

Wh-which relatives and the existence of pied-piping*

Kanoe Evile and David Pesetsky
(MIT)

Abstract

This paper describes and offers an analysis of a kind of relative clause acceptable to some English speakers that we call a ***wh-which* relative**, e.g. *the snowmen whom (of) which the children loved*. We propose that these relatives involve the movement of a phrase headed by an element that we call R, analogous to the Q posited by Cable (2010a, 2010b) for interrogatives — the optional *of* in the example above being an overt form of a special variant of R. The syntax of this variant resembles particularly closely the variant of Q proposed by Coon (2009) for Ch’ol interrogatives in triggering movement to its specifier. If correct, the analysis supports the overall explanatory landscape for pied-piping phenomena proposed by Cable, but presents a challenge to his broader claim that all pied-piping phenomena can be explained in this way. We sketch one possible response, but leave the matter unresolved.

Contents

1	The phenomenon	1
2	More than just <i>which</i> : towards an analysis	5
3	Proposal	7
4	More than just <i>wh</i> : is pied-piping a concept after all?	11
5	Conclusions	14

1 The phenomenon

This paper has both a descriptive and an analytical goal. First, we describe, possibly for the first time, the properties of a kind of relative clause found in the English of some speakers (possibly limited to younger generations), which we will call a ***wh-which* relative**, exemplified by (1):

- (1) The snowmen **whom (of) which** the children loved went on a vacation to Hawaii.

We will argue for an analysis of this relative-clause type that bears on Cable’s (2010a, 2010b) proposed explanation for apparent pied-piping in *wh*-questions. Building on these proposals and Coon’s (2009) extension of them to Ch’ol (and some other Mayan languages), we propose an analysis of these English relative clauses almost identical to Cable’s and Coon’s proposals for *wh*-questions.

In particular, we argue that instances of apparent pied-piping seemingly motivated by the presence of a non-head relative *wh* word are actually mundane instances of movement of the maximal projection of a different element, which is the actual head of the moving constituent and the real reason for movement — just as Cable and Coon suggested for apparent pied-piping in *wh*-questions. But we will also suggest that this might not be the true characterization of all movements that appear to involve pied-piping, the exciting prospect that emerged from their work. We will suggest one analytic path that might eliminate the problem, but leave the resolution of this puzzle open, for lack of independent evidence for this path.

One surprising property of the relative clause in (1) when compared with Standard English relative clauses, is, of course, the presence of a second *wh*-form *which*. We are not surprised by the presence of *who(m)* in a relative clause whose head is [+human] (including vacationing snowmen), but relative clauses in Standard English introduced by *which* are otherwise limited to those that modify inanimate heads. We examine several variants of this construction below, not all of them introduced by *whom* —

*We are grateful for discussion and suggestions to Amir Anvari, Seth Cable, Win Carus, Amy Rose Deal, Kai von Fintel, Norvin Richards, and multiple respondents to a query on Facebook concerning *wh-which* relatives. We are especially grateful to Keita Allen, Harlein Evile, Robert Evile, Noah Evile, Kirah Evile and Cody Villegas for sharing their judgments with us. The authors’ names are listed alphabetically. Email: evile@mit.edu, pesetsk@mit.edu.

but they do all contain an instance of *which* seemingly doubling the more expected *wh-form*.¹ The optional presence of *of* also needs an explanation, of course. We will argue that its nature and properties hold the key to the construction as a whole. We will suggest that a phonologically null variant of this element is present in *wh-which* relatives even when *of* is not pronounced. We will therefore refer to it as *R_{of}* (which we will suggest is a variant of an R-element that heads the \bar{A} -moved phrase in Standard English relative clauses as well), and will provide a generalization concerning the circumstances under which it may be overt. We will ultimately propose that what distinguishes *R_{of}* from other instances of English R is the fact that it triggers movement of a *wh*-headed phrase to its specifier (with *which* marking the original position of the moved element) — at which point the link to Cable and Coon’s proposals will be clear.

We have not formally investigated the distribution of *wh-which* relatives among English speakers. The construction seems perfectly natural to the first author of this paper, a university-age speaker from Hawaii, and to some but by no means all of her peers — but it is completely alien to the second author and to many other speakers. We have not been able to determine whether the construction is more prevalent among younger than among older speakers (though we suspect this is the case), nor have we discerned any particular geography to its distribution. The construction seems to be most prominent in casual discourse, and online attestations are easiest to find in social media posts and other texts of a similarly informal nature — but are not limited to such environments. Though we suspect most of these attestations are written by North American speakers, some appear to come from the UK and Ireland as well. In this connection, it is striking (and unfortunately not a property for which we will have an explanation) that the form *whom* is strongly preferred to *who*, despite the fact that *whom* is otherwise regarded as more a formal option than *who*.

Throughout this paper, we offer examples from online sources wherever we can — mainly because the very existence of this construction comes as a surprise to many speakers. The few examples not credited to an online source reflect the judgments of the first author and two speakers that she has consulted.

A sampling of relative clauses from online sources introduced by *whom of which* is given below, followed by examples introduced by *whom which* without overt *R_{of}*.

(2) ***Whom of which* relatives: online examples**

- a. God bless everyone **whom of which** has donated. (https://www.facebook.com/BayCountySO/posts/10154725235348516?comment_id=10154726715048516)
- b. Dave, Carter, Stefan, LeRoi, Boyd, and Tim are special people **whom of which** make special music together. (https://www.goodreads.com/review/show/4389105616?book_show_action=true)
- c. But they’ve been linked with a number of different targets over the last month, but seemingly instead spent the entire time trying to recall a player **whom of which** they sent on loan in the summer to a club and gave them an option to buy him as well. (<https://www.talkchelsea.net/opinions/chelsea-have-missed-reece-james-so-much-he-will-be-like-the-bes-t-january-signing/>)
- d. The Daytona 500 in 2017 was very special as well as the 2014 Martinsville race where he chased down and held off Jimmie Johnson, **whom of which** was the defending series champion at the time (<https://twitter.com/frosteewolf/status/1581318772660797443>)
- e. One of my co-workers, **whom of which** I’ve never had a conversation with before, went out of his way to tell me how beautiful I was today. (https://twitter.com/areola_grande/status/1524193451553742849)
- f. During your discussion, you guys emphasized the detriment of being a bastard in GOT. Aegon the Conqueror was based on William the Conqueror, **whom of which** was a bastard. (<https://twitter.com/sonofmeroe/status/1580193010511273984>)
- g. Our 7th figure in the set is one of the show’s main reoccurring characters, **whom of which** we all love to hate. (<https://www.brickbanter.com/post/review-lego-creator-expert-10292-friends-apartment-the-one-with-all-the-references>)

1. We will not be drawing any connection to another kind of double-*wh* relative discussed by Kayne (2017, 366), pointed out to us by Gary Thoms:

(i) ?That car over there belongs to my old friend John Smith, whose long-standing attachment to which is well-known to all his friends.

As Kayne notes, *which* here has a distinct antecedent from *whose*, which is not the case in examples like (1) (where there is no detectable external antecedent for *which*). Furthermore, the form *which* is used in (i) because *that car* is inanimate. If both antecedents are animate, both pronouns will of course be forms of *who* (to the extent that the construction is parsable and acceptable in the first place):

(ii) ??That linguist over there was the dissertation advisor of my old friend Mary Smith, whose regard for whom is well-known to all her friends.

(3) **Whom which relatives (no of): online examples**

- a. You get desperate, then you lower your standards by asking the guy **whom which** you turned down 3 times that night to dance. (<https://www.angelfire.com/electronic/icyurthong/other/asianparty.html>)
- b. Oh, that's me **whom which** you're looking for; let's have a chat in DM! (https://twitter.com/jenifer_rose01/status/1582855951748542464)
- c. Don cherished being around people and he never met a person **whom which** he would not engage in a conversation. (<https://www.dignitymemorial.com/obituaries/paoli-pa/donald-keyser-7603051>)
- d. Our board is largely comprised of intelligent, driven women **whom which** we are lucky to work with! (<https://twitter.com/serveuphopeorg/status/1369075605770223616>)
- e. Just my two cents as a teacher **whom which** parents from time to time ask about videogames. (<https://www.reddit.com/r/Switch/comments/dzu95q/comment/f8axqnl/>)
- f. Give my regards to Tiff Macklem of the Bank of Canada as well **whom which** I also am extremely displeased with (<https://twitter.com/syntheticpol/status/1582248856863272960>)
- g. But presidential candidate Donald Trump would rather Kelly, **whom which** the frontrunner has attacked, stay home for the debate. (<https://www.mic.com/articles/133404/fox-news-republican-debate-2016-early-preview-for-thursday-night-debate>)
- h. Instead of a typical one-size-fits-all approach offered at many schools, we offer the unique experience of having incredibly small class sizes and a tailor-made education. While this benefits students of all abilities, it is especially helpful for a gifted student, **whom which** may require a deeper level of understanding to fully prosper (<https://tenneyschool.com/the-gifted-student-how-we-foster-exceptional-growth-in-exceptional-students/>)

That *wh-which* relatives are not slips or typing errors is suggested not only by the speakers' intuitions that we report, but also by several prescriptivist websites on which readers have asked about the propriety of *whom of which* relatives (and are uniformly advised to spurn the construction as non-standard and redundant). For example:

"I recently encountered this expression and I'm pretty much stumped. People seem to be using it in place of 'who'. Example:

[...] they were developed by non-medical professionals whom of which have applied their skills to help solve a health care / medical problem they had faced.

"Another example:

As well as Dave, special thanks goes to the 'Girls in Pink' for providing a high service throughout the whole day, as well as club chairman, Bob Thomsett and Chrissie whom of which manned the kitchen which was busy all day.

"I can't quite wrap my head around the expression, but I figured it might be one of the many idiosyncrasies of the English language. Is this a valid expression or some newfangled bastardisation?"

(<https://english.stackexchange.com/questions/106180/whom-of-which-a-valid-expression>)

Some typical responses:

"No, it is not a valid expression. It's simply bad English"

"They're wrong. Who is all you need and what you want. And there's more wrong with those sentences besides 'whom of which'"

"I'm voting to close this question as off-topic because it is based on a grammatical mistake and no definitive answer could be made."

A similar extended discussion of the construction can be found at <https://www.usingenglish.com/forum/threads/using-whom-of-which.159982>. The website *Grammarhow*, which describes itself as "on a mission to help you become better at English", devotes an entire page to this construction — followed by multiple examples of appropriate substitutions for it.

"In English, there can be plenty of times when new words or phrases seem to be created as idiosyncrasies. Phrases such as 'whom of which' seem to develop over time, even though they don't make all that much sense. This article will explore whether it works grammatically.

"Is 'Whom of Which' Correct?"

"'Whom of which' is never grammatically correct. It never makes sense to write this phrase as it is a long-winded version of the simple 'who.'"

"There is never a situation where 'whom of which' makes sense. It's not something that you should be comfortable with using. Most native speakers will look at it and think it sounds bizarre.

The only time that people seem to use it is when they're trying to be overly wordy. They might use it when they feel like they need to 'pad out' the word count in their writing. Even in these cases, "whom of which" is never correct.

(<https://grammarhow.com/whom-of-which/>)

There is of course no better sign that a syntactic construction forms part of the real grammar of real speakers than prescriptivists protesting against its use.

Apart from the contents of its left periphery, the syntax of *wh-which* relatives is that of standard relative clauses, involving \bar{A} -movement from within the relative clause. For example, this movement may cross a clause boundary, but obeys islands, as shown in (4); and can license a parasitic gap, as shown in (5):

(4) **Obedience to islands**

- a. ✓ The person whom (of) which Sue believes that we should visit ____ is on the phone.
- b. *The person whom (of) which I met [the snowman that talked to ____] is my friend
- c. *The children whom (of) which Santa asked [why I gave a present to ____] had a very merry Christmas.
- d. *The linguist whom (of) which [an article by ____] impressed that snowman is visiting our department.

(5) **Licensing of parasitic gaps**

The reindeer whom (of) which Donner gave a carrot to ____ after sledding with ____ is a fine animal.

As examples throughout this paper demonstrate, the construction is available in both restrictive and non-restrictive relatives, as well as relative clauses with a variety of modified heads — definite, indefinite, quantificational, and pronominal. Throughout our investigation of this construction, we have come across a general feeling on the part of speakers that the restrictive relatives are somehow “more restrictive” than their standard-English counterparts without the extra *which*, but we have not been able to make this feeling precise — and the use of the construction in non-restrictive contexts makes it clear that there is no restrictivity requirement imposed by the construction.

We will thus assume, possibly wrongly, that *wh-which* relatives are interpreted semantically just like their standard English counterparts. This favors analyses in which the main differences between the two types of relative clauses can be shown to be purely syntactic in nature, ideally invoking parameters of variation familiar from other puzzles with a similar character. Our proposal will have that property.

Turning now to the left periphery of the construction, we note first that a *whom-(of)-which* relative can only modify a [+human] nominal, just like standard *who*-relatives. If the head is inanimate, one might expect a *which-(of)-which* relative to be possible. These are rejected by speakers we have consulted, possibly to avoid repetition — but online attestations, though seemingly rare, do occur:²

(6) **Which of which relatives: online examples**

- a. He's an excellent governor, with none of the Trump baggage **which of which** Trump did on his own (<https://twitter.com/kurtfisher18333/status/1581853032807272448>)
- b. I don't know if I would 100% agree with that the one thing Obama did successfully was marry John McCain (rightly or wrongly) to George Bush's wars **which of which** had grown unpopular by then especially Iraq which Obama essentially ran on ending in favor of focusing on Afghanistan (<https://twitter.com/jch6289/status/1572999060142841857?s=61&t=ppYz-7H2VFVOvh6mioUq6Q>)
- c. I recall numerous very boring family lunches in the 1990s which would be enlivened by bar staff being asked for Dubonnet, a drink **which of which** few had heard of and which even fewer kept in stock. (<https://twitter.com/drcharlielynch/status/1571178231813885953>)

Where and *when* are also possible as the initial *wh*-form in a *wh-which* relative. Speakers may feel slightly less comfortable with these than with examples whose first element is *whom*, and attestations seem to be correspondingly sparser:

(7) **Where/when (of) which relatives: online examples**

- a. Since termination of any innocent person at any point of their life is clearly immoral and always should be prohibited under the law in any civilised country, there has to be a clear temporal point **where of which** the law recognises the start of such a life. (<https://twitter.com/max43833673/status/1542638408631259142>)
- b. My experience was very seamless - but it was through St. Luke's, **where of which** I was already a pre-established patient through my primary care doc. (<https://twitter.com/kaileyholt14/status/1279991484368867329>)

2. We do not present online examples that lack overt *R_{of}* since occurrences of *which which* (also attested) might well be typing errors. See also footnote 14 below for other examples of inanimate heads with *wh-which* relatives.

- c. Listen Chaps, some of us live in apartments with toilets that simply aren't made for bidet attachments so we carry the bidet box from apartment to apartment hoping we finally moved into a place **where which** we can properly clean our butts! (<https://twitter.com/ughcmonn/status/1458299240292175873>)
- d. Applications are taken at any time and you will be told of the next available unit at the time **when which** you apply. (<https://www.methodisthealth.org/articles/applying-for-cpe>)
- e. three of the top use cases are sales-centric, showing that those adopting AI are doing so to grow their business significantly and with a strong focus on customers and sales, at a time **when which** the economy is struggling. (<https://techunwrapped.com/investment-in-systems-based-on-artificial-intelligence-will-exceed-300000-million-in-2026/>)

2 More than just *which*: towards an analysis

Since the transformation of a *wh*-word into a complementizer is a well-known diachronic path, one might wonder whether *which* is a complementizer in the variant of the construction lacking overt R_{of} , in which case *whom* could be viewed as a specifier of CP in a "doubly-filled COMP" configuration.³ This proposal makes it hard to find a place for R_{of} in the variant that includes it, however, and runs afoul of constituency evidence from coordination that we present below. While this introductory section might be the optimal place to present this evidence, creation of the relevant examples will require us to exploit certain resources of the construction that we are not yet in a position to introduce.

We argue instead for a different proposal, according to which the sequence *wh-(of)-which* seen in the examples presented above forms a constituent \bar{A} -moved in its entirety to the specifier of CP by the same process familiar from standard English relative clauses like *the person who you met*. We propose an internal structure for this constituent like that seen in (8) in which "*wh*" occupies a specifier position internal to the moved constituent and R_{of} is the constituent's head (in the examples seen so far). The reason we have surrounded both "*wh*" and "*which*" with sets of three dots will become clear as we proceed.

- (8) [[...*wh*...] [R_{of} [...*which*...]]]

In the standard English counterparts of all the examples seen so far, what is relativized would be a single word, e.g. *the snow-men whom the children loved* (though of course more complex analyses of words like *where* are imaginable). When a phrasal PP is relativized — a case where standard English appears to show pied-piping (e.g. *the person with whom you disagree* — one of the outcomes for speakers who command the *wh-which* constructions sandwiches the preposition between the initial *wh* and *which*, as seen in (9) and (10) below.⁴

(9) PP pied-piping → preposition between *whom* and *which*: online examples

- a. It must be nice to be able to silence those **whom with which** you disagree. (<https://twitter.com/hvacjdub/status/1468656565431451655>)
- b. [...] it struck me that my idea of heaven would be having a friend **whom with which** I could sing Falling In Reverse lyrics out loud down the street (<https://twitter.com/fulconafterdark/status/1445015294884384772>)
- c. It's wild. There isn't a celebrity out there **whom to which** I would devote that much advocacy. (https://twitter.com/alan_smithee_jr/status/1517550584743841793)
- d. Your family is not only those **whom to which** you are related by blood but those you love and choose to celebrate life. (https://twitter.com/ryan_iori/status/1342519660676321280?)

3. A precedent for this alternative could be found in German dialects in which relative clauses can be introduced by a relative pronoun followed by an invariant neuter *wh*-form otherwise translatable as 'what' (Wiltchko 2013; Kallulli and Laszakovits 2022)):

[...] dea Briafroga [**dea wos** bei uns austrogn hot] is jetzt in Pension
DET_F mailman REL.PRO COMP at us delivered has is now in retirement
 'the mailman who delivered in our neighborhood is now retired' ("Austro-Bavarian German"; Wiltchko 2013, 159, ex. 4)

In these constructions, however, the *wos* component cannot, as far as we know, be replaced with a *wh*-phrase, making its analysis as a complementizer plausible — in contrast to *which* in the English construction discussed here. We are grateful to Martina Wiltchko and Dalina Kallulli for bringing this construction to our attention.

4. There appear to be no restrictions on the prepositions that may be sandwiched in this fashion. This fact argues against a connection with the inversion of prepositions with *wh* elements in the "Swiping" construction first discussed by Ross (1969), e.g. *I know Mary is traveling with someone, but I don't know who with* — which is limited to "light" prepositions (e.g. *with*, but not *without*; cf. (9f)). It is also limited to constructions with the Sluicing variety of ellipsis, not a characteristic of this construction — and to bare *wh*-words, also not a property of this construction, as we shall see in section 4 (cf. (23)).

- e. I also have a little brother, someone **whom without which** I would have never had a villain to star in my movies growing up (true story). (<https://www.lorenaparkour.com/bio>)
- f. Thanks to all our attendees and presenters **whom without which**, <comma sic> none of this would happen (<https://inog.net>)
- g. Funny how the people **whom for which** this law was meant won't be affected by it. (https://twitter.com/otherthan_jay/status/1532680990170263552)
- h. The students that have been affected and will continue to suffer are those on the academic bubble. Those **whom for which** this is a critical make or break time in their education. (<https://www.pgfreepress.com/the-bctf-is-getting-warmer-2/>)
- i. This protects trustees against beneficiaries **whom of which** they have no knowledge.⁵ (<https://www.chegg.com/flashcards/trusts-and-equity-three-certainties-and-secret-trust-c0eb07aa-7acd-4444-b238-59fb641e9a3c/deck>)

(10) **PP pied-piping → preposition between *where/when* and *which*: online examples⁶**

- a. Part of a separate series of GEICO commercials **where in which** actor Mike McGlone walks into an empty room and asks a rhetorical and/or obvious question. (https://en.wikipedia.org/wiki/GEICO_Cavemen,; accessed; 10/29/2022)
- b. Saying this in response to a tweet **where in which** Jeremy is defending a Jewish man is comical. (<https://twitter.com/alfkebab/status/1585577278347558912>)
- c. Any area **where to which** a person has legal standing to admit or decline admittance <sic> to another person is considered a "dwelling" under Castle. (<https://twitter.com/stevebooth13/status/1585668136170315776>)
- d. Everyone should have a place **where to which** they can return and feel at home. (<https://erinalmond.com/tag/north-carolina/>)
- e. I can't remember when I realized I wasn't going to have a normal life. There had to have been some point, I'm sure, a moment in time **when before which**, <comma sic> I was certain I'd get a teaching degree, fall in love, get married, churn out a couple of kids, house in a nice neighborhood, barbecues, newspaper subscription, all of that [...] (<https://www.avclub.com/the-x-files-dreamland-millennium-closure-1798173250>)
- f. Pick a time of day **when after which** you'll no longer accept a business call. (<https://twitter.com/chicsoo9/status/1520206554791923713>)
- g. Watch the movie "Charlie Wilson's War" starring Tom Hanks. It's about the time we used Afghanistan to fight our Cold War with russia. You know, the time **when during which** we trained Bin Laden (<https://twitter.com/familiasener/status/1519385737174597634>)

The presence of a preposition between *wh* and *which* as in (9) and (10) blocks the presence of overt *of*_R:

- (11) a. *those **whom with of which** you disagree...
- b. *those **whom of with which** you disagree...

This fact might seem to suggest that a preposition sandwiched between *wh* and *which* occupies the same position as that occupied by *R_{of}*. Note, however, that these sandwiched prepositions head PPs that are all licensed in the clause-internal position from which relativizing \bar{A} -movement was launched. In this respect they contrast with *R_{of}*, which is not licensed in the clause-internal relativized position (e.g. *the children loved (*of) the snowmen*). This fact already militates against the proposal that *R_{of}* occupies the same position as the sandwiched prepositions of (9) and (10).

We propose instead that the sandwiched prepositions in (9) and (10) are heads of a PP *complement* of the position occupied by *R_{of}*, and that the obligatory silencing of *R_{of}* should be explained in some other way (to which we turn below). We thus propose a structure like (12) below (with P thus belonging to the three dots preceding *which* in (8)):

- (12) [_{R_{of}}P [...*wh*...]] [_{R_{of}} [_{PP} P *which*]]

In fact, a PP containing *which* as a subconstituent is not the only kind of full phrase that can occupy the position we are identifying as the complement of silent *R_{of}*. A nominal containing *which* as a subconstituent can also occur in this position:⁷

5. Note that *of* in this example is the preposition required by *knowledge*.

6. Because of potential synonymy between the *wh*-words and PPs used in these examples and the limited number of prepositions that could take *when* and *where* as complements, it is more possible here than elsewhere that some of these examples may be typing errors.

7. Though we have not found online examples, the two phenomena just discussed may be combined, so that *which* is contained within a larger nominal that is itself the object of a preposition: e.g. *the person whom about pictures of which we were talking*

(13) **Which as proper subpart of larger nominal following whom: online examples**

- a. College is weird. You pack up your stuff and move away from your parents for the first time ever. You move into a place with 60,000 other students **whom none of which** you know, leaving the group of friends you have spent 12 years with. (<https://u.osu.edu/trimble93hseportfolio/category/yearinreview/>)
- b. I am 14 years old and have had a crush on a boy (and if it really matters I'm female) since I met him, however because he was surrounded by my friends **whom several of which** he dated (we were kids so I don't think it counts as a red flag cause we were trying to figure ourselves out) (https://www.reddit.com/r/Advice/comments/xuj534/how_can_i_get_over_someone_i_have_liked_for_two/)
- c. Oh look how I will conveniently stand by the window talking to children **whom a couple of which** I've never met in order to get my mug on the news. (https://twitter.com/julzd_martin/status/1532643591578914816)
- d. We don't have a single top of the rotation pitcher currently starting for the Royals. The GM has been here for 15 years. This isn't a comment solely on the pitching draft class of 2018, **whom some of which** we are seeing get chances at the MLB level. (https://twitter.com/upton_4/status/1409552955230101509?s=61&t=J2ISJ6gM-QnGRMHwHEntnA)
- e. How the heck do y'all make friends on here like I've been on here since 2017 and I made like 5 friends, **whom none of which** I still talk to. (https://twitter.com/pjm_delight/status/1097686681048805376?s=61&t=J2ISJ6gM-QnGRMHwHEntnA)
- f. Their warrior caste include the fearsome barbarians **whom stories about which** are told to scare children. (<https://trolllord.com/forums/viewtopic.php?t=4604>)
- g. "All I think about is you" she said to three men **whom two of which** could literally be her father because of their age and also don't know she exists (<https://twitter.com/mythicalllamaxo/status/1512549060363767808>)
- h. I truly can't say enough nice things about this place. It's the staff that make it for me, my husband and our best friend **whom all of which** have become regulars! (<https://www.yelp.com/biz/island-girl-cigar-bar-ponte-vedra-beach>)
- i. As far as I am aware GRRM said that he will not be introducing new POV characters in the next book. So we have an existing pool of POVs, **whom some of which**, <comma sic> will most likely die at some point in the next book. (https://www.reddit.com/r/asoiaf/comments/7emnj1/spoilers_extended_who_will_be_the_first_pov/)

Strikingly, overt *of* is strongly dispreferred in such examples as well.⁸ A variant of (13f) with *of*, for example — e.g. **barbarians whom of stories about which are told to scare children* — is not acceptable, and we have not found online examples with this configuration. This fact supports our view that the complementary distribution of overt *of* and the boldfaced prepositions seen in (9) and (10) is not a sign that they occupy the same position. Instead, we propose the following rule governing the pronunciation of R_{of} :

(14) **Overttness of R_{of}**

R_{of} is optionally realized as *of* when its complement is bare *which*, and is null otherwise.

3 Proposal

There is a simple way to convert any *wh-which* relative clause into an English relative clause of the standard type: replace *which* with the element we have been calling *wh*, replace *whom* with *who* as appropriate, and do not pronounce R_{of} . This procedure will convert *the snowmen whom (of)which the children loved* into *the snowmen who the children loved*; *those whom with which you disagree* into *those with whom you disagree*; and *barbarians whom stories about which are told to scare children* into *barbarians stories about whom are told to scare children*. In this fact, we suggest, may lie the key to the correct analysis of the *wh-which*

8. Because of the absence of *of* in attested examples of this type, it is conceivable that in (13f-i) only *whom* has raised to spec,CP, and the phrase containing *which* is occupying the subject position — in which case we would be dealing with a different puzzle entirely. The examples in (13a-e), however, involve relativization of a position lower than the highest subject of the relative clause, and are thus immune to analysis of that type. Note as well that the mysterious use of *whom* characteristic of *wh-which* relatives is found in these examples, another reason to be suspicious of the alternative analysis in which only *who* has undergone \bar{A} -movement in (13f-i). Some subject extraction attestations do contain *who*, however:

- a. The majority of the experimental group believed the actions within the scenario were legal, but at the same time they also identified the actions to be more immoral than the control group, **who the majority of which** found the actions to be illegal. (<https://epublications.regis.edu/cgi/viewcontent.cgi?article=1853&context=theses>)
- b. When three New Yorkers, **who all of which** used to make a steady living in stage production, found themselves with some extra time on their hands, they decided to craft a blend of metal, thrash, and doom to form High Strange. (<https://www.noecho.net/features/high-strange-metal-band>)

construction: the initial *wh* originates in the position of *which*, and reaches its surface position by movement to the specifier of R_{of} . Our preliminary proposal for the analysis of a *wh-which* relative is thus the following:⁹

1. inside RP_{of} :

- (a) R_{of} contains a probe that searches for a constituent bearing [+*wh*], triggering movement of the maximal projection of its goal to Spec, RP_{of} (with a complication discussed below).
- (b) *Which* marks the original position of the phrase moved to Spec, RP_{of} .
- (c) The pronunciation of R_{of} is governed by (14).

2. at the CP-level:

C contains a probe that searches for a constituent headed by R_{of} , triggering \bar{A} -movement of the entire RP_{of} to Spec,CP.

In the simplest examples with which this paper began, the complement of R_{of} moves within RP_{of} to form its specifier, and the entire RP raises to spec,CP, as shown in (15a).¹⁰ Examples like those in (9) and (10) involve preposition-stranding subextraction of a *wh* element to form a specifier of RP, as shown in (15b). Examples like those in (13) involve comparable subextraction of *wh* from a nominal, as shown in (15c):

(15) Sample analyses of *wh-which* relatives

- a. ...the snowmen [CP [RP **whom** R_{of} *which*] C the children loved — ... cf. (1)
- b. ...those [CP [RP **whom** R_{of} [PP with *which*]] C you disagree — ... cf. (9a)
- c. ...students [CP [RP **whom** R_{of} [DP none of *which*]] C you know — ... cf. (13a)

If this analysis of *wh-which* relatives is correct, what looks like *wh*-movement in a *wh-which* relative — i.e. movement triggered by a [+*wh*]-probe on C — is actually RP_{of} -movement. The fact that R_{of} is sometimes silent but (silent or not) requires a *wh* creates the illusion that it is C that needs [+*wh*] — but the relationship is actually indirect: C interacts with RP_{of} and R_{of} interacts with *wh*. This analysis can immediately be extended to Standard English relatives like *the snowmen who the children love* that lack the distinctive properties of *wh-which* relatives, if these involve RP movement as well. All that is necessary is to posit a distinct flavor of R for these relatives that does not trigger movement of its *wh* goal (unlike R_{of}) and is always silent.¹¹

9. There are of course multiple proposals for the overall syntax of relative clauses, including those that posit raising of the modified NP from within the relative clause (as first proposed by Vergnaud 1974). We do not explore these variants here, making the (possibly wrong) assumption that the fundamentals of our analysis can remain intact in the face of a fairly wide variety of different views about the details of relative clause formation. For example, head-raising analyses can easily be made compatible with our proposal, with the *wh*-head constituent undergoing the movement described here as a property of *wh* alone. We might then ask if the mysterious *which* of the *wh-which* construction might be a functional element that selects a *wh*-head pair (Kayne 2008) as a complement — its shape possibly reflecting *wh*-agreement with the *wh* in its complement — and is stranded by movement of that pair to the specifier of RP_{of} .

We should also note, if it should turn out that the \bar{A} -movement characteristic of English relative clauses targets a position different from the specifier of CP (Rizzi 1997), nothing important is likely to need changing in our proposal.

10. This movement violates the “anti-locality” condition proposed by Abels (2003) (and developed in much subsequent work) that bans movement from complement to specifier position of the same head. If Abels’ proposal is correct, we might view *of* in *wh-which* relatives, not as R_{of} itself, but rather as a “spacer” inserted between R_{of} and what would otherwise be its complement precisely in those circumstances where it is necessary, in order to avoid an anti-locality condition. This would explain why it is disallowed except in the environment specified in (14), i.e. why it is never found in cases where the specifier of R_{of} is formed by subextraction from its complement. The optional overtiness of *of* would remain a puzzle, however.

11. Or perhaps the *which* mentioned in the pronunciation rule (14) must be a *which* that marks the position from which movement took place, in which case the fact that R in Standard English relatives must be silent follows directly from the fact that it does not trigger movement of *wh*, unlike its *wh-which* counterpart.

An attractive feature of this proposal, we believe, is its extreme *unoriginality*. It is in fact a faithful analogue for relativization of Cable's (2010a, 2010b) theory of pied-piping phenomena in *wh*-questions.¹² Our proposal is especially close to Coon's (2009) analysis of the syntax of questions in the Mayan language Ch'ol that built on Cable's work.

Following work by Hagstrom (1998) and others on similar phenomena in other languages, Cable observed what looks like interrogative *wh*-movement in Tlingit always includes a particle *sá* at the right periphery of the phrase that undergoes \bar{A} -movement to C, a particle that he assigned to the category *Q*. Since Tlingit is head-final in all syntactic categories, Cable concluded that *sá* is the head of the moved constituent. Consequently, what interrogative C probes for is *Q*, and what it causes to move is its maximal projection *QP*. Internal to *QP*, Tlingit *Q* in turn requires the presence of a *wh* element within its complement, just as we have suggested for *R_{of}* internal to *RP_{of}*. When a question involves what has traditionally been viewed as pied-piping, Tlingit makes clear that we are simply observing a situation in which *Q* has merged with a constituent larger than the *wh*-word itself, and what moves is *QP*:

(16) **Pied-piping as movement of *QP* in Tlingit**

- a. Aadóo yaagú *sá* ysiteen?
who boat *Q* you.saw.it
'Whose boat did you see?'
- b. Aadóo teen *sá* yeegoot?
who with *Q* you.went
'Who did you go with?'
- c. Daakw keitl *sá* asháa?
which dog *Q* it.barks
'Which dog is barking?'

(Cable 2010b, 8 ex. (11))

When an island boundary separates the *wh*-element from interrogative C in Tlingit, *sá* must follow the entire island. Certain locality conditions also hold between *sá* and the *wh* that it is looking for.

Cable argued that Tlingit holds the key to the proper analysis of interrogative \bar{A} -movement and pied-piping cross-linguistically. In a language like English, in which there is no overt *Q* in *wh*-questions, In English, Cable proposed, *Q* is phonologically null, but its interaction with *wh* can still be detected in locality conditions that limit the syntactic distance between the *wh*-word and the edge of the constituent that \bar{A} -moves.

Coon used Cable's proposal to explain a puzzling pattern of pied-piping phenomena in Ch'ol, earlier explored in closely related Tzotil by Aissen (1996). Unlike Tlingit, but like English, Ch'ol does not display an overt *Q*-morpheme at the periphery of the phrase that \bar{A} -moves in *wh*-questions. However, the *wh*-word of the phrase obligatorily occupies its left-periphery. Thus, though a non-*wh* possessor always follows the possessum in Ch'ol, as seen in (17) —

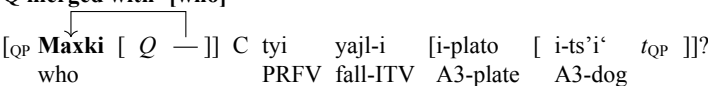
(17) **Possessum-possessor order in non-*wh* nominal (Ch'ol)**

- Tyi yajl-i [i-plato [i-ts'in' aj-Maria]].
PRFV fall-ITV A3-plate A3-dog CL-Maria
'Maria's dog's plate fell.'

(Coon 2009, 168, ex. (5))

— a *wh*-possessor will always be found to the left of the possessum, as seen in (18). Coon argues that this pattern is a consequence of a null *Q* like that posited by Cable for English questions — but with a twist: the *wh*-probe on Ch'ol *Q* (unlike English and Tlingit *Q*) triggers movement of its *wh*-goal to its specifier. In a structure with possessor recursion and a *wh*-element as the innermost possessor, how big a constituent moves to spec,CP is determined by how high *Q* attached within the nominal. Wherever *Q* attaches, it attracts the *wh*-element to its specifier. As a consequence, the \bar{A} -moved interrogative phrase comes in a variety of sizes, depending on how big a constituent *Q* merged with — but its leftmost element is always the *wh*-word, as illustrated in the examples of (18), where the arrow marks the movement of *who* to form a specifier of *Q*, and the *QP* as a whole has moved to the specifier of CP from the trace position indicated with *t_{QP}*.

(18) **Wh-movement to *Q* followed by *QP* movement to C (Ch'ol)**

- a. ***Q* merged with '[who]'**

 [QP **Maxki** [*Q* —]] C tyi yajl-i [i-plato [i-ts'i' *t_{QP}*]]
 who PRFV fall-ITV A3-plate A3-dog
 'Whose dog's plate fell?'

12. Cable himself briefly sketched an extension of his analysis to Standard English relative clauses in his concluding chapter (Cable 2010a, 202).

b. **Q merged with '[dog of who]'**

[_{QP} **Maxki** [_Q [_{NP} **i-ts'i'** —]]] C tyi yajl-i [i-plato _{t_{QP}}]?
 who A3-dog PRFV fall-ITV A3-plate
 'Whose dog's plate fell?'

c. **Q merged with '[plate of [dog of who]]'**

[_{QP} **Maxki** [_Q [_{NP} **i-plato** [_{NP} **i-ts'i'** —]]]] C tyi yajl-i [_{t_{QP}}] ?
 who A3-plate A3-dog PRFV fall-ITV
 'Whose dog's plate fell?'

(Coon 2009, 168, ex. (7))

Our analysis of *wh-which* relatives thus proposes a head in relative clauses that plays a syntactic role analogous to that played by Q in Cable and Coon's proposals — which is why with malice aforethought we have called the head found in *wh-which* relatives *R_{of}* (R being the letter after Q, as well as the first letter of "relative"), and treat *of_R* as an instance of R. Like English and Ch'ol Q but unlike Tlingit Q, English R can be silent — but like Tlingit Q, it can also be overt for speakers whose grammar permits *wh-which* relatives. Like Ch'ol Q but unlike English and Tlingit Q, English R triggers movement of a *wh* element in the domain that it c-commands.

The only novelty of *wh-which* relatives that we have seen so far besides the pronunciation condition in (14) is the fact that the original position of the *wh*-element is obligatorily marked by an overt element *which* rather than a gap. Crucially, the relation between *which* and the *wh*-element in the specifier of *RP_{of}* obeys islands — a fact that strongly argues for the movement that we are proposing, but also suggests that *which* is not a resumptive pronoun (which one might expect to ameliorate island violations), but perhaps a syntactic companion of the *wh*-element obligatorily stranded by movement.¹³ The unstarred examples below, which do not violate islands, are judged awkward and stylistically peculiar — but contrast clearly in acceptability clearly with the starred examples:

(19) **Island effects on the R *wh* relation: *R_{of}* merged with a nominal**

- a. These students, [**whom a claim about which**] we discussed in class, are my friends.
- b. *These students, [**whom a claim that we had met which**] we discussed in class, are my friends.
- c. *These students, [**whom people that know which**] we met ___ yesterday, are my friends.

(20) **Island effects on the R *wh* relation: *R_{of}* merged with a gerundive clause**

- a. These students, [**whom talking to which**] I recommend as a strategy, are my friends.
- b. These students, [**whom claiming (that) you know which**] I recommend as a strategy, are my friends.
- c. These students, [**whom trying to visit which**] I recommend as a strategy, are my friends.
- d. *These students, [**whom meeting the person who taught which**] I recommend as a strategy, are my friends.
- e. *These students, [**whom asking when you should visit which**] I recommend as a strategy, are my friends

As also predicted, the relation between *which* and whom also shows strong crossover effects within *RP_{of}*, another argument for a movement (and binding) relation between these positions:

(21) **Strong crossover effects on the *wh-which* relation**

These students_{*i*}, [**whom_{*i*} their_{*i,j*} claim that we had met which**] we discussed in class, are my friends.

13. Kotek and Erlewine (2016) present experimental evidence of subtle quantifier- and negation-induced intervention effects in complex relative clause constructions parallel to those studied by Beck (1996; 2006), Pesetsky (2000), and Kotek (2014; 2019), among others, in the context of *wh*-questions. In particular, they show that speakers reject to some degree relative clauses like *I want to try this recipe, [very few ingredients for which] I (already) have at home*, with *very few* (also *no*, *only one*, etc.) impeding the ability of *which* to serve as a relativizer from within the complex \bar{A} -fronted relative phrase. Building on the previous work cited and related studies, they propose that this kind of intervener-sensitivity diagnoses a non-movement interpretation strategy for relative *wh* contained in a larger expression (i.e. what is traditionally viewed as pied-piping). If the *wh* element underwent (covert) movement, it would be sensitive to islands in a manner that *wh*-elements in this kind of example are not, but would also not be sensitive to interveners like *very few*. Our proposal that *wh-which* relatives involve actual movement, and our demonstration of island-sensitivity, thus predicts that under similar experimental conditions intervention effects (which diagnose non-movement) should not be detected. We leave the testing of this prediction for future research. We are grateful to Seth Cable for pointing out the relevance of Kotek and Erlewine's work to our proposal.

We do not have an explanatory account of the obligatory use of *which*, rather than a gap (or some other element) as a marker of the extraction site, unfortunately. So we stipulate this fact and leave it as a topic for future investigation.

4 More than just *wh*: is pied-piping a concept after all?

An important consequence of the Q theory of interrogative phrase movement is its potential to explain pied-piping phenomena without the need for a special theory of pied-piping. If one views *wh*-question or *wh*-relative clause formation as a result of a *wh*-probe on C, movement of a phrase headed by a *wh*-word is expected — but not movement of a phrase that merely contains a *wh*-word that is not its head. If mere containment is sufficient (i.e. if apparent pied-piping turns out to be real), the theory must include some special mechanism such as “feature percolation” that copies the *wh* feature from a non-head to a node that dominates it. If, on the other hand, the probe on C is actually looking for Q or for R — with Q and R being the only heads with an actual interest in *wh* — then what looks like pied-piping can be understood instead as garden-variety movement of the maximal projection of the head bearing the feature C is actually looking for. If this is the end of the story, then, as Cable (2010b, 9)) writes, “the concept of ‘pied-piping’ may be eliminated from the theory of grammar”

It is in fact important to the logic of Coon’s discussion that neither of the movements she discusses in her analysis of Ch’ol *wh*-questions requires anything beyond movement of the maximal projection of the head bearing the feature sought by the probes that she posits on C and on Q. Indeed, the central observation that motivated her paper is the fact that there is no fourth word-order pattern alongside the three seen in (18). Just as there is no need to posit a special pied-piping mechanism for movement of an interrogative phrase to C, there is also no pattern that would require us to posit pied-piping in the movement of *wh* to Q. Q attracts a *wh*-headed constituent — and is not interested in other QPs or any phrase that merely contains *wh* but is not headed by it. As a consequence, we never find any sign that the phrase ‘whose dog’ moves internal to the QP in examples like those in (18). What moves to the specifier position of CP never looks like ‘[whose dog] plate’ or ‘[dog (of) whom] plate’.

Troublingly, the situation looks different in *wh-which* relatives, at least under the analysis we have developed here. Constructions seemingly analogous to the missing fourth pattern in Ch’ol do exist. In *wh-which* relatives it is possible for a phrase that merely contains *wh* but is not headed by it to occupy the initial position in this construction. This raises the possibility that though Q and R might be real, and though their properties might indeed permit us to dispense with pied-piping as an account of specific examples, something like pied-piping and the special mechanisms needed to account for it is also real after all.

The examples in (22) show movement of a nominal that contains a non-head *wh* to the specifier of R, with and without overt *of*. The more complex examples in (23) show movement of similar nominals stranding a preposition.¹⁴

(22) *phrasal-wh (of) which* relatives: online examples

- a. This threat, the pandemic, is to address the worse threat that is global warming **whose impacts of which** the World is already experiencing. (https://twitter.com/em_lickspittle/status/1523896512186568709)
- b. If I buy a puppy **whose parents which** both have good hip scores am I guaranteed that my puppy will be OK? (<http://british-samoyed-club.co.uk/bsc/wp-content/uploads/Hip-Scoring-cheat-sheet-final.docx>)
- c. like i said, i have multiple friends (**none of whom which** are diabetic or obese) that have been hospitalized due to covid. (https://twitter.com/perc_nobrickski/status/1443000193083850756)
- d. The entertainment, treats, and experience is still nothing compared to gathering with Wyoming fans, **many of whom of which** I have known most of my life. (<https://wyo4news.com/news/wandering-amylessly-venturing-into-the-byu-cougar-den/>)
- e. Closer to Vermeer in brush handling were Pieter de Hooch (1629–1684), Gabriel Metsu, Frans van Mieris, Gerrit ter Borch (1617–1681) and Gerrit Dou (1613–1675), **all of whom of which** possessed subtly distinctive brushwork. (http://www.essentialvermeer.com/glossary/glossary_a_c.html)

(23) *phrasal-wh P which* relatives: online examples

- a. My girlfriend would assume that I had finally clobbered either a) a former co-worker or b) a former pastor, **both of whom with which** I had rather intense disagreements. (<https://twitter.com/mythigator/status/1474031603554787330?>)
- b. Yet my feeds get populated with libtards, **none of whom to which** I subscribe (<https://twitter.com/unapologeticit1/status/1586022953313001472>)

14. The possibility of a complex phrase as the specifier of RP_{of} permits us to show that the head of a *wh-which* relative does not need to be animate, independent of the questionable status of the examples in (6) above:

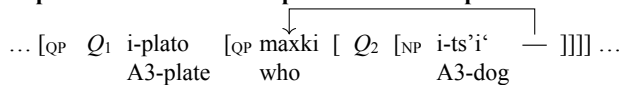
- a. The table **whose leg (of) which** Mary tried to repair is in the next room.
- b. The book **whose main ideas about which** I’m going to speak to day is this one.

- c. I mean chronic illnesses that cause a person to lose weight or affect a persons gastrointestinal health, people who are physically or mentally impaired, people who are incapacitated, **all of whom to which** a restriction on diet would be a potential detriment to their wellbeing (https://twitter.com/eva_priest/status/1479170191938535424)
- d. This sets us apart from the world of banks and loan providers, **all of whom for which** the starting point and goal is their product [...] (<https://thefundingnexus.com/about-us>)
- e. The owner of the four bedroom Maili house at 87-794 Farrington Highway said the 83-year-old tenant died in August 2020 and since then the owner has been in a dispute with the tenant’s two adult sons, **one of whom which** was notified last week by a deputy sheriff that the property must be vacated by July 23. (<https://www.staradvertiser.com/2021/07/29/hawaii-news/fire-destroys-apparently-abandoned-home-in-maili>)
- f. He will be greatly missed by his nieces Sydney, Adelyn and Madison and his nephews Ethan, Grant, Sean and Gavyn **all of whom for which** he always had a warm smile, bear hug and a bit of advice. (https://www.shellhouseriversfunerallhome.com/obituaries/print?o_id=4819475)
- g. The estimates are regularly updated and currently suggest there are 4,800 people with long COVID – **1,000 of whom for which** it is severely affecting their daily activities. (<https://www.local.gov.uk/publications/must-know-long-covid-what-role-local-government>)
- h. NSDS has a very large customer base nationally, including most of the biggest customers in the screen printing market, **some of whom for which** we have assisted in facilitating many large growth projects. (<http://www.nsdsc.co.za/content/screen.html>)
- i. It is interesting too that she is just like my mother & my ex-wife in this way, **both of whom from which** I am estranged, & perhaps permanently in both cases ;-) (<https://twitter.com/pearltiresias/status/1582349607312404480>)
- j. how dare someone **whose work of which** I partake and enjoy be a human being with a complexity and inner world (<https://twitter.com/beesbrain/status/1573428695477661697>)¹⁵
- k. My goodness! Although I have absolutely no knowledge of Betty (Mabry) Davis, she influenced (directly and indirectly through her producer Greg Errico) many people and bands **whose music of which** I am aware. (<https://twitter.com/i4eye2th4tooth/status/1554896576190881792>)

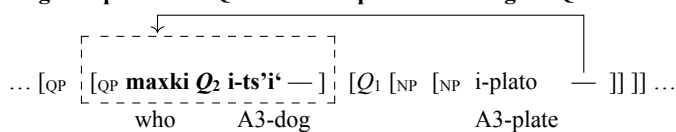
Clearly, if our overall approach to the construction is correct, examples of this kind pose a threat to the prospects for the elimination of pied-piping mechanisms as a component of the grammar. It is worth noting, however, that examples like these can at least be fit into a pigeonhole compatible with our overall analysis that removes the threat, albeit by purely technical means. A centerpiece of Coon’s account of the Ch’ol pattern is a sharp distinction between *C*, which attracts only the maximal projection of *Q*, and *Q*, which attracts only the maximal projection of *wh*. If *Q* were permitted to attract another *QP* (or if *Q* and *wh* were not distinct features in the first place), we might expect a “roll-up” movement pattern to be acceptable, in which *wh* raises to the specifier of a *QP* that then raises to form the specifier of a higher *Q* within the same interrogative phrase. Such a derivation is in fact forbidden:

(24) **A forbidden derivation (Ch’ol)**

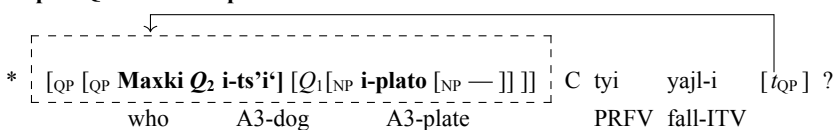
a. **step 1: movement of inner possessum *wh* to specifier of lower *QP***



b. **illegal step 2: lower *QP* moves to specifier of a higher *Q***



c. **step 3: *QP* moves to specifier of *CP***



‘Whose dog’s plate fell?’

(Coon 2009, 170, based on ex. (9) and (10a))

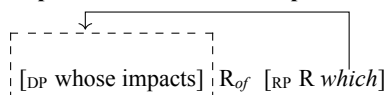
15. *Of* here is a stranded preposition rather than an instance of *R*, selected by *partake*. The same is true of *of* in the next example, where it is selected by *aware*.

If English dialects that permit the full range of *wh-which* relatives presented here do permit R to attract another RP, examples like those in (22) and (23) are derivable as instances of RP movement forming a specifier of a higher RP. We must assume that the only kind of RP that R itself can attract, however, is one whose head (like the head of standard English RP) lacks the movement inducing property — or else the theory would permit impossible examples of *wh-which* recursion such as **the snowmen whom of which of which the children loved* and worse:

- (25) a. **step 1: merge standard-English RP with R_{of}**

R_{of} [RP R [DP whose impacts]]

- b. **step 2: lower RP moves to specifier of higher (of) $_R$ (*which* marks extraction site)**



This pigeonhole for examples like those in (22) and (23), however, is for now merely a proof-of-concept demonstration that Cable's most ambitious claim might not have to be weakened. Whether an analysis like that sketched in (25) is actually correct is a question we leave open, pending further evidence for the possibility of RP recursion.

Finally, redeeming a promissory note from the introductory section of this paper, we may use the availability of the complex phrasal specifiers of RP_{of} seen in (22) and (23), as well as the availability of the complex phrasal complements to R_{of} seen in (9) and (13) to construct examples that use coordination to verify the overall constituency for *wh-which* relatives that we have proposed throughout.

The examples in (26) verify the internal constituency of RP_{of} proposed here. As shown in (26a-b), it is possible to coordinate contrasting phrases occupying both the specifier and complement positions of RP_{of} , though some judgments are reported as slightly uncertain. Note as well that the acceptability of a complex phrase in both the position of *whom* and the position of *which* in initial examples such as (1) already eliminated the possibility (which one might entertain at first) that either element is itself a head in the left periphery of the clausal spine. What might remain at stake if one is searching for alternatives to our analysis is the constituency of the *wh-which* sequence as a whole, for which (26c) below is relevant.

- (26) **Coordination: testing for constituency within RP_{of}**

- a. **coordination of complement of R_{of}**

the person **whose friends and whose enemies (%of) which** I visited ...

- b. **coordination of specifier of R_{of}**

the person **whom pictures of which and books about which** we discussed ...

- c. **coordination of RP_{of}**

the person **[whose friends (of) which] and [whose enemies (of) which]** I met last week ...

- d. **non-constituent coordination**

**the person whose friends of and whose enemies of which* I met last week

Similarly, the examples in (27) below verify the constituent structure proposed here for the CP within which \bar{A} -movement of RP_{of} takes place. Example (27a) coordinates two relative clause CPs as a baseline. The remaining examples shave off words one by one, and show that coordination cannot target any smaller sequence of words until what is coordinated is a TP (example (27a)), as predicted.¹⁶

- (27) **Coordination: testing for internal constituent structure of the *wh-which* relative clause as a whole**

- a. ✓ people **whom of which** I know well and **whom of which** you don't

- b. *people **whom of which** I know well and **of which** you don't

- c. *people **whom of which** I know well and **which** you don't

- d. ✓ people **whom of which** I know well and you don't

The wider range of configurations discussed in this section also raises questions about the constituency of acceptable and attested *wh-which* relatives whose leftmost element is a P:

- (28) **P *whom* (of) *which*: PP as specifier of RP_{of} ?**

- a. Bicycles are not permitted on the Bay Bridge, and the state no longer provides a shuttle service. Instead, they have a private shuttle service **with whom which** you can directly contract.
(<http://bikewashington.org/routes/chesapeake/index.htm>)

16. Example (27d) is more natural than (27a), but the contrast with (27b) and (27c) is clear nonetheless.

- b. I had a conversation with my republican neighbor the other day **with whom which** I had never spoken before (https://twitter.com/david_defiant/status/1567522627576647682)
- c. Over time, he became a beloved grandparent to eight grandchildren [*sic*]: Cassandra, Katelyn, Colleen, Samantha, Emma, Sebastian, Connor and Lucien, **by whom of which** he will be greatly missed. (<https://www.kohlerfuneralhome.com/obituary/2554220>)
- d. Because vaccine passports don't make a scrap of difference to covid and this I have seen first hand in a group of people who are ALL double vaccinated **of whom of which** over 50% tested +ve for covid (<https://twitter.com/meylaine/status/1446742202462482432>)
- e. It's you **to whom which** I belong / I love it, the feeling's getting strong. (lyrics to 1988 song *I like* by the band *Guy*; <https://www.youtube.com/watch?v=671GfElFygl>)¹⁷

In principle, the leading preposition in these examples might belong to the specifier of RP_{of} that underwent \bar{A} -movement — in which case, they represent instances of the same phenomenon as the examples in (23), except that it is a PP that moved within RP_{of} . If so, then it is a point of interest that *which* can mark the location from which a PP has moved, not just a nominal. On the “proof-of-concept” analysis just sketched, the structures in question once again would involve a plain RP whose head does not trigger movement attracted to specifier position by a higher R_{of} .

Alternatively, the leading preposition might be external to the RP_{of} within which movement of a *wh*-element took place, in which case these examples represent something new in this section: a Standard English RP embedding an RP_{of} :

(29) **Two possible derivations of the examples in (28)**

- a. **P internal to spec, RP_{of}**

 ...a private shuttle service [CP [RP_{of}] [RP R [PP with whom]] [R_{of} which_{PP}]] ...]
- b. **P external to spec, RP_{of}**

 ...a private shuttle service [CP [RP R [PP with [RP_{of} whom R_{of} which_{DP}]]]] ...]

If relative *where* and *when* are themselves prepositional, then the examples in (7) may have already taught us that the first of these parses is a possibility. Whether the second parse is also available could in principle be tested by coordinating *wh*-(of)-*which* following a single P, e.g. *people with [whose friends of which] and [whose enemies of which] I am equally comfortable*. The judgment is less than clear, however, so we will leave this question open.

5 Conclusions

If our analysis of *wh-which* relatives is correct, it provides yet one more instance of the “unity in diversity” of syntax structures across the world’s languages. In the present case, we have suggested that ideas developed to explain Tlingit interrogatives, which have already illuminated puzzles in Ch’ol, might also illuminate the novel set of puzzles discussed here — puzzles posed by relative clauses in a (possibly innovative) dialect of English.

Of course, the puzzles posed by *wh-which* relatives have not been fully solved here, so it is possible that an alternative view of the construction will fare better with the remaining problems. In particular, though we have argued that the relation between *which* and the pre- R_{of} phrase is a movement relation, we do not know why the original position of this relation should be marked by *which*. In addition, the surprising preference for *whom* over *who* remains unexplained.¹⁸

17. The use of this variant of the *wh-which* construction here in a recorded and published song lyric probably removes any possibility that it is a mere speech error. This example was brought to our attention by Yutaka Ohno (Facebook discussion, December 23 2021), in the context of the following Twitter post, which we cannot resist quoting:

‘I Like’ by Guy was the first time I heard “to whom which” in a song. That lyric has been on a satisfying grammar loop in my mind since 1989. (<https://twitter.com/DonnettaLavinia/status/1285701613668257793>)

18. There are other environments where many English speakers use or even prefer *whom* over *who*, namely when it is an in-situ object of a verb or preposition — as in (apparent) pied-piping structures like *the person to whom we spoke* and multiple interrogatives like *who spoke to/visited whom?*. (See Lasnik and Sobin 2000 for a more nuanced discussion of the use of *whom* in these environments and elsewhere, and also Huddleston and Pullum 2002, 464 ff..) If there were some reason to treat the specifier of R_{of} as a position somehow analogous to these, this problem might be resolved.

References

- Abels, Klaus. 2003. *Successive cyclicity, anti-locality, and adposition stranding*. Doctoral dissertation, University of Connecticut. URL <https://opencommons.uconn.edu/dissertations/AAI3104085/>.
- Aissen, Judith. 1996. Pied-piping, abstract agreement, and functional projections in Tzotzil. *Natural Language and Linguistic Theory* 14:447–491.
- Beck, Sigrid. 1996. Quantified structures as barriers for LF movement. *Natural Language Semantics* 4:1–56.
- Beck, Sigrid. 2006. Intervention effects follow from focus interpretation. *Natural Language Semantics* 14:1–56.
- Cable, Seth. 2010a. Against the existence of pied-piping: Evidence from Tlingit. *Linguistic Inquiry* 41:563–594. URL http://dx.doi.org/10.1162/LING_a_00013.
- Cable, Seth. 2010b. *The grammar of Q: Q-particles, wh-movement, and pied-piping*. New York: Oxford University Press.
- Coon, Jessica. 2009. Interrogative possessors and the problem with pied-piping in Chol. *Linguistic Inquiry* 40:165–175.
- Hagstrom, Paul. 1998. *Decomposing questions*. Doctoral Dissertation, Massachusetts Institute of Technology, Cambridge, MA.
- Huddleston, Rodney, and Geoffrey K. Pullum. 2002. *The Cambridge grammar of the English language*. Cambridge University Press.
- Kallulli, Dalina, and Sabine Laszakovits. 2022. Head movement in germanic doubly-filled comp constructions. In *Proceedings of the Olomouc Linguistics Colloquium 2021*, ed. Markéta Janebová, Joseph Emonds, and Ludmila Veselovská, 66–77. Palacký University, Olomouc. URL <https://ff.upol.cz/fileadmin/userdata/FF/katedry/kaa/sborniky/OlincoProceedings2021.pdf>.
- Kayne, Richard S. 2008. Antisymmetry and the lexicon. *Linguistic Variation Yearbook* 8:1–31.
- Kayne, Richard S. 2017. A note on some even more unusual relative clauses. In *Order and structure in syntax I: Word order and syntactic structure*, ed. Laura R. Bailey and Michelle Sheehan, 363–371. Language Science Press. URL <https://langsci-press.org/catalog/view/159/1129/975-1>.
- Kotek, Hadas. 2014. *Composing questions*. Doctoral Dissertation, MIT, Cambridge. URL <http://ling.auf.net/lingbuzz/002231>.
- Kotek, Hadas. 2019. *Composing questions*. MIT Press.
- Kotek, Hadas, and Michael Yoshitaka Erlewine. 2016. Intervention effects in relative pronoun pied-piping: Experimental evidence. In *Proceedings of Sinn und Bedeutung*, ed. Nadine Bade, Polina Berezovskaya, and Schöller Anthea, volume 20, 448–461. URL <https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/273>.
- Lasnik, Howard, and Nicholas Sobin. 2000. The who/whom puzzle: on the preservation of an archaic feature. *Natural Language and Linguistic Theory* 18:343–371.
- Pesetsky, David. 2000. *Phrasal movement and its kin*. Cambridge: MIT Press.
- Rizzi, Luigi. 1997. The fine structure of the left periphery. In *Elements of grammar*, ed. Liliane Haegeman, 281–337. Dordrecht: Kluwer Academic Publishers.
- Ross, John Robert. 1969. Guess who? In *Papers from the 5th regional meeting of the Chicago Linguistic Society*, ed. Robert I. Binnick, Alice Davison, Georgia M. Green, and Jerry L. Morgan, 252–286. Chicago: Chicago Linguistic Society.
- Vergnaud, Jean Roger. 1974. *French relative clauses*. Doctoral Dissertation, MIT. URL <http://dspace.mit.edu/handle/1721.1/12993>.
- Wiltshko, Martina. 2013. Descriptive relative clauses in Austro-Bavarian German. *Canadian Journal of Linguistics/Revue canadienne de linguistique* 58:157–189.