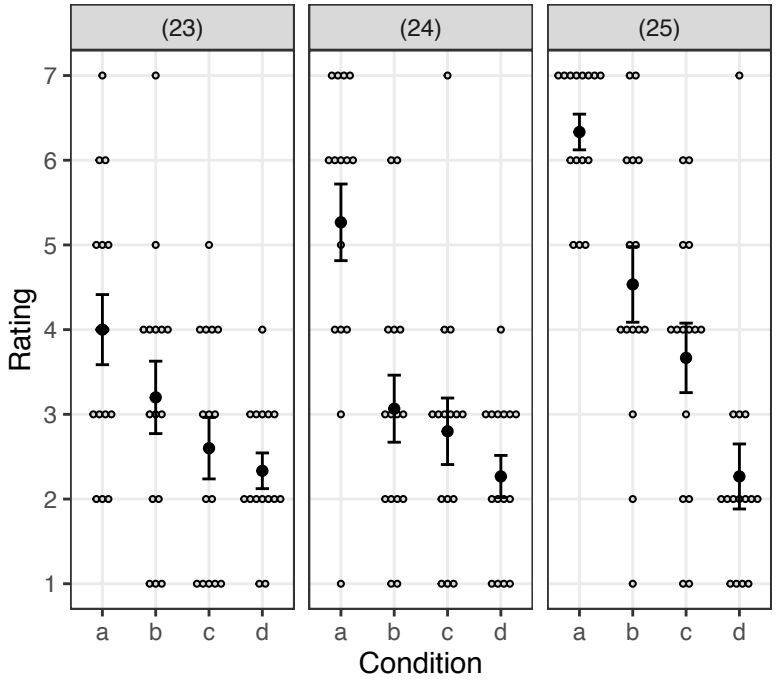

Figure 6: Distribution of our subjects' responses to items (23)–(25)

§3.2

(26) (a/b) In a highly classified operation, the Secret Service is tracking who {it suspects/is suspected} to be a female assassin.

(c/d) In a highly classified operation, who {the Secret Service suspects/is suspected} to be a female assassin is being tracked{./ by the Secret Service.}

(27) (a/b) Despite the fog, I can just discern who {I assume/are likely} to be paratroopers in the distance.

(c/d) Despite the fog, who {I assume/are likely} to be paratroopers are just discernible in the distance.

(28) (a/b) The authorities are interviewing who {they believe/are believed} to be international drug dealers.

(c/d) Who {the authorities believe/are believed} to be international drug dealers are being interviewed{./ by the authorities.}

(29) (a/b) The politician is inviting who {he sees as/seems to him to be} a major potential donor to the fundraiser.

(c/d) Who {the politician sees as/seems to the politician to be} a major potential donor is being invited to the fundraiser.

Figure 7 shows the distribution of individual responses by our subjects to each of our TFR quartets. Again there is a hint of bimodality, e.g. for (26c). Strikingly, the means show two different patterns, with (b) rated worse than (c) in (28) and (29) but vice versa in (26) and (27); post-hoc speculation might pin the blame on *who are believed* in (28b) and *to him* in (29b).

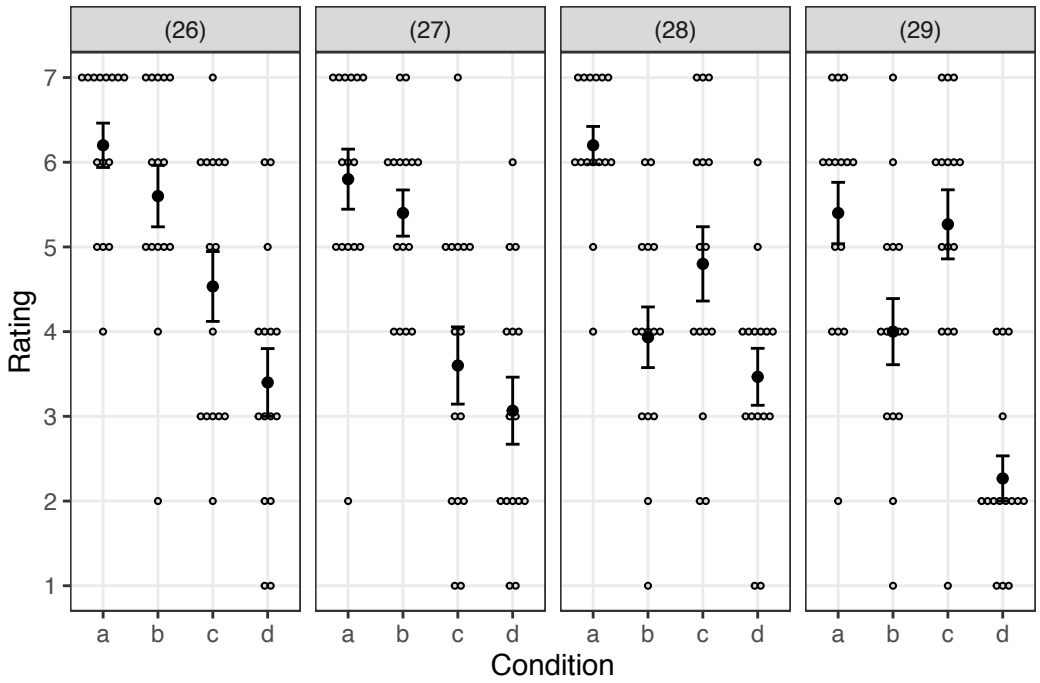

Figure 7: Distribution of our subjects' responses to items (26)–(29)

§3.3

Singular vs. plural agreement

(30) The debate is heating up; {there's/there are} who conservatives have dubbed {a 'feminazi'/'feminazis'} due to speak next.

(31) This show is a must-see; {there's/there are} who critics have proclaimed to be {a future star/future stars} performing in it.

(32) There's a clear generational divide; {there's/there are} who older people will perceive as {a radical/radicals} running for office.

(33) The rally is getting a lot of press; {there's/there are} who columnists have portrayed as {a leading candidate/leading candidates} giving {a speech/ speeches}.

Fn. 14 (ratings from an earlier run of the experiment)

(34) Gentrification is getting worse; (a) there**'s** who **locals** refer to as a yuppie developer with plans for the neighborhood. 4.60

..... (b) there **is** who **locals** refer to … 4.47

..... (c) there**'s** who **the mayor** refers to … 4.33

..... (d) there **is** who **the mayor** refers to … 4.07

Embedded subjects

(35) It is well known that who teachers deem to be good students are eligible for special prizes.

(36) We hear on the news all too often that who the FBI initially labeled as suspects were eventually released for lack of evidence.

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