

Predicate *which*-Appositives

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1. Introduction

PREDICATE *which*-APPPOSITIVES, henceforth PWAs, are a class of nonrestrictive, parenthetical relative clause (see Potts 2002b:82-86). As the name implies, a PWA takes a predicate-denoting XP as its antecedent. The construction is rather common, being found in everyday speech in addition to various kinds of literature and prose. Examples from the wild are given here (PWAs bold, antecedent underlined):

- (1) When I had got rid of him, **which I thought it well to do** without prolonging explanations, my mind was much troubled by these two circumstances taken together.
(Charles Dickens, *Great Expectations*, 1861)
- (2) Some 50,000 American soldiers and airmen will remain tucked away [...] ready to assist with logistics, intelligence, helicopters and even firepower if the Iraqis need such help—**which they will**.
(Xan Smiley, “Still nothing like normal”, *The Economist The World in 2011*, 2010)
- (3) ...as long as [P_{HAVE} DP] is a well-formed piece of English, **which it is**.
(Heidi Harley, “Wanting, Having, and Getting,” *Linguistic Inquiry* **35** 2004)¹
- (4) I put a check next to those I intended to fire when *Roseanne* became No. 1, **which I knew it would**.
(Roseanne Barr, “And I Should Know”, *New York Magazine* 15 May 2011 <http://nymag.com/arts/tv/upfronts/2011/roseanne-barr-2011-5/>)¹

Inside the PWA, there is material missing from the verbal structure of a clause. I refer to this missing material as the gap. The gap corresponds to a predicate-denoting syntactic phrase of some sort—a VP, a DP, an AP, or a PP.² This missing material is interpreted as though it were there; for instance, the PWA in example (4) is interpreted basically as *I knew it would become No. 1*. The main point of this paper will be to investigate how to account for this missing material and its interpretation.

Inside the PWA, the gap may occur in embedded clauses, as (1) and (4) show, and the missing material typically follows directly after some ellipsis-licensing head (in the sense of Lobeck (1995)). One might therefore conclude that PWAs look like they contain material that has undergone VERB PHRASE ELLIPSIS, or VPE. One could reason that the material was deleted on the surface under identity with the antecedent, just as in VPE. However, in accord with Potts (2002b), PWAs otherwise behave like relative clauses. They contain an overt *which* that may have been moved from the site of the gap. Thus, the gap may not be an ellipsis gap, but rather, the origin of a relative operator.

When one tests PWAs with diagnostics meant to distinguish these hypotheses, the diagnostics provide evidence for both movement and ellipsis. That is, there is both evidence that the gap is created by deletion and evidence that the gap is left by A'-movement. The analysis of these facts must account for the results of these diagnostics. In this paper, I follow Houser et al. (2007) and propose that pronouns can replace VPs post-syntactically. Thus, the apparently-missing VP spells out as *which* on the PF branch after it has

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¹Many thanks to Mark Norris for sharing these examples.

²For convenience, I will generally refer to this constituent as a VP throughout the rest of this paper. This missing phrase may simply be vP. I leave this issue aside here.

undergone *wh*-movement as the relative operator in the PWA. In effect, I argue that the *which* in PWAs is a novel form of surface anaphora (in the sense of Hankamer & Sag (1976); see §2).

This paper proceeds as follows. In §2, I start by providing evidence that the gaps in PWAs are derived by an ellipsis-like process by showing that VPE diagnostics come back positive. Following this, in §3, I argue that the derivation of PWAs involves A'-movement from the position of the gap, which is problematic given the results in the previous section. In §4, I look at related phenomena in Irish and Danish. Drawing from the analyses of these phenomena, I propose an analysis of PWAs in §5 before concluding in §6.

2. PWAs contain surface anaphora

As I noted initially, PWAs look like they contain VPE. VPE is often taken to superficially delete phonological material on the way to PF under identity with some other syntactic or semantic material elsewhere in the discourse. This ultimately preserves the underlying syntactic structure, which gets passed to LF for semantic interpretation (Merchant 2001, Goldberg 2005).³ Following Hankamer and Sag's (1976) dichotomy, ellipsis is said to be a form of SURFACE ANAPHORA, so-called because it deletes material from a relatively superficial level of representation. Surface anaphora contrast with DEEP ANAPHORA (or pronominal anaphora), which are merged into the structure directly from the numeration. These elements have no internal syntactic structure, but instead derive their interpretation from the semantics.

Since ellipsis results in the non-pronunciation of syntactic material, it can be hard to distinguish from pronominal elements that simply have no pronunciation to begin with. Consequently, a number of diagnostics have been devised over the years to tell phonological deletion from null pronominal elements. I will rely on three in particular here.⁴ First, it is possible to extract elements out of the deleted material via movement (Schuyler 2001), but movement out of pronominals is impossible, evidently because they do not have internal syntactic structure. Second, surface anaphora permit the introduction of missing antecedents, whereas pronominal anaphora do not (Bresnan 1971). Finally, surface anaphora generally require some linguistic antecedent to license the deletion, but deep anaphora do not require any such antecedent and may be licensed pragmatically (Hankamer & Sag 1976). As we will see, the anaphoric component in PWAs behaves like a surface anaphor with regard to these tests.

2.1. Extraction from missing VPs is possible

Assuming something like Baker's (1988) Uniformity of Theta-role Assignment Hypothesis, the subject of an unaccusative like *sink* is initially merged as the complement to the verb:

- (5) The ship_{*i*} sank *t_i*

Schuyler (2001) demonstrates that it is possible to extract elements out of ellipsis sites, but not out of pronominal anaphora like the *it* in *do it*. This explains the difference between (6) and (7).

- (6) *Ellipsis:*
The ship sank, and I think the barge_{*i*} will ~~⟨sink *t_i*⟩~~ too.

- (7) *Deep Anaphora:*
* The ship sank, and I think the barge will do it too.

³This is certainly not a universally held belief—see, for instance, Lobeck 1995 and Chung et al. 1995. However, I find Merchant's and Goldberg's arguments compelling, and I assume them here.

⁴A fourth diagnostic, syntactic parallelism, is sometimes cited. It has been claimed that surface anaphora do not tolerate voice mismatch between the antecedent and the anaphor, but that deep anaphora do Sag (1976). I leave this aside here, because the data is in reality more complicated than this, and it is not immediately clear how distinguishing this test is (see Merchant 2007). What does seem clear is that speakers who permit voice mismatch in VPE also permit it in PWAs, so it at least seems to pattern the same way.

Just like VPE, it is possible to move arguments out of the missing VP in PWAs. We see this both in unaccusatives (8) and in passives (9):

- (8) The ship didn't sink, which I think the barge will ____.
- (9) Mary was seen by the cops, which Bill was not ____.

Here, then, the anaphor in PWAs patterns with VPE. If PWAs contained deep anaphora, we would not expect to be able to extract unaccusative or passive subjects in the anaphor.

Unfortunately, due to the fact that PWAs are A'-islands, it is not possible to test whether elements can be moved out via *wh*-movement or topicalization.

2.2. *Missing antecedents can be introduced*

Indefinites in a deleted VP can introduce antecedents for pronouns, since the indefinite is actually in the syntactic structure but simply unpronounced (Grinder & Postal 1971). Bresnan (1971) argues that this distinguishes surface anaphors from pronominal anaphora, since pronouns do not have any syntactic structure in which the antecedent indefinites may sit.⁵

As Heim (1982) notes, indefinites in the scope of negation cannot introduce referents. This means that the pronoun *he* in (10) cannot find its antecedent in the first conjunct, a point which (11) supports. The fact that the pronoun can pick up an antecedent means that the antecedent must therefore be in the second conjunct, presumably in the deleted VP.

- (10) Mary has never met a dwarf, but Sally has _____. He was very short.
- (11) # Mary has never met a dwarf. He was very short.

The same logic applies to example (12). Here, the antecedent to *it* cannot be in the first clause, which (13) is meant to show. Therefore, the antecedent must be in the missing VP in the PWA.

- (12) Sally has never painted a whole house, which Mary has _____. It was rather small, though.
- (13) # Sally has never painted a whole house. It was rather small, though.

Noticeably, examples with deep anaphora are bad:

- (14) # Sally has never painted a whole house, but Mary managed to do it. It was rather small, though.

Thus, in this case, PWAs pattern with surface anaphora and not with pronominal anaphora.

2.3. *No pragmatic licensing is possible*

Hankamer & Sag (1976) show that surface anaphora does not permit non-linguistic antecedents found purely in the surrounding environment. Thus, VPE is not permissible in (15a). For comparison, a pronominal anaphor is perfectly acceptable, as in (15b).

- (15) *Situation: You and your friend walk into a room and all the windows are broken. Your friend says:*
- a. # Oh no! I wonder who did ____!
- b. Oh no! I wonder who did this!

⁵There have been objections to using missing antecedents as a diagnostic, most recently, to my knowledge, by Houser (2010). So far as I can see, Houser's objection amounts to little more than the one put forth by Postal (1972). Regarding this, I ultimately agree with Hankamer and Sag's (1976:fn.16) response to Postal: "the fact remains that there is a difference between VP Deletion, which readily allows missing antecedent effects for all speakers, and sentential *it* (including *do it*) anaphora," a kind of deep anaphora, "which in general do not."

If PWAs contain surface anaphora, then they should behave like VPE. In other words, they should not be pragmatically licensed by what is happening in the surrounding environment. As it turns out, PWAs are not possible with purely environmental antecedents:

- (16) *Situation: Harvey is fighting a pig. Speaker A walks in and says:*
 # Which Harvey shouldn't ___!

If (16) were grammatical, that would constitute evidence in favor of a deep anaphoric analysis. However, the conditions necessary to run the diagnostic are independently ungrammatical. That is, this example is bad for independent reasons, as relative clauses typically need some sort of syntactic material to adjoin to. Since no such material exists, this can also explain why example (16) is bad. Thus, this diagnostic is mostly presented in the name of thoroughness. It is not possible to tell if (16) is bad because pragmatic licensing is insufficient to license the anaphor.

2.4. Summary

The diagnostics discussed in this section provide evidence that PWAs contain surface anaphora. The following table summarizes the results of these tests:

- (17) VPE diagnostics:

Diagnostic	PWA	VPE	Pronominal
Argument Extraction	Yes	Yes	No
Missing Antecedents	Yes	Yes	No
Pragmatic Licensing	??	No	Yes

With regard to these diagnostics, the anaphoric component of PWAs looks more like VPE than it does pronominal anaphora. Given these results, I conclude that PWAs contain a form of surface anaphora like VPE that causes a VP to go unpronounced.

3. PWAs and A'-movement

Although I just concluded that PWAs appear to contain some sort of surface anaphor that is responsible for the missing VP, they nonetheless look like typical relative clauses. Potts (2002b), in fact, simply assumes that they are. Under his analysis, *which* begins low in the position of the gap, and moves to the specifier of CP, picking up the denotation of the phrase the relative clause is adjoined to (Potts 2002b:83-84). Potts's approach to PWAs can therefore be thought of as a deep anaphoric approach where the *wh*-element is responsible for the interpretation of the PWA, not a surface anaphoric process. In this section, I give evidence that supports this analysis. In particular, I provide evidence that shows that the gaps in PWAs are not generated by VPE, contrary to what I just showed in §2. The data instead points toward an A'-movement analysis of PWAs.

3.1. Gaps in PWAs cannot occur in islands.

VPE is unbounded and is therefore island-insensitive (Ross 1967). However, a PWA is bad if the gap is separated from the initial *which* by an island. The following examples show this for a range of islands, compared with similar examples of VPE (intended antecedents are underlined).

- (18) Adjunct Island:

- a. * Harvey bought a pig, which Tom built a pen before Mary could _____. PWA
 b. Harvey bought a pig, but Tom built a pen before Mary could _____. VPE

- (19) Relative Clause Island:
- a. * Sam eats quickly, which Sally met a man who also does _____. PWA
 - b. Sam eats quickly, and Sally met a man who also does _____. VPE
- (20) Subject Island:
- a. * I know that Sam eats quickly, which that Sally does _____surprised Tom. PWA
 - b. I know that Sam eats quickly, but that Sally does _____surprised Tom. VPE
- (21) Complex NP constraint:
- a. * Harvey bought a pig, which Tom remembered the fact that Sally would _____. PWA
 - b. Harvey bought a pig, and Tom remembered the fact that Sally would _____. VPE
- (22) Embedded Question Island:⁶
- a. *? Harvey bought a pig, which Tom asked whether Sally should _____. PWA
 - b. Harvey bought a pig, and Tom asked whether Sally should also _____. VPE
- (23) Coordinate Structure Constraint:
- a. *? Sam bought a pig, which Tom thinks that Sue will _____and that Sal might sell a goat. PWA
 - b. Sam bought a pig, and Tom thinks that Sue will _____and that Sal might sell a goat. VPE

If the missing material in PWAs is the result of VPE, then the island sensitivity is completely without explanation. Therefore, this sensitivity to islands suggests that the gaps in PWAs are not derived by VPE. This data receives a straightforward explanation under Potts's analysis. Under his account, *which* moves from the position of the gap, so the sensitivity to islands can be explained by *wh*-movement's typical inability to move elements out of islands.

3.2. Gaps in PWAs are not optional. VPE is.

VPE is an optional process; ellipsis of a VP never has to occur. Thus, the examples in (24) are both grammatical and semantically equivalent (though (24b) may be a bit odd, pragmatically speaking):

- (24) VPE:
- a. Mary met Sally, and Harvey might also _____.
 - b. Mary met Sally, and Harvey might also meet Sally.

In PWAs, however, the missing VP can never be pronounced. Pronouncing it results in ungrammaticality.

- (25) PWAs:
- a. Mary met Sally, which Harvey might also _____.
 - b. * Mary met Sally, which Harvey might also meet Sally.

Since VPE is optional, this constitutes further evidence against VPE in PWAs. There is no reason to think that VPE should be obligatory in (25) but not (24). However, if *which* obligatorily moves from the position of the gap to the specifier of CP, then this movement would derive the gap obligatorily. Again, a *wh*-movement account of PWAs provides a better account for the properties of the gap than can an account relying on surface anaphora.

⁶As Potts (2002a:633) notes, VP relativization is relatively good across as this sort of island.

3.3. Summary

The evidence presented in this section runs counter to that presented in the last. The examples here suggest that the gaps in PWAs are not derived via VPE. Rather, it is consistent with an A'-movement account of PWAs. The sensitivity to islands and the obligatoriness of the gap are all readily explained under an analysis where *which* moves, leaving the gap behind.

This leaves us in a bit of an analytical bind. The simple movement of pronominal *which* does not immediately provide an explanation for all of the VPE-like properties of the anaphor in PWAs. However, ellipsis does not account for the A'-movement properties that the construction seems to have. In other words, neither approach on its own can handle the full range of data.

There needs to be a way to permit a full, potentially elided VP in the structure that still permits A'-movement of *which*. In the next section, I look at two constructions outside of English whose analyses will be integral to the solution of this problem.

4. VP anaphors in other languages

There are a couple of other phenomena that share some of the more intriguing properties of PWAs, in particular *as*-clauses in Irish (McCloskey 2011), and pronominal verbal anaphora in Danish (Houser et al. 2007). The analyses of these phenomena can help guide the analysis of PWAs. In this section, I discuss these analyses.

4.1. Irish *as*-Clauses

Parenthetical *as*-clauses in Irish, like PWAs, show evidence of surface anaphora in addition to A'-movement.⁷ As McCloskey (2011) notes, Irish *as*-clauses contain gaps that look identical to those left by VPE. As example (26) shows, this includes a stranded verb directly before the gap, characteristic of ellipsis sites in Irish.

- (26) Chuaidh se 'un an aonaigh mar a dubhairt sé a rachadh ____.
 went he to the fair as c said he c go.COND ____
 'He went to the fair as he had said he would.'

As we can see, the verb *rachadh* is stranded carrying inflectional morphology while the rest of the VP is unpronounced.⁸ Goldberg (2005) argues that in cases like this that involve VPE, the verb raises into the inflectional layer of the clause (an independently motivated operation in Irish) and the rest of the VP deletes. Additionally, she shows that other approaches to such verb-stranding behavior run into notable difficulties, requiring a number of stipulative hacks to both the syntax and semantics (for instance, externally merging verbs directly into I or T). Verb raising and subsequent deletion is thus the most coherent and motivated approach to verb stranding. It follows that the verb-stranding behavior in *as*-clauses must be similar. Stipulating that *rachadh* is externally merged into the inflectional layer would run into the same problems it does with VPE. This means that the most coherent analysis for cases such of this is one where the verb raises out of a VP, and so this constitutes evidence that there must be a full VP out of which the verb in (26) moves.

The critical observation here is that the complementizer that appears in this construction (glossed as *c* above) is the one associated with *wh*-movement in Irish. This signals that there is A'-movement in this construction, and separating it from a construction where only VPE has occurred. McCloskey (2011) notes that the missing VP is the same constituent as the one elided by VPE but that the gap is indeed

⁷It is worth noting that parenthetical *as*-clauses and *which*-appositives bear remarkable similarity to one another, syntactically speaking. See Lee-Goldman 2008.

⁸Importantly, Goldberg (2005:64-72) argues that that the missing material is not the result of object drop or null pronominals.

created by movement. He suggests the element which moves is a silent VP. The verb first raises out of VP into the inflectional layer of the clause. The VP is then subsequently moved into the specifier of CP, where it must be left unpronounced.⁹

Thus, in Irish, we see a problem similar to the one we have in PWAs. There is evidence for both VPE, in the form of head extraction, as well as for A'-movement. In this case, movement and subsequent non-pronunciation of the VP captures permits a uniform account of the data.

4.2. Danish *det* anaphora

McCloskey's analysis may provide a promising explanation for the A'-movement properties of PWAs. Movement of a full VP might explain the island sensitivity of PWAs while providing a way of understanding why the gap must be obligatory.

The trouble is that the overt *which* appears to function as a relative operator in PWAs. The diagnostics in §3 show that *which* looks to be an element that moves from the position of the gap, but it does not look much like a VP, silent or otherwise. Here, I turn to Danish. In Danish, the pronoun *det* is a verbal anaphor, homophonous with the neuter form of *it* (Houser et al. 2007):

- (27) Han siger han kan hække, men selvfølgelig kan han ikke det.
 He says he can crochet, but of course can he not DET
 'He says he can crochet, but of course he can't.'

Det is interesting because it is a pronominal element that stands in the place of a VP. At first glance, it looks like an average pronominal anaphor. In spite of this, it is possible to extract arguments out of an otherwise missing VP and to introduce missing antecedents within the anaphor—evidence for internal syntactic structure. Likewise, it cannot be licensed by pragmatic control, but needs a linguistic antecedent. Following the diagnostics in §2, this shows that *det* is a surface anaphor. More intriguingly, *det* appears in a position where one expects to find a VP.

Houser et al. argue that *det* is in fact a pronominalized VP, the result of a post-syntactic operation that they call VERB PHRASE PRONOMINALIZATION, or VPP. VPP is meant to be very similar to VPE except that it makes a VP spell out as a pronoun rather than as phonologically null. This means that there is a full VP in the syntax, but rather than pronouncing the full structure the VP gets pronounced as *det*. Thus, *det* is a surface anaphor. Such an operation, when combined with McCloskey's approach to *as*-clauses, helps to solve the problem of PWAs. I turn to this in the next section.

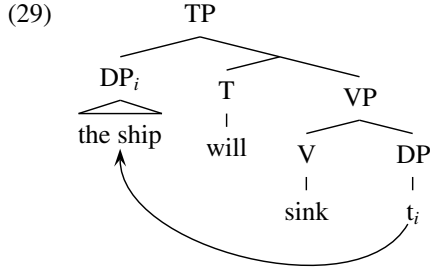
5. Analysis

Combining McCloskey's analysis of Irish *as*-clauses with the approach to Danish *det* suggested by Houser et al. provides an explanation for the behavior of PWAs. McCloskey's approach to *as*-clauses captures the A'-movement properties of the clauses and partially explains why they contain VP gaps. Combining his approach with VPP can help to solve why the VP gaps in PWAs appear to be created by moving a *wh*-pronoun. I claim that *which* in PWAs is actually a pronominalized VP that undergoes *wh*-movement. This lets us understand a number of the properties of PWAs. First, let us step through the derivation of the PWA in (28).

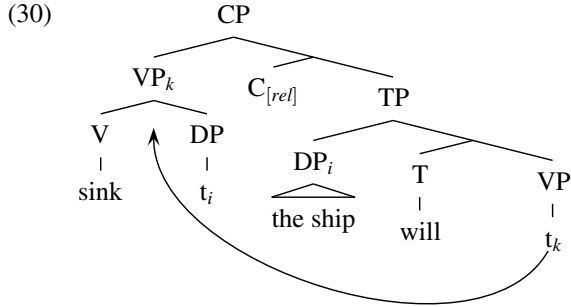
- (28) The barge sank, which the ship will (too).

First, the clause in the PWA is built. Argument movement takes place as normal.

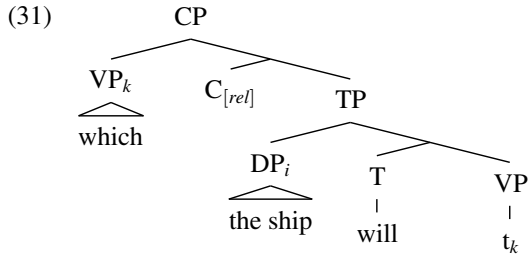
⁹Potts (2002a,b) argues that *as*-clauses contain A'-movement cross-linguistically. Whether it is the case that VP is always the moved element remains to be seen.



After $C_{[rel]}$ is merged, VP moves into the specifier of CP.



This structure ultimately spells out and is sent to PF. This is where VPP occurs, changing the pronunciation of the VP into the pronoun *which*:



Pronominalization explains the VPE-like properties discussed in §2. Since the pronominalization process derives the pronoun post-syntactically, *which* is a surface anaphor. Before the VP moves to the specifier of CP, it is present in the structure at the time argument movement happens. Similarly, indefinites in the pronominalized VP can still establish referents, since they are still there in the structure to do so. Pronominalization of the VP simply covers up this internal structure, just like VPE.

Crucially, this derivation also accounts for the facts in §3. The VP ultimately undergoes *wh*-movement to the specifier of $CP_{[rel]}$. This explains the obligatory gaps in PWAs. The relative complementizer obligatorily requires that an element be moved into its specifier, and this obligatory movement creates the gap. Since movement out of islands is always bad, the sensitivity to islands is also explained.

6. Conclusion

We have seen that diagnostics show evidence for both deletion and A'-movement in PWAs. Islands and obligatoriness suggest movement, while extraction and missing antecedents suggest deletion. These facts can be reconciled with pronominalization. Provided a post-syntactic process of pronominalization, as argued for by Houser et al. (2007), we can capture the VPE-like surface-anaphoric properties of the verbal anaphor in PWAs.

Hankamer & Sag (1976) only found one instance of overt surface anaphora, claiming that the *so* of *do so* was such a case.¹⁰ If this analysis is on the right track, PWAs exhibit another rare instance of phonologically overt surface anaphora, along with Danish *det*. Due to its rarity, the derivation of overt surface anaphora has received little explicit treatment in the literature, but the different forms may ultimately require the post-syntactic derivation of pronouns as argued here.

The precise formal properties of VPP remain to be worked out in full, but it stands to reason that whatever process removes phonological material in VPE could also, in a late-insertion model of grammar, provide the VP with alternate phonological material. The data here supports such an approach. There are still mysteries that need to be explained, however. For instance, it remains unclear why VPP is obligatory in PWAs. Nonetheless, I have shown that VPP offers a promising way to understand the behavior of PWAs.

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¹⁰This has been challenged recently. See Houser 2010.

