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RESEARCH

Conjunction saves multiple sluicing: How *(and) why?

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Our goal in this paper is to analyze coordinated wh-sluicing in English and compare its properties to the properties of multiple sluicing, coordinated wh-questions and coordinated clefts. We show that none of these constructions has the properties of coordinated sluices, and conclude that coordinated sluices are not derivationally related to them. We propose, instead, that coordinated sluices underlyingly involve coordination of two interrogative CPs with a single fronted wh-phrase and an elided TP in each CP. In addition, we propose that the elided TP of the second conjunct in a coordinated sluice contains a pronominal element (an E-type pronoun) coindexed with the trace of the fronted wh-phrase in the first conjunct. We show that this analysis derives the properties of coordinated sluices and explains *why* they differ from multiple sluices, coordinated wh-questions and coordinated clefts.

Keywords: coordinated sluicing; multiple sluicing; coordinated wh-questions; coordinated clefts; clause-mate condition

1 Introduction

In this paper, we investigate the effects of coordination on the status of multiple sluicing constructions in English. We build on the observation that coordination sometimes improves the status of constructions that are ungrammatical *without* coordination. This is, for example, what happens in multiple wh-questions: the ungrammatical sequence of two fronted wh-phrases in (1a) becomes grammatical when the two wh-phrases are coordinated, as shown in (1b) (Browne 1972; Kazenin 2002; Whitman 2002; 2004; Gračanin-Yuksek 2007; Gribanova 2009; Scott 2012; Citko and Gračanin-Yuksek 2013; 2016, among many others):

(1) a. *__When where__ did you see John?
b. __When and where__ did you see John?

Similarly, the ungrammatical sequence of a complementizer followed by a wh-phrase in (2a) becomes grammatical when a conjunction separates them, as shown in (2b) (Giannakidou and Merchant 1998; Citko and Gračanin-Yuksek 2017).

(2) a. *Let me know __if when__ you see John.
b. Let me know __if and when__ you see John.

We focus on a similar contrast, involving multiple sluicing constructions. In English, multiple sluicing is quite restricted: the ungrammatical multiple sluicing example in (3a)

improves when the two wh-phrases are coordinated, as shown in (3b) (Bolinger 1978; Hoyt and Teodorescu 2012).[1,2]

(3) a. Lasnik (2014: 8)
?*Someone saw something, but I can't remember **who what**.

b. Someone saw something, but I can't remember **who or what**.

We examine possible sources for coordinated sluices, and show that coordinated sluices like (3b) above cannot be derived from multiple sluices in (3a). We also show that they cannot be derived from coordinated wh-questions or coordinated clefts, illustrated in (4a–b), respectively.

(4) a. *Coordinated Wh-Questions*
*Someone saw something, but I can't remember **who or what saw**.

b. *Coordinated Clefts*
Someone saw something, but I can't remember **who** it was **or what** it was.

We propose instead that coordinated sluices involve coordination of two CPs, with a single wh-phrase sluiced in each, as shown in (5).

(5) *Coordinated Sluicing*
Someone saw something, but I can't remember
[$_{CP1}$ **who**$_i$ [$_{\sout{TP1}}$ ~~t_i saw something~~]] or [$_{CP2}$ **what**$_j$ [$_{\sout{TP2}}$ ~~they$_i$ saw t_j~~]]

We proceed as follows. In Section 2, we investigate coordinated wh-questions as a possible source for coordinated sluices and show that deriving coordinated sluices from coordinated wh-questions makes an incorrect prediction for English that the two should be subject to the same restrictions. In Sections 3 and 4, we argue against deriving coordinated sluicing from multiple sluicing and coordinated clefts, respectively. In Section 5, we present our proposal, and in Section 6, we address the question of *why* coordinated wh-questions and coordinated sluices cannot share the same underlying structure. Section 7 is the conclusion.

[1] To the best of our knowledge, Bolinger (1978: 145) was the first to note the improvement that coordination brings about (even though he was not explicit about it). His insight, based on the contrasts in (i–ii), was that the ungrammatical multiple sluicing examples improve if "the words are separated": inserting a conjunction between the wh-phrases is one of the ways they can be separated.

(i) Bolinger (1978: 145)
a. I know somebody gave somebody something. *But **who who what**? (*But **who, who, what**?)
b. I know somebody gave somebody something (something to somebody). ?But **who, what, to who**?

(ii) Bolinger (1978: 145)
I know they're taking something someplace. *But **what where why**? But **what, where and why**?

Hoyt and Teodorescu (2012: 86) attribute the observation that "the unacceptability of multiple remnants in English can be mitigated by the addition of a conjunction between the two remnants" to Richards (1997). We were not able to locate the original discussion.

(iii) Hoyt and Teodorescu (2012: 86)
a. John gave someone something, and I want to know **who and what**.
b. John gave something to someone, but I don't know **what or to whom**.

[2] Here and throughout the paper we boldface wh-phrases in example sentences even if the original source didn't.

2 Coordinated wh-questions as possible source for coordinated sluicing

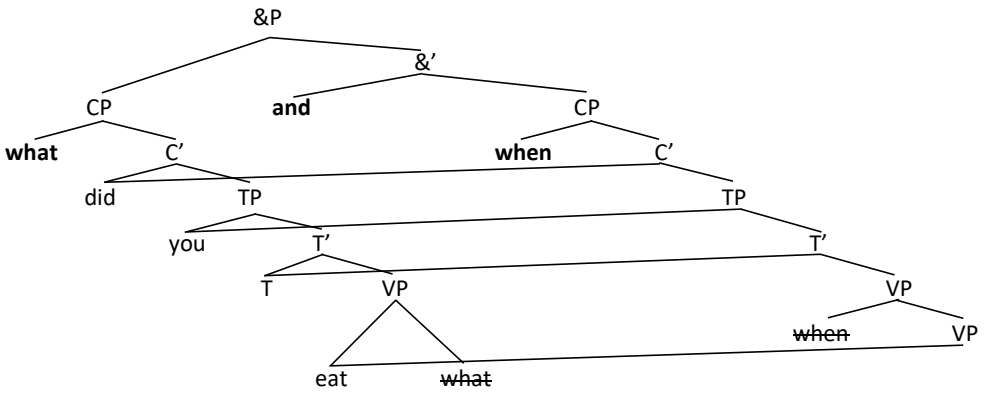
2.1 Background on English CWHs

Coordinated Wh-Questions (henceforth **CWHs**) are questions in which two wh-phrases, not necessarily of the same category, appear conjoined in a left-peripheral position, as shown in (6a–b). The grammaticality of (6a) is not surprising given that it involves coordination of two Adverbial Phrases (so they could be part of a larger Adverbial Phrase), but in (6b) coordination would have to target a DP and an AdvP, in violation of the Law of the Coordination of Likes (Williams 1981). This has led to alternative analyses for CWHs, on which coordination involves larger (clausal) constituents, or which regard the fact that coordinated constituents are wh-phrases as sufficient for the purposes of evaluating "likeness" (see Gračanin-Yuksek 2017 for an overview of existing approaches to CWHs).

(6) a. [$_{\text{AdvP}}$ **When**] **and** [$_{\text{AdvP}}$ **where**] were you born?
b. [$_{\text{DP}}$ **Who**] **and** [$_{\text{AdvP}}$ **when**] did you teach?

English CWHs have been shown to be subject to a number of restrictions (discussed by Browne 1972; Kazenin 2002; Whitman 2002; 2004; Gračanin-Yuksek 2007; Gribanova 2009; Scott 2012; Citko 2013; Citko and Gračanin-Yuksek 2013; 2016, among many others). In order to capture these restrictions, Gračanin-Yuksek (2007) proposes that English CWHs have the structure in (7b), which she dubs a *bi-clausal non-bulk sharing structure*.[3] It is *bi-clausal* because coordination is at the CP level, it is *sharing* because the two CPs share lexical material due to the multidominant nature of the structure (in this particular case, the two CPs *share* everything *except for* the wh-phrases). And it is *non-bulk* sharing because multiple individual nodes are being shared (rather than a larger chunk of structure being shared in bulk).

(7) a. **What and when** did you eat?
b.



This structure captures a number of restrictions on English CWHs. The first one concerns the ban on coordinating two wh-arguments, illustrated in (8a). This example is ungrammatical for the same reason (8b) is ungrammatical. The verb *put* requires two VP internal arguments, but since according to the structure in (7b) it has *only one* per conjunct, its selectional requirements are not satisfied in either conjunct.

(8) a. *__What and where__ did you put?
b. *__What__ did you put and __where__ did you put?

[3] This is also the structure adopted by Citko and Gračanin-Yuksek (2013).

The second restriction concerns CWHs with obligatorily transitive verbs like *buy*. Such CWHs are ungrammatical if one of the wh-phrases is an adjunct and the other one a direct object, as shown in (9a), whose ungrammaticality also reduces to that of (9b).

(9) Obligatorily transitive V; *wh-DO & wh-adjunct*
a. *__What and when__ did you buy?
b. *__What__ did you buy and __when__ did you buy?

In this respect (9a) contrasts with (10a); instead of the obligatorily transitive verb *buy*, (10a) has the optionally transitive verb *eat*, which can be interpreted intransitively in the conjunct that is missing the direct object.

(10) Optionally transitive V; *wh-DO & wh-adjunct*
a. **What and when** did you eat?
b. **What** did you eat **and when** did you eat**?**

The third restriction concerns CWHs in which one of the coordinated wh-phrases is a subject, such as the one in (11a). This example is ungrammatical because in English all finite clauses require an overt subject, due to the EPP requirement (Chomsky 1981). In (11a), however, since the subject is one of the wh-phrases, it is only part of the first conjunct, but not the second one, as shown in (11b).

(11) a. *__Who and when__ sang?
b. *__Who__ sang and __when__ sang?

Finally, the structure in (7b) captures the interpretation of CWHs; they are interpreted as two coordinated CPs with a single wh-pronoun in each CP, as we would expect given this structure. This is most obvious in CWHs in which one of the coordinated wh-phrases is a direct object, and the other one is an adjunct, such as the one in (12a). This example can have the so-called *at-all* reading, paraphrased in (12b), on which the wh-object is *not* part of the interpretation of the question introduced by the wh-adjunct. Since the wh-object is not part of the conjunct introduced by the wh-adjunct, the verb *ate* in the *where*-conjunct is interpreted intransitively, giving rise to the *at-all* reading. The *at-all* reading contrasts with the so-called *it* reading, paraphrased in (12c), on which the direct object is present in both conjuncts for interpretive purposes.[4]

[4] A reviewer asks what other readings CWHs might have. Gračanin-Yuksek (2007) and Citko and Gračanin-Yuksek (2013) report that English CWHs only have the *at-all* reading, as predicted by (7), which they argue is the only possible structure for CWHs in English. This structure has been challenged by experimental evidence reported in a series of presentations by Kush, Larson and Lewis (e.g., Lewis, Larson, and Kush 2012 and Lewis, Kush, and Larson 2013). Their experiments show that CWHs with obligatorily transitive verbs and *what* as one of the wh-phrases are more acceptable when *what* introduces the second conjunct than when it introduces the first. In other words, (ia) is more acceptable than (ib).

(i) Lewis, Kush, and Larson (2013)
a. **When and what** did John fix?
b. *__What and when__ did John fix?

(12) a. I know **what and where** you ate.

b. *At-all reading*
I know **what** you ate and **where** you ate **at all**.

c. *It reading*
%I know **what** you ate and **where** you ate **it/the thing you ate**.

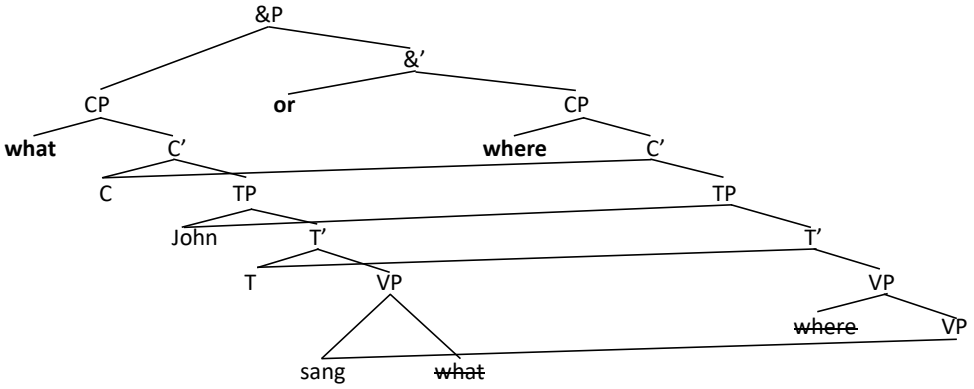
With this background on CWHs (and the structure in (7b)) in mind, we turn to the question of whether coordinated sluices can be derived from coordinated wh-questions. This is the focus of the next section.

2.2 Against coordinated wh-questions as the source of coordinated sluicing

If coordinated sluices were derived from coordinated wh-questions, the only difference between the structure of CWHs, given in (13b), and the structure of coordinated sluices, given in (14b), would be that in coordinated sluicing, TPs in the two conjuncts undergo ellipsis (indicated in (14b) by shadowing and dotted lines).[5]

(13) a. I don't remember **what or where** John sang.

b.

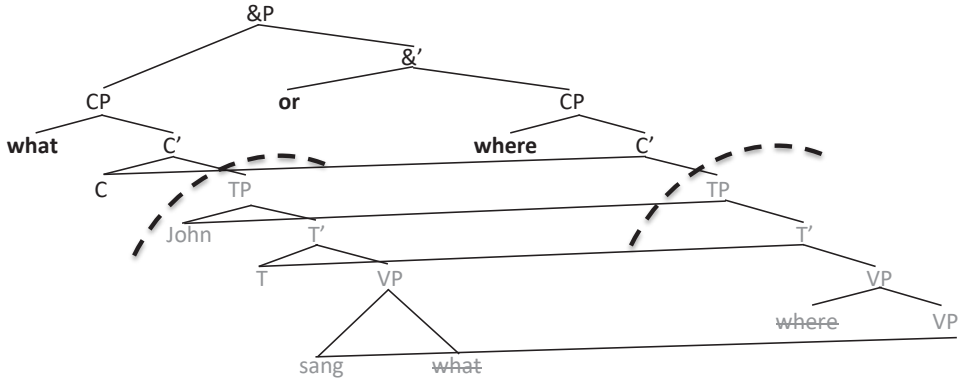


This finding might be taken as evidence that in (ia) a copy/trace of *what* is present in both conjuncts (otherwise the verb in the first conjunct would be missing an obligatory argument). Kush, Larson, and Lewis do not take this stance; they argue for an analysis in which only the second wh-phrase is syntactically related to the rest of the structure. If a copy of *what* is indeed present in both conjuncts in a subset of CWHs, then such CWHs would be predicted to have the *it* reading. However, the above mentioned experiments also show that *any* CWH with an obligatorily transitive verb (even those in which *what* introduces the second conjunct, as in (ia)) is less acceptable than any CWH with an optionally transitive verb, suggesting that a structure which might give rise to the *it* reading is not readily available. Whitman (2002; 2004) also reports that his participants preferred CWHs with obligatorily transitive verbs in which *what* is in the second conjunct. However, he explicitly states that "the most important finding [of the experiment] is one that the corpus data do not show: When the nominal wh word [*what*] is adjacent to the body of the interrogative, obligatory NP-gap [CWHs] are still less grammatical […] than optional NP-gap ones." Given that all these experiments tested the relative acceptability of CWHs with obligatorily transitive verbs rather than the availability of the *at-all* versus the *it* readings, we do not take the contrast in (ia-b) to be a counterexample to our generalization that CWHs in English only have the *at-all* reading, at least for some speakers.

[5] We do not address crosslinguistic variation here. In principle, languages that allow different structures for CWHs might also allow different structures for coordinated sluices. Interestingly, this is not what seems to be happening: Citko and Gračanin-Yuksek (to appear) show that Croatian and Polish coordinated sluices also involve bi-clausal structures, in spite of allowing mono-clausal structures for CWHs.

(14) a. I know John sang something at some event, but I don't remember **what or where**.

b. ...but I don't remember



In the previous section, we reviewed the restrictions on English CWHs and showed how these restrictions follow from the structure in (13b). Assimilating coordinated sluices to CWHs predicts that coordinated sluices should be subject to the same restrictions. This is not what we find: coordinated sluices are *not* subject to the same restrictions as coordinated wh-questions. First, coordination of obligatory arguments is impossible in CWHs, but possible in coordinated sluicing, as shown in (15a–b).

(15) a. *Coordinated Wh-Questions*
*Do you know **what and to whom** John gave?

b. *Coordinated Sluicing*
I heard that John gave something to someone. Do you know **what and to whom**?

Second, in CWHs involving obligatorily transitive verbs, coordination of a wh-object with a wh-adjunct is impossible, as shown in (16a). No such restriction holds of coordinated sluicing, as shown in (16b).

(16) a. *Coordinated Wh-Questions*
*Do you know **what or when** John bought?

b. *Coordinated Sluicing*
I know John bought something sometime last week, but I don't remember **what or when**.

Third, coordination cannot involve a subject wh-phrase in CWHs, but it *can* in coordinated sluicing, as shown by the contrast between (17a) and (17b).

(17) a. *Coordinated Wh-Questions*
*Do you know **who and when** ate?

b. *Coordinated Sluicing*
I know that someone ate at some point. Can you tell me **who and when**?

Coordinated sluices also differ from CWHs with respect to their interpretation. We saw in (12) above that English CWHs have *at-all* readings. Another example of this is given in (18). By contrast, coordinated sluices do not have *at-all* readings, and only allow *it* readings, as shown in (19). This indicates that the wh-phrase introducing the first conjunct (*what* in our example) in a coordinated sluice is also interpreted in the second conjunct.

(18) a. *Coordinated Wh-Questions*
What and where did John sing?

b. *At-all reading*
What did John sing and **where** did John sing **at all**?

(19) a. *Coordinated Sluicing*
I heard that John sang something, but I forgot **what and where**.

b. *At-all reading*
#…but I forgot **what** John sang and **where** he sang **at all**.

c. *It reading*
…but I forgot **what** John sang and **where** he sang **it**.

These differences between CWHs and coordinated sluices lead us to conclude that coordinated sluices are not derived from CWHs. We have not said anything yet about *why* this should be the case; we will discuss this question in Section 6. First though, we turn to multiple sluicing as a possible source for coordinated sluicing.

3 Multiple sluicing as possible source for coordinated sluicing

3.1 Background on multiple sluicing

Multiple sluicing in English has been analyzed in various ways (see Vicente 2018 for an overview). On one analysis (Nishigauchi 1998; Lasnik 2007; 2014), the first wh-phrase in a multiple sluicing configuration moves leftwards to [Spec CP], while the second one is extraposed/moved rightwards to an adjoined position, as shown schematically in (20b).

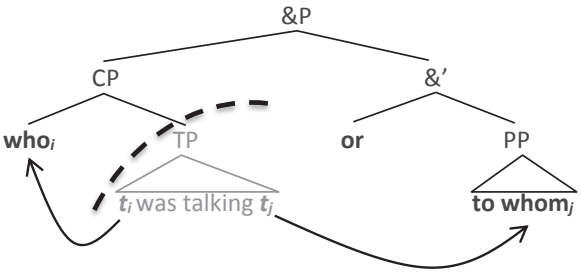
(20) a. Lasnik (2014: 9)
Someone was talking (yesterday) to someone, but I don't know **who to who**.

b. …but I don't know **who**$_i$ [~~t_i was talking t_j (yesterday)~~] **to who**$_j$.

If (20b) is the correct analysis of multiple sluicing, could coordinated sluicing be derived in an analogous way, and, if so, what would such a derivation look like? One possible structure is given in (21b); the first wh-phrase moves to [Spec CP], and the second wh-phrase moves in a sidewards manner (Nunes 2001; 2004) and merges with the conjunction head. The result, however, violates the Law of the Coordination of Likes (Williams 1981): it involves coordination of a CP with a PP. The two conjuncts are not both wh-phrases nor are they similar in any other respects, so it is hard to imagine how a violation of the Law of the Coordination of Likes might be avoided in this structure.

(21) a. Someone was talking (yesterday) to someone, but I don't know **who or to whom.**

b. …but I don't know



Another prominent analysis of multiple sluicing in English involves multiple leftward movement of both wh-phrases to [Spec CP] (Merchant 2001; Richards 2001; 2010; Park and Kang 2007; Abels and Dayal 2017a; b, among others), as shown in (22b).

(22) a. Park and Kang (2007: 396)
?Mary showed something to someone, but I don't know exactly **what to whom**.

b. …but I don't know exactly [$_{CP}$ **what**$_i$ [$_{C'}$ **to whom**$_j$ [$_{TP}$ ~~Mary showed t_i t_j~~]]]

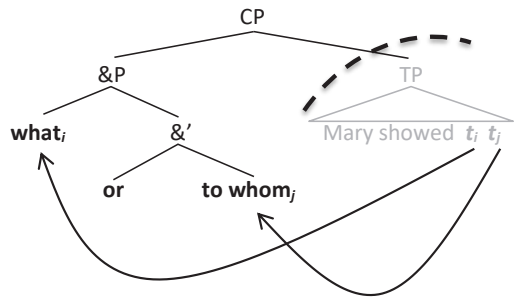
What is unusual about this derivation for a language like English is that both wh-phrases undergo *overt* wh-fronting: multiple *overt* wh-fronting in English is exceptionally allowed in multiple sluicing because the deletion of the TP removes the violation induced by the pronunciation of the highest copy of the second wh-phrase. For Abels and Dayal, after deletion removes lower copies of both wh-phrases from the structure, the remaining copies count as simultaneously *highest* and *lowest*. Thus, it is possible to characterize the examples in (22a–b) as involving the pronunciation of the highest copy of *what* and the lowest copy of *to whom*.[6]

3.2 Against multiple sluicing as the source of coordinated sluicing

If coordinated sluices were derived from multiple sluices and if multiple sluices have the structure in (22b), coordinated sluices would presumably involve sideward movement of wh-phrases to form a Coordination Phrase in [Spec CP] (Zhang 2007; 2010), followed by the deletion of the TP in which the wh-phrases originated, as shown in (23b).

(23) a. ?Mary showed something to someone, but I don't know exactly **what or to whom**.

b. …but I don't know exactly



[6] For Merchant (2001), Richards (2001; 2010) and Park and Kang (2007), the deletion of the TP that contains the trace of the second wh-phrase removes from the representation the part of the wh-movement chain that would normally be pronounced, leaving the higher copy of the second wh-phrase as the only one to be pronounced.

However, there are sufficient differences between multiple sluicing and coordinated sluicing to argue against deriving coordinated sluicing from multiple sluicing. We turn to these differences next.

The first one involves the so-called *clause-mate condition*. Multiple sluicing crosslinguistically is well-known to be subject to this condition, which requires all wh-remnants in a multiple sluicing configuration to originate in the same finite clause (see Takahashi 1994; Nishigauchi 1998; Merchant 2001; Marušič and Žaucer 2013; Lasnik 2014; Citko to appear, among others). This is shown in (24a–b).[7]

(24) a. Lasnik (2014: 6)
*One of the students said that Mary spoke to one of the professors, but I don't know
[**which student**$_i$ **to which professor**$_j$ [~~t_i said [that Mary spoke t_j~~]].

b. Abels and Dayal (2017a: 25)
*Some linguist was upset because Harry spoke to some philosopher]] but Bill doesn't know
[**which linguist**$_i$ **which philosopher**$_j$
[~~t_i was upset [because Harry spoke to t_j~~]].

Coordinated sluicing, however, is not subject to this condition (Abels and Dayal 2017a), as shown by the grammatical status of parallel coordinated sluicing examples in (25a–b).

(25) a. [One of the students said [that Mary spoke to one of the professors]], but I don't know **which student or to which professor**.

b. Adapted from Abels and Dayal (2017a: 25)
[Some linguist was upset [because Harry spoke to some philosopher]] but Bill doesn't know **which linguist and which philosopher**.

The second difference concerns restrictions on wh-remnants. Multiple sluicing is marginal at best if both wh-remnants are simplex wh-DPs such as *who* or *what*, and improves considerably (at least for some speakers) if one wh-phrase is either a PP (Lasnik 2014; Abels and Dayal 2017a; b; Kotek and Barros 2018; Cortés Rodríguez 2019), as shown in (26a–b), or a *which* wh-phrase, as shown in (27a–b).[8]

(26) Hoyt and Teodorescu (2012: 86)
a. *John gave someone something, and I want to know **who what**.
b. ?John gave something to someone, but I don't know **what to whom**.

(27) a. Park and Kang (2007: 396)
?*Someone saw something, but I can't remember **who what**.

b. Kotek and Barros (2018: 799)
Every boy likes some girl, but I don't know **which boy which girl**.

Coordination of simplex wh-DPs, by contrast, is perfectly fine in coordinated sluicing, as (28) shows.

[7] Example (24b) also involves an island violation (the Adjunct Condition).

[8] There is some variation in the acceptability of multiple sluicing among English speakers. Kotek and Barros (2018: Fn. 4), for example, note the existence of two types of speakers: "a substantial number who find multiple sluicing unimpeachable, alongside others who find it marginal at best." We thank Jozina Vander Klok for reminding us of this variation.

(28) Hoyt and Teodorescu (2012: 86, crediting Richards 1997)
John gave someone something, and I want to know **who and what**.

Another difference concerns interpretation; the interpretation of coordinated sluicing is different from the interpretation of multiple sluicing. Abels and Dayal (2017a: 24) note that multiple sluicing can in principle either have a single-pair (SP) or a pair-list (PL) reading, and that the readings of the sluice are disambiguated by the readings of the antecedent.[9]

(29) Abels and Dayal (2017a: 24)
a. *Single-Pair Reading*
Some student has published on some topic, but I couldn't tell you **which student on which topic**.
b. *Pair-List Reading*
Every student has published on some topic, but I couldn't tell you **which student on which topic**.

Coordinated sluices, however, only allow single-pair readings, as noted by Abels and Dayal (2017a) (also by Gribanova 2009 for Russian, who builds on Grebenyova's 2004; 2006 work on multiple sluicing). This is indicated by the infelicity of the sluice in (30b), whose antecedent forces a pair-list interpretation.

(30) a. *Single-Pair Reading*
Some student has published on some topic, but I forgot **which student and on which topic**.
b. *Pair-List Reading*
#Every student has published on some topic, but I forgot **which student and on which topic**.

The last difference between coordinated sluices and multiple sluices involves swiping (**S**luiced **W**h-phrase **I**nversion with **P**repositions **I**n **N**orthern **G**ermanic) (we thank Anikó Lipták for bringing this fact to our attention). The paradigm in (31a–e), due to Richards (2001), shows that in a multiple sluicing configuration, only the first wh-PP remnant can undergo swiping. This is shown by the grammaticality of (31a). All the other logically possible swiping options are out: in (31b) and (31c) the second PP is swiped, and in (31d-e) both are.[10]

[9] The pair-list reading seems to be the preferred, and, according to some, the only possible reading that multiple sluicing gives rise to. Merchant (2001), for example, states that multiple sluicing has only the pair-list reading, as indicated by the ungrammaticality of (ia), where the antecedent forces a single-pair reading, in contrast to (ib), where it forces a pair-list reading.

(i) Merchant (2001: 112)
a. *Someone said something, but I couldn't tell you **who what**.
b. (?)Everyone brought something (different) to the potluck, but I couldn't tell you **who what**.

[10] Richards' (2001: 137–141) main focus is on distinguishing multiple sluicing from gapping. He accounts for the fact that only the first PP allows swiping in terms of superiority: both PPs move to some left peripheral position, and subsequently, the higher of the two wh-phrases moves to the specifier of CP stranding the preposition.

(31) Richards (2001: 139)
I know John was talking with somebody about something,
a. ...but I don't know **who with** about what.
b. *...but I don't know with who **what about**.
c. *...but I don't know **what** with who **about**.
d. *...but I don't know **who with what about**.
e. *...but I don't know **who what with about.**

Coordinated sluices are not subject to this restriction, as shown in (32a–c).

(32) I know John was talking with somebody about something,
a. ...but I don't know **who with** or about what.
b. ...but I don't know with who or **what about**.
c. ...but I don't know **who with** or **what about.**

These differences between multiple sluicing and coordinated sluicing lead us to conclude that coordinated sluicing is not derived from multiple sluicing.

4 Coordinated clefts as possible source for coordinated sluices

On some accounts, sluicing can be derived from non-isomorphic pre-sluice sources (i.e., short sources, predicative sources, cleft sources) (Erteschik-Shir 1973; Merchant 2001; Marušič and Žaucer 2013; Barros, Elliott and Thoms 2014; 2015; Vicente 2018, among others). In more concrete terms, this means that the source of the sluice in (33) is the "short" string in (33b) or the cleft string in (33c), rather than the isomorphic string in (33a) containing an island. Since neither (33b) nor (33c) involves an island, the availability of such short sources is one way to derive the lack of island effects in sluicing.[11]

(33) Merchant (2001); Barros, Elliott and Thoms (2014)
They hired someone who speaks a Balkan language – guess **which**!
a. …**which** they hired someone who speaks!
b. …**which** she speaks!
c. …**which** it was!

Abels and Dayal (2017a: 25) suggest that coordinated sluices, like the one in (34a), "are derived from a different pre-sluice", indicated by their cleft source and/or predicative source paraphrases in (34b).

(34) Adapted from Abels and Dayal (2017a: Fn. 16)
a. Some linguist spoke to some philosopher but Bill doesn't know **which linguist and which philosopher.**

[11] The same logic has been used to explain exceptions to the so-called *P-stranding generalization*. However, as pointed out to us by a reviewer, there are also island repair phenomena where the short sluice analysis is ruled out. These are cases like (i), in which the sluice contains a parasitic gap (PG), discussed in Yoshida et al. (2015), who argue that (i) cannot have a cleft or copular structure as the source because such a source would not contain the "real gap" (RG) that would license the parasitic gap in the remnant. The same point is made in Vicente (2018).

(i) Yoshida et al. (2015: 1453)
The editor told me **which book** I must review $\__{RG}$ soon after receiving $\__{PG}$, but I don't remember exactly how soon after receiving $\__{PG}$.

b. Some linguist spoke to some philosopher but Bill doesn't know **which linguist and which philosopher it was/they were.**

In this section, we focus on cleft sources and the question of whether coordinated sluices in general can be derived from coordinated clefts along the lines schematized in (35).

(35) I know that someone saw something but I don't know **who** ~~it was~~ **or what** ~~it was~~.

The same considerations that rule out a cleft source for singular sluices rule out a cleft source for coordinated sluices. We show this by applying to coordinated sluices a subset of the ten diagnostics that Merchant (2001) used to argue against deriving singular sluices from clefts. Van Craenenbroeck (2010) showed some of Merchant's original diagnostics to be inconclusive due to the fact that they do not distinguish between the cleft source and the non-elliptical wh-question source for the sluice.[12] Thus, we focus primarily on the diagnostics that do make this distinction.

The first diagnostic involves compatibility with adjuncts. Merchant shows that adjuncts can appear in sluices but not in clefts, as shown in (36a). The fact that adjuncts are possible in coordinated sluicing, as shown in (36b), shows that the coordinated sluice in (36b) cannot be derived from the coordinated clefts in (36c).

(36) a. Merchant (2001: 121)
He fixed the car but I don't know **how/why/when** (*it was).
b. He fixed something somehow, but I don't know **what or how.**
c. He fixed something somehow but I don't know **what** it was **or how** (*it was).

The second diagnostic concerns implicit arguments. Example (37a) shows that implicit arguments are possible as correlates of wh-phrases in sluicing constructions, but not as pivots of clefts. Implicit arguments are also possible as correlates of wh-phrases in coordi-

[12] For example, Merchant takes the contrast between the grammatical cleft in (ib) and the ungrammatical sluice in (ic) to argue against a cleft source.

(i) Merchant (2001: 122)
Someone dented my car last night--
a. I wish I knew **who**!
b. I wish I knew **who the hell** it was!
c. *I wish I knew **who the hell!**

Not surprisingly, coordinated sluices pattern with regular sluicing in that they also disallow aggressively non-D-linked wh-phrases, as shown in (iia), which suggests that they cannot be derived from the coordinated cleft in (iib).

(ii) a. *Someone saw something, but I can't remember **who the hell or what the hell**.
b. Someone saw something, but I can't remember **who (the hell)** it was **or what (the hell)** it was.

However, as brought to our attention by one of the reviewers, the distribution of aggressively non-D-linked wh-phrases is not a valid diagnostic for establishing that a sluice is derived from a non-cleft source. If it were, we would expect (iii), the non-elliptical non-cleft source for the ungrammatical sluice in (ic), to also be ungrammatical. We thank one of the reviewers for bringing Van Craenenbroeck's work to our attention and for pointing out the example in (iii).

(iii) Van Craenenbroeck (2010: 1721)
I wish I knew **who the hell** dented my car!

nated sluices, as shown in (37b), which shows that coordinated sluices cannot be derived from coordinated clefts in (37c).[13]

(37) a. Merchant (2001: 121)
They served the guests but I don't know **what** (*it was).
b. They served someone but I don't know **whom or what.**
c. They served someone but I don't know **who** it was **or what** (*it was).

The next diagnostic involves what Merchant refers to as '*mention-some'* modification.[14] He shows that wh-pivots in pseudoclefts are impossible with modifiers like '*for example*'. However, such modifiers can modify sluiced wh-phrases. This is shown in (38).

(38) Merchant (2001: 122)
A: You should talk to somebody in the legal department for help with that.
B1: Could you tell me **who** (*it is), for example?
B2: **Who** (*is it), for example?

Coordinated sluices also allow '*mention-some*' modification, as shown in (39):

(39) **A:** Someone should definitely talk to someone about this issue.
B1: Could you tell me **who or to whom**, for example?
B2: Could you tell me **who**, for example, **or to whom**?

The last diagnostic we consider involves case.[15] Cleft pivots tend to have designated cases. For example, in languages in which wh-pivots in clefts are nominative, we expect

[13] Van Craenenbroeck (2010), attributing the observation to Mark Baltin, gives the following examples to show that adjuncts and implicit arguments are possible in so-called "long" clefts:

(i) (Van Craenenbroeck 2010: Fn. 3)
a. He fixed the car, but I don't know **how** it was that he fixed the car.
b. They served the guests, but I don't know **what** it was they served the guests.

[14] Two related diagnostics that Merchant discusses are *'else'* modification and *'mention-all'* modification. *'Else'* modification is possible in sluicing but not in clefts (as shown in (ia)), whereas *'mention-all'* modification has the opposite distribution, as shown in (ib).

(i) Merchant (2001: 122)
a. Harry was there, but I don't know **who else** (*it was).
b. A bunch of students were protesting, and the FBI is trying to find out **who all** *(it was).

Van Craenenbroeck (2010) shows that the *'mention-all'* diagnostic is not conclusive, given that it does not distinguish between the wh-question and the cleft source for the sluice; both are grammatical (as shown in (iia-b)), which leaves the ungrammaticality of the corresponding sluice mysterious.

(ii) Van Craenenbroeck (2010: 1722)
a. A bunch of students were protesting, and the FBI is trying to find out **who all** it was.
b. A bunch of students were protesting, and the FBI is trying to find out **who all** was protesting.

[15] Merchant also uses swiping to argue against a cleft source for sluicing, based on the contrast in (ia–b). However, as Van Craenenbroeck (2010) points out, since swiping is also impossible in non-elliptical wh-questions (as shown in (ii), modeled after Van Craenenbroeck's (2010) example (41c): **God knows who for she bought a robe.*), this diagnostic by itself does not distinguish between clefts and non-elliptical wh-questions as potential sources for sluicing.

(i) Merchant (2001: 123–124)
a. They were arguing, but I couldn't figure out **what about.**
b. ***What about** was it (that they were arguing)?

(ii) ***What about** were they arguing?

to find wh-remnants in coordinated sluicing to be nominative as well if coordinated sluices are derived from coordinated clefts. We show with data from Polish that this is not what we find (see Sag and Nykiel 2011 for a discussion of case in Polish non-coordinated sluices).

(40) *Polish*

a. Ktoś kierował czymś, ale nie wiem, **kto** to był
someone.NOM managed something.**INSTR** but not know who.**NOM** it was
i co to było.
and what.**NOM** it was
'Someone managed something but I don't know who it was and what it was.'

b. Ktoś kierował czymś, ale nie wiem, **kto i**
someone.NOM managed something.**INSTR** but not know who.**NOM** and
czym/*co.
what.**INSTR** /*what.**NOM**
'Someone managed something but I don't know who and what.'

Given the differences between coordinated sluicing and coordinated clefts discussed in this section, it is reasonable to conclude that the two constructions are not derivationally related.

In the next section, we present an analysis that derives the properties of coordinated sluicing and explains why these properties differ from the properties of constructions that we have entertained as possible sources of coordinated sluicing: coordinated wh-questions, multiple sluicing and coordinated clefts.

5 Analysis

The analysis of coordinated sluicing must account for the fact that coordinated sluicing is not subject to the clause-mate condition (unlike multiple sluicing), that there are no restrictions on the category of *wh*-phrases in coordinated sluicing (unlike in multiple sluicing), that coordination of arguments is possible in coordinated sluicing (unlike in CWHs), and that coordinated sluicing does not have the *at-all* reading (unlike CWHs).

Our starting point is the observation that in examples involving coordinated sluicing, such as the one in (41a), modeled after Merchant's (1999: 484) examples, the interpretation of the second sluice is (41b), and not (41c): The speaker is not wondering whether Abby called *some* suspect, the speaker is wondering whether Abby called *the* suspect mentioned in the first conjunct (whoever he/she might be).

(41) a. I know Abby called some suspect. I wonder **which suspect and when**.
b. I know Abby called some suspect. I wonder **which suspect** Abby called and **when** she called **him**.
c. #I know Abby called some suspect. I wonder **which suspect** Abby called and **when** she called **some suspect**.

This interpretation is reminiscent of the interpretation, given in (42b), of single sluicing examples like (42a) below, discussed first by Merchant (1999).

(42) Merchant (1999: 484)

a. **Which suspect** did Abby call **and when**?
b. **Which suspect** did Abby call and **when** did she call **him**?

Merchant proposes that in examples like (42a), the elided TP contains a pronominal correlate of the wh-trace in the antecedent clause, the $^{P}\boldsymbol{e}$ in (43). This pronominal correlate, according to Merchant, is interpreted as an E-type pronoun.

(43) Merchant (1999: 484)
[$_{CP}$ **Which suspect**$_2$ did [$_{TP}$ Abby call $\boldsymbol{t}_2$]] and [$_{CP}$ **when** did [$_{TP}$ Abby call $^{P}\boldsymbol{e}_2$]]

Building on this semantic similarity between examples of coordinated sluicing like the one in (41a) and examples involving coordinated questions with a single sluice, like the one in (42a), we propose that the two have the same underlying structure; i.e., that coordinated sluicing is derived from coordination of singular wh-questions, with an E-type pronoun in the second conjunct, co-indexed with the trace of the wh-phrase in the first conjunct (see also Scott 2012 and Barros and Kotek 2019), as shown in (44a–b).[16]

(44) a. Someone saw something, but I can't remember **who or what**.
b. Someone saw something, but I can't remember
[**who**$_i$ <~~$\boldsymbol{t}_i$ saw something~~>] or [**what**$_j$ <~~**they**$_i$ saw $\boldsymbol{t}_j$~~>]

The bi-clausal structure we propose for coordinated sluices explains why coordinated sluicing does not have the properties found in multiple sluicing, coordinated wh-questions, or coordinated clefts. While coordinated sluices involve coordination of single wh-questions with ellipsis in each conjunct, multiple (non-coordinated) sluices, coordinated wh-questions, and coordinated clefts have different underlying structures, given (in a somewhat simplified manner) in (45a–c), respectively.

(45) a. *Multiple Sluicing*
Someone saw something, but I can't remember **who**$_i$ **or what**$_j$ <~~$\boldsymbol{t}_i$ saw $\boldsymbol{t}_j$~~>.
b. *Coordinated Wh-Questions*
Someone saw something, but I can't remember **who**$_i$ <~~$\boldsymbol{t}_i$ saw~~> or **what**$_j$ <~~saw $\boldsymbol{t}_j$~~>.
c. *Coordinated Clefts*
Someone saw something, but I can't remember **who**$_i$ <~~it was $\boldsymbol{t}_j$~~> or **what**$_i$ <~~it was $\boldsymbol{t}_j$~~>.

The structure we propose straightforwardly derives two properties of coordinated sluicing: the absence of the clause-mate condition and the absence of the restriction on the category of wh-phrases that can be coordinated.

The clause-mate condition – the requirement that multiple moving wh-phrases originate in the same clause – arises only when the multiple instances of wh-movement interact so that their paths either nest or cross. Abels and Dayal (2017a; b), for example, account for the clause-mate condition in multiple sluicing by assuming that *covert* wh-movement is clause-bound and subject to superiority (for these authors the second wh-phrase in a

[16] This is the structure that Scott (2012: 119) proposes for Russian coordinated sluicing involving two adjunct wh-phrases and the structure that Barros and Kotek (2019) assume when they discuss the identity condition on sluicing in examples like (i).

(i) Barros and Kotek (2019: 18)
Sally met someone, but I don't know **who** ~~she met~~, or **when** ~~she met them~~.

This is also the structure we propose in Citko and Gračanin-Yuksek (to appear) to explain the phenomena discussed in section 3 above.

multiple sluicing configuration undergoes *covert* wh-movement). The fact that the restrictions that derive the clause-mate condition in multiple sluicing hold of *covert* movement implies that there is another, overt instance of wh-movement and the fact that one instance of wh-movement is overt and the other one is covert indicates that the two are, in some relevant sense, evaluated in the same domain, i.e., that they interact. On our analysis of coordinated sluicing, schematized in (46b), the two instances of wh-movement happen in separate clauses, unlike in multiple sluicing, schematized in (46a).

(46) a. *Multiple Sluicing*
[$_{CP}$ **who**$_i$ [$_{C'}$ **what**$_j$ [$_{TP}$ … t_i … t_j …]]]

b. *Coordinated Sluicing*
[$_{\&P}$[$_{CP}$ **who**$_i$ [$_{TP}$ … t_i ….]] and [$_{CP}$ **what**$_j$ [$_{TP}$ … t_j ….]]]

Since in (46b) there is no interaction between the two instances of wh-movement (neither is *non-first* in a single domain), it is expected that the clause-mate condition does not constrain coordinated sluicing, as shown by the grammaticality of the (b) examples and the contrast between the (a) and (b) examples in (47) and (48).

(47) a. Lasnik (2014: 12)
A certain boy said that Fred talked to a certain girl. *I wish I could remember **which boy to what girl**.

b. A certain boy said that Fred talked to a certain girl. I wish I could remember **which boy and to what girl**.

(48) Adapted from Abels and Dayal (2017a: 25)
a. *Some linguist was upset because Harry spoke to some philosopher but Bill doesn't know **which linguist to which philosopher**.

b. Some linguist was upset because Harry spoke to some philosopher but Bill doesn't know **which linguist and to which philosopher.**

Our analysis also derives the fact that there are no restrictions on the category of wh-phrases that can be coordinated in multiple sluicing. Recall that English multiple sluicing is degraded if both wh-remnants are simplex wh-DPs and improves if the second wh-phrase is a PP (Bolinger 1978; Richards 1997; 2010; Lasnik 2014; Cortés Rodríguez 2019). This is shown by the contrast in (49).

(49) Lasnik (2014: 8)
a. ?*Someone saw something, but I can't remember **who what**.
b. ?Someone talked about something, but I can't remember **who about what**.

Different authors account for this restriction in different ways. Lasnik (2007; 2014) attributes the ungrammaticality of (49a) to restrictions on extraposition. Recall that on his analysis, the first wh-remnant in a multiple sluicing construction undergoes leftward wh-movement to [Spec CP], while the second one undergoes extraposition, as shown in (50).

(50) Someone talked about something but I can't remember [$_{CP}$ **who**$_i$ [$_{TP}$ ~~t_i talked t_j~~] [**about what**$_j$]]

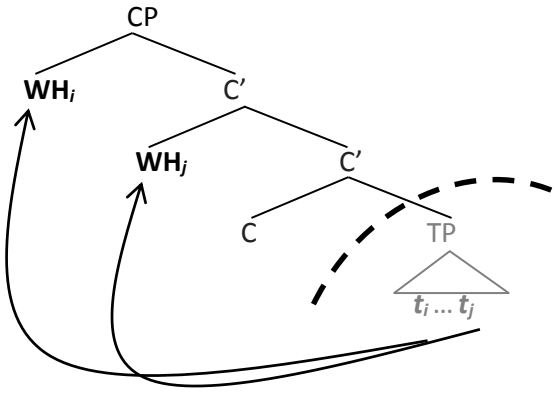
As shown in (51a–b), extraposition is sensitive to the DP vs. PP contrast in that PPs extrapose more easily than DPs do.

(51) Lasnik (2014: 9)
a. ?***Who** bought yesterday **what**?
b. **Who** was talking yesterday **to who**?

We have argued that coordinated sluicing is not derivationally related to multiple sluicing. Since on our analysis of coordinated sluicing, both wh-phrases undergo leftward wh-movement, there is no extraposition, and the absence of the preference for PPs is to be expected.

Richards (2010) accounts for the ban on multiple wh-DP remnants in multiple sluicing in a different way. As stated in Section 3.1, Richards assumes that multiple sluicing involves the structure in (52), where both wh-phrases undergo movement to [Spec CP].

(52)



Richards considers the ban on two wh-DP remnants in English sluicing to be a special case of a more general restriction on linearization that "rejects trees in which two nodes that are both of type α are to be linearized in the same Spell-Out domain" (Richards 2010: 5). He refers to this restriction, given in (53), as *Distinctness*.

(53) *Distinctness* (Richards 2010: 5)
If a linearization statement <α, α> is generated, the derivation crashes.

In a multiple sluice, two wh-DP remnants cause the derivation to crash: fronting both wh-phrases to their left-peripheral positions creates the linearization statement <DP, DP>, which violates Distinctness.

Since on our analysis of coordinated sluicing the two wh-phrases are in separate clauses, they are never required to be linearized in the same Spell-Out domain. Thus, even when both wh-remnants are DPs, the illicit linearization statement is never created and Distinctness is obeyed.

The bi-clausal nature of our analysis does not in and of itself derive the availability of wh-argument coordination in coordinated sluicing, or the absence of the *at-all* reading. However, both of these properties follow from the presence of an E-type pronoun in the second conjunct (*they*), co-indexed with the trace of the wh-phrase in the first conjunct, as shown in (44b), repeated here as (54).

(54) Someone saw something, but I can't remember **who**$_i$ <~~t_i saw something~~> **or** **what**$_j$ <~~they$_i$ saw t_j~~>.

The presence of the pronoun in the second conjunct makes wh-argument coordination possible in coordinated sluicing by ensuring that the selectional properties of the verb are satisfied in both conjuncts; in the first conjunct, by the wh-phrase and the indefinite pronoun, and in the second conjunct, by the wh-phrase and the E-type pronoun (co-indexed with the trace of the wh-phrase in the first conjunct). Since the selectional properties of the verb are satisfied in both conjuncts, regardless of the type of wh-phrases or the type of the verb, coordination of wh-arguments is possible.

The presence of the pronoun in the second sluice also derives the absence of the *at-all* reading in coordinated sluicing. The *at-all* reading arises in coordination of wh-questions in which a wh-object that introduces one conjunct is not interpreted in the conjunct introduced by a wh-adjunct, as in the CWH in (55a). Since in coordinated sluicing the wh-object *is* interpreted in the second conjunct (via the E-type pronoun), the *at-all* reading is not available, as (56a–b) shows.

(55) *At-all reading*
  a. **What and where** did John eat?
  b. **What** did John eat and **where** did John eat **at all**?

(56) *It reading*
  a. I know John ate something at a famous restaurant but I forgot **what and where**.
  b. …I forgot **what** John ate and **where** he ate **it/the thing he ate/#at all**.

Finally, since coordinated sluicing involves coordination of two single questions, it captures the observation that coordinated sluices have only single pair readings and contrast in this respect with multiple (non-coordinated) sluices. This is shown by the contrast in (57), repeated from (29), where coordinated sluicing is unacceptable when the antecedent clause contains a distributive quantifier *every* and acceptable with the non-distributive *some*.

(57) a. Some student has published on some topic, but I forgot **which student and on which topic**.
  b. #Every student has published on some topic, but I forgot **which student and on which topic**.

Our analysis makes the prediction, brought to our attention by Joe Emonds, that each of the two conjuncts should be able to undergo ellipsis independently of the other. We think this prediction is correct as long as no independent restrictions are violated. These independent restrictions include *MaxElide*, constraints against cataphoric dependencies, conditions on the interpretation of indefinites and/or the licensing of E-type pronouns. In the remainder of this section, we present examples that show that this prediction is borne out.

We start with examples in which ellipsis, instead of targeting TPs in the two conjuncts (as in (58a)), targets a TP in one conjunct and a VP in the other conjunct, as in (58b–c), or a VP in both conjuncts, as in (58d). All the examples with VP ellipsis are ungrammatical.[17,18]

[17] We thank Caroline Heycock for bringing VP ellipsis examples to our attention, and Anikó Lipták for suggesting MaxElide as a possible explanation for their ungrammaticality.

[18] (58c) is possible on the irrelevant reading on which there is no VP ellipsis in the second conjunct, and the verb *did* functions as a main verb.

(58) a. Someone sang something, but I can't remember **who**$_i$ **[~~t_i sang~~] or what**$_j$ **[~~they$_i$ sang t_j~~].**
b. *Someone sang something, but I can't remember **who**$_i$ t_i **did [~~sing~~] or what**$_j$ **[~~they$_i$ sang t_j~~].**
c. *Someone sang something but I can't remember **who**$_i$ **[~~t_i sang~~] or what**$_j$ **they**$_i$ **did [sing t_j].**
d. *Someone sang something but I can't remember **who**$_i$ t_i **did [~~sing~~] or what**$_j$ **they**$_i$ **did [~~sing t_j~~].**

We attribute the ungrammaticality of (58b–d) to violations of MaxElide, which, in general terms, requires deletion of the largest possible constituent (see Fiengo and May 1994; Lasnik 2001; Takahashi and Fox 2005; Merchant 2008; Kimura 2013, among others).[19] Our conclusion that (58b-d) are excluded because they violate MaxElide is corroborated by the contrast in (59a–b). The ungrammatical (59a) parallels (58b) in that the first of the coordinated sluices involves VP ellipsis, in violation of MaxElide. In the grammatical (59b), however, the sluice involving VP ellipsis contrasts with the antecedent clause, which results in the auxiliary being focused. The focused auxiliary is not part of the maximal string that can be deleted, so (59b) does not violate MaxElide even though, like the ungrammatical (59a), it involves VP ellipsis.[20]

(59) a. *I know Mary saw some movies but I don't know **which ones she did or when.**
b. I know which movies Mary DIDN'T see, but I don't know **which ones she DID or when.**

We turn next to examples in which ellipsis targets a TP only in one conjunct. The (a) examples in (60) and (61) are baseline coordinated sluicing examples, in which TP ellipsis takes place in both conjuncts. In the (b) examples, TP ellipsis takes place only in the second conjunct, and in the (c) examples only in the first conjunct. Crucially, both (b) and (c) examples are grammatical. For completeness' sake, we also include (d) examples, in which there is no ellipsis in either conjunct.[21]

(60) a. Some students sang but I don't know **which students**$_i$ [~~t_i sang~~] **or when**$_j$ [~~they sang t_j~~].
b. Some students sang but I don't know **which students**$_i$ t_i sang **or when**$_j$ [~~they sang t_j~~].
c. Some students sang but I don't know **which students**$_i$ [~~t_i sang~~] **or when**$_j$ they sang t_j.
d. Some students sang but I don't know **which students**$_i$ t_i sang **or when**$_j$ they sang t_j.

[19] Here we follow the literature mentioned in the main text and refer to MaxElide as a grammatical constraint. However, as a reviewer points out, the preference to elide more rather than less has received a non-uniform treatment in the literature and should therefore be taken as more of a descriptive term (the "MaxElide effect") than as a *bona fide* constraint (see, for example, Griffiths 2019, where this effect is attributed to a parallelism condition on ellipsis recoverability rather than to the requirement that ellipsis should apply to as much material as possible).

[20] We are grateful to an anonymous reviewer for suggesting adding focused material into the offending sluice.

[21] Both (60a–d) and (61a–d) involve an antecedent TP with an optionally transitive verb *sing*; they differ in that the second conjunct in (60a–d) is introduced by the adjunct *when*, whereas in (61a–d), it is introduced by the optional argument *what*. This difference does not affect the generalization that the two conjuncts can undergo ellipsis independently of one another.

(61) a. Some students sang but I don't know **which students**$_i$ [~~t_i sang~~] or **what**$_j$ [~~they sang t_j~~].
b. Some students sang but I don't know **which students**$_i$ t_i sang or **what**$_j$ [~~they sang t_j~~].
c. Some students sang but I don't know **which students**$_i$ [~~t_i sang~~] or **what**$_j$ they sang t_j.
d. Some students sang but I don't know **which students**$_i$ t_i sang or **what**$_j$ they sang t_j.

The examples in (60) and (61) show that the two instances of TP ellipsis in multiple sluicing are in principle independent, as one can take place without the other. However, things get more complicated in (62), which shows that not all logically possible TP deletions are grammatical. What distinguishes the examples in (62) from the ones in (60) and (61) above is the fact that the wh-pronoun *what,* which introduces the second sluiced conjunct, has an overt correlate *something* in the antecedent clause. The ungrammaticality of (62b) might be taken to indicate that in this case the second conjunct cannot be deleted. However, the fact that the non-elliptical (62d) is equally ungrammatical shows that the ungrammaticality of (62b) has nothing to do with ellipsis.

(62) a. Some students sang something but I don't know **which students**$_i$ [~~t_i sang something~~] or **what**$_j$ [~~they sang t_j~~].
b. *Some students sang something but I don't know **which students**$_i$ sang something or **what**$_j$ [~~they sang t_j~~].
c. Some students sang something but I don't know **which students**$_i$ [~~t_i sang something~~] or **what**$_j$ they sang.
d. *Some students sang something but I don't know **which students**$_i$ sang something or **what**$_j$ they sang.

The problem with the examples in (62b) and (62d) appears to stem from the presence of two instances of the indefinite pronoun *something*: one in the antecedent TP *Some students sang something*, and the other one in the first conjunct *which students sang something*. Either instance of the indefinite *something* could in principle be the correlate of the wh-pronoun *what* in the second conjunct. However, the two indefinites necessarily introduce two different discourse referents (Heim 1982). Thus, what may be causing the degradation of (62b) and (62d) is the fact that both TPs (the TP *Some students sang something* and the first conjunct *which students sang something*) contain the correlate *something*, but the two correlates are non-identical since the referents of the two indefinites are different.

There is another question related to the grammatical coordinated sluicing example in (62a), where the TP in the first conjunct is deleted (together with the TP in the second conjunct). The question is whether the non-elliptical source of the first conjunct contains the indefinite *something* to being with. The interpretation of singular sluices such as the one in (63a) below suggests that it does not. The most natural interpretation of (63a) is *not* the one in (63b), in which the sluice contains the indefinite present in the antecedent TP, but the one in (63c), in which the sluice contains a pronoun coindexed with the indefinite in the antecedent.

(63) a. Some students sang something but I don't know **which students.**
b. Some students sang something but I don't know which students sang **something**.

c. Some students sang something but I don't know which students sang **it/the thing that they sang**.

Kim (2010) arrives at a similar conclusion based on the examples in (64) and (65a). She first notes that in (64) the two instances of *someone* refer to two different individuals, and discusses the source of the sluice in (65a) in light of this observation.

(64) Kim (2010: 164–165)
Someone committed a crime on Monday and someone committed a crime on Tuesday.

(65) Kim (2010: 164–165)
a. John asked where someone had committed a crime but he does not know when.
b. John asked where someone had committed a crime but he does not know when someone committed a crime.
c. John asked where someone had committed a crime but he does not know when **he** committed a crime.

Kim states that if the source of the sluice in (65a) were (65b), we would also expect (65a) to be a statement about two different individuals, one committing a crime at a certain place and the other committing a crime at a certain time. This is not what (65a) means; it asks about the time and place of the crime committed by one and the same person. This leads Kim to propose (65c) as a source for (65a).

If this reasoning is on the right track, the source for the multiple sluice in (66a) does not contain an indefinite in the first conjunct (as in (62a), repeated as (66b)), but rather a pronominal element, as shown in (66c).

(66) a. Some students sang something but I don't know **which students** or **what**.
b. Some students sang something but I don't know **which students**$_i$ [~~***t***$_i$ sang something~~] or **what**$_j$ [~~they sang ***t***$_j$~~].
c. Some students sang something but I don't know **which students**$_i$ [~~sang **it**$_j$~~] or **what**$_j$ [~~they sang ***t***$_j$~~].

However, even when the indefinite is replaced with a pronoun that can be construed as an E-type pronoun, as in (66b), the sentence is degraded if this pronoun is pronounced. This is what examples (67a–b) show.

(67) a. *Some students sang something but I don't know **which students** sang **it** or **what**.
b. *Some students sang something but I don't know **which students** sang **it** or **what** they sang.

We attribute the ungrammaticality of these examples to a cataphora constraint, which in this case prevents the pronoun *it* from being coindexed with the wh-pronoun *what* following it (Kazenin 2002, for example). We take it to be the same constraint that excludes example (68a), which contrasts with (68b), where the pronoun stands in an anaphoric relationship with the preceding wh-phrase.

(68) a. *I wonder who sang **it**$_i$ and **which aria**$_i$ amazed the audience.
b. I wonder **which aria**$_i$ amazed the audience and who sang **it**$_i$.

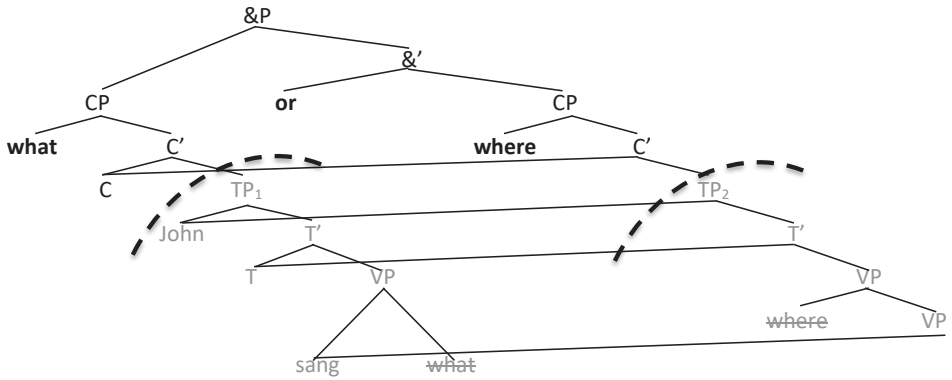
We thus conclude that in coordinated sluicing ellipsis may apply to each conjunct without applying to the other conjunct(s), as long as no independent constraints are violated.

6 Back to coordinated sluicing versus coordinated wh-questions

So far, we have shown that coordinated sluicing and CWHs have different properties, which we took as evidence that coordinated sluicing cannot be derived from CWHs. However, we have not addressed the question of *why* this should be the case: why do coordinated sluices differ from CWHs? In other words, what excludes the same source for both constructions?

If this were possible, the coordinated sluice in (69a) would be derived from the structure of CWH in (69b), and would presumably have the properties found in CWHs, which is not what we find (see the discussion of the differences between coordinated sluices and CWHs in Section 2.2).

(69) a. I know John sang, but I don't remember **what or where**.
b. ...but I don't remember



We hypothesize that (69b) is excluded by economy. Our reasoning relies on an independently motivated assumption that operations apply only when they have an effect on pronunciation and/or interpretation (see Fox 2000).[22] In the case at hand, the idea is that ellipsis can only apply if it has an effect on pronunciation. We adopt Merchant's (2001: 60) proposal that ellipsis is triggered by an E(llipsis) feature, which instructs "the PF system to skip its complement for purposes of parsing and production." In (69b), the E feature is located on C, and since both TP_1 and TP_2 are its complements, both have to be deleted. However, since deleting one TP (say TP_1) will already have deleted the string *John sang*, deleting TP_2 will have no further effect on pronunciation; such a vacuous application of ellipsis is banned by economy considerations.

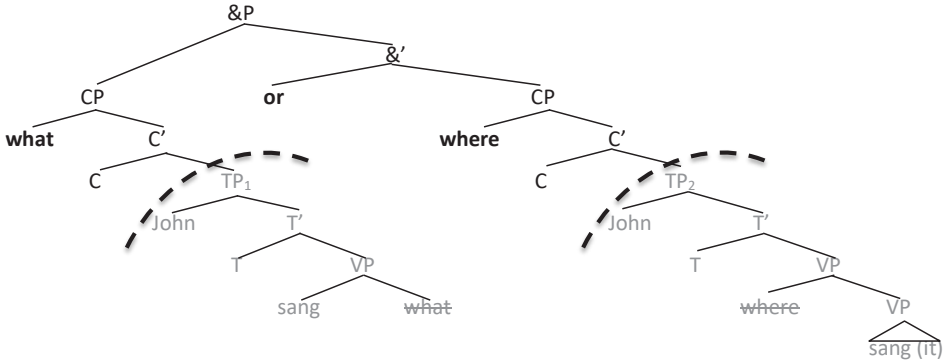
[22] We build on Fox (2000), who argues that covert semantic operations that have no effect on the interpretation of an utterance are banned from applying. In Fox's words: "scope shifting operations (e.g., Quantifier Raising (QR) and Quantifier Lowering (QL)) are allowed to apply only when they are necessary to achieve a designated semantic interpretation" (Fox 2000: 3). Fox proposes the principle of *Scope Economy* in (i) to formalize this ban:

(i) *Scope Economy* (Fox 2000: 3)
Scope-shifting operations (SSOs) cannot be semantically vacuous.

In our analysis of coordinated sluicing, given in (70b), ellipsis also applies to *two* syntactic objects: TP_1 and TP_2, just as it does in (69b). However, each TP dominates a *separate* string, so both ellipsis operations have an effect on pronunciation. Thus, no ellipsis operation applies vacuously.

(70) a. I know John sang, but I don't remember **what or where**.

b. ...but I don't remember



We next turn to a related question: why can't CWHs be derived from the structure we posited for coordinated sluicing? What prevents the CWH in (71a) from having the structure in (71b) or (71c)?

(71) a. Tell me **what and where** John sang.

b. Tell me **what**$_i$ [~~John sang t_i~~] and **where**$_j$ John sang t_j.

c. *Tell me **what**$_i$ [~~John sang t_i~~] and **where**$_j$ John sang **it**$_i$ t_j.

We first consider (71b) as a possible source of the CWH in (71a). In this structure, the verb *sing* in the second conjunct does not contain a direct object; this forces an intransitive interpretation of the verb and yields the *at-all* reading of the CWH, as desired. However, if the string in (71a) were derived from (71b), it would mean that the sluicing remnant in the first conjunct – the wh-phrase *what* – has no overt correlate in the second conjunct, i.e., that its correlate is an implicit argument. Implicit arguments always take the lowest scope in their clause, as indicated, for example, by the fact that (72b) does not give rise to the same ambiguity as (72a) and that (73) is not ambiguous (Fodor and Fodor 1980). These examples show that an implicit argument (interpreted as an existential) does not interact with other quantifiers in the sentence; instead, it is always outscoped by them.

(72) Fodor and Fodor (1980: 759)

a. Everyone ate something.
'Everyone is such that there is something that he ate.'
'There is something such that everyone ate it.'

b. Everyone ate.
'Everyone is such that there is something that he ate.'
#'There is something such that everyone ate it.'

(73) Fodor and Fodor (1980: 760)
Everyone was kissed.
'Everyone is such that there is someone who kissed them.'
#'There is someone such that that person kissed everyone.'

Given this, the structure in (71b) violates *Scope parallelism* (Romero 1998), which requires that the remnant of a deletion operation and its antecedent have the same scope. Scope parallelism is violated in (71b) because the wh-phrase *what* in the sluiced, first conjunct takes the highest scope in the clause, but its antecedent, the implicit argument in the second conjunct does not because it is outscoped by the fronted wh-phrase *where*. Thus, (71a) cannot be derived from (71b).

We next turn to (71c), repeated as (74), as a possible source for (71a). The structure in (74) contains a pronoun in the second conjunct that would presumably be pronounced,[23] yielding an incorrect string.

(74) *Tell me **what**$_i$ [~~John sang t_i~~] and **where**$_j$ John sang **it**$_i$ t_j.

Our next question is what excludes (74). We believe that (74) is ungrammatical because the wh-trace in the first conjunct, which the E-type pronoun is coindexed with, is deleted. This may be related to the condition that requires the antecedent of an E-type pronoun to be overt and salient (Evans 1977; Kadmon 1987; Heim 1990; Chierchia 1992; Elbourne 2001; 2005; Patel-Grosz and Grosz 2010; Grosz et al. 2014, among others).[24] This is corroborated by the contrast in (75), where the (a) example (from Merchant 2001) contains no ellipsis in the first conjunct, and the pronunciation of the E-type pronoun in the second conjunct is licit. Our (b) example, in which the first conjunct is elided, no longer licenses the pronunciation of the E-type pronoun in the second conjunct.

(75) a. Merchant (2001: 203)
The report details **what** IBM did and **why** IBM did **it**.
b. *The report details **what** and **why** IBM did **it**.

However, the ungrammatical (75b) becomes grammatical if another possible antecedent for the pronounced E-type pronoun is added to the discourse, as shown in (76). Now, the preceding sentence contains the indefinite *something*, which serves as an alternative antecedent for the E-type pronoun *it*. Examples (77a–b) show that this holds more generally.[25,26]

(76) IBM did something to fix the problem. The report details **what** and **why** IBM did **it**.

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[23] This was also pointed out to us by Karlos Arregi.

[24] The cases these authors discuss to show that E-type pronouns require overt antecedents are different from ours. They involve examples in which the antecedent of an E-type pronoun is syntactically completely absent, as in (ib), which contrasts with (ia), or examples in which the antecedent is present, but is for some reason not accessible to the pronoun, as in (iib), which contrasts with (iia).

(i) Patel-Grosz and Grosz (2010: 341)
a. Every man who had a **wife** hugged **her.**
b. #Every married man hugged **her.**

(ii) Patel-Grosz and Grosz (2010: 341)
a. Every man who owns a **donkey** loves **it**.
b. #Every donkey-owner loves **it**.

[25] We are grateful to an anonymous reviewer for suggesting examples in (76) and (77a).

[26] Our examples (61c) and (62c) above, repeated in (i-ii), show the same thing. Here, the correlate of the boldfaced E-type pronoun *they* in the second conjunct is the trace of *which students* in the first conjunct. This correlate is deleted, but there is an alternative correlate for the E-type pronoun in the sentence: the indefinite *some students* in the antecedent clause, which saves the structure.

(i) Some students sang but I don't know **which students**$_i$ [~~t_i sang~~] or **what**$_j$ **they**$_i$ sang t_j.
(ii) Some students sang something but I don't know **which students**$_i$ [~~t_i sang something~~] or **what**$_j$ **they**$_i$ sang.

(77) a. John sang something. Tell me **what** and **where** he sang it.
b. John said something. Do you remember **what** or **why** he said it?

We conclude that the analysis in (71c) is impossible for CWHs because on such an analysis, the non-elided E-type pronoun in the second conjunct is always co-indexed with a copy of a wh-phrase that has undergone ellipsis. If this is illicit, we have an explanation for why CWHs cannot be derived in the same way as coordinated sluices.

7 Conclusion

We started with a puzzle concerning the ameliorating effect of coordination in multiple sluicing: why do the ungrammatical cases of multiple sluicing in English improve when the wh-phrases are coordinated?

We presented several arguments against the claim that coordinated sluicing is derived from coordinated wh-questions (CWHs). First, coordinated sluices allow wh-coordination to contain obligatory argument(s) of the verb, while CWHs do not. Moreover, coordinated sluices disallow *at-all* readings, while CWHs allow such readings. We also showed that coordinated sluicing cannot be derived from multiple sluicing: while multiple sluicing is, coordinated sluicing is *not* subject to the clause-mate condition. Also, unlike multiple sluicing, coordinated sluicing allows coordination of simplex DP wh-phrases. Finally, we showed, based on contrasts involving compatibility with wh-adjuncts, compatibility with implicit arguments, "mention-some" modification, and case considerations that coordinated sluicing is not derived from a coordinated cleft construction. Instead, we proposed a bi-clausal structure for coordinated sluices, which involves coordination of two CPs, with a single wh-phrase in the specifier of each CP and TP ellipsis in each CP. We justified the existence of this structure alongside the structure of CWHs by showing that the two constructions cannot share the same underlying source (either the one we posited for coordinated sluicing or the one of CWHs) because if they did, the derivation of one construction would involve a violation of a principle that is independently operative in the grammar.

Abbreviations

CWH = Coordinated Wh-Questions, DO = Direct Object, EPP = Extended Projection Principle, SP = Single Pair reading, PL = Pair-list reading, INSTR = instrumental, NOM = nominative, QL = Quantifier Lowering, QR = Quantifier Raising, PG = parasitic gap, RG = real gap, SSO = Scope Shifting Operations.

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Competing Interests

The authors have no competing interests to declare.

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