Reverse sluicing in English and Greek[1]

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Abstract

In this article we identify and analyze a novel elliptical phenomenon in English and Greek which we dub reverse sluicing. We show that a complete account of reverse sluicing follows from an extension of the analysis of sluicing proposed in Chung, Ladusaw, and McCloskey (1995). Chung et al.'s operation of IP-copy, which reconstructs a missing IP at LF, supplemented by the standard Heimian analysis of indefinites, can successfully capture the facts in Greek. We discuss the differences between English and Greek and argue that these differences can be reduced to an independent difference in the availability of certain empty categories in the two languages. We claim further that the copy theory of movement (Chomsky 1995) provides a natural account for the restrictions on the interpretation of the indefinite variables involved.

1. The basic phenomenon

We will use the term *reverse sluicing* for constructions which consist of the apparent coordination of a *wh*-complementizer with a CP containing a *wh*-phrase

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in its specifier like those in (1) and (2).[2] There is a basic contrast between English and Greek with respect to what the *wh*-phrase in SpecCP can be: in English, only adjuncts are licit, while in Greek, both adjuncts and arguments are possible.

(1)   a.   [adjunct]
            It's not clear if and when the police arrested the demonstrators.

       b.   [argument]
            *It's not clear if and who the police have arrested.

(2)   a.   [adjunct]
            Dhen ine akomi safes an ke pote sinelave   i   astinomia
            not is yet   clear if and when arrested.3SG the police
            tus dhiadhilotes.
            the demonstrators
            'It's not clear yet if and when the police arrested the demonstrators.'

       b.   [argument]
            Dhen ine akomi safes an ke pjon sinelave   i   astinomia.
            not is yet   clear if and whom arrested.3SG the police
            'It's not clear yet if the police arrested someone and who it was.'
   lit. 'It's not clear yet if and whom the police arrested.'

Data like these have to our knowledge been overlooked in the literature both on embedded questions and coordination. Kathol (1995: 158–159), however, (following Reis 1985: 301) mentions similar data in German, as in (3). He suggests that these data are evidence for a unitary left-peripheral position in subordinate clauses in German, an instance of head-XP coordination (in Comp, essentially):

(3)   *Ob und inwiefern   das interessant ist, wage ich nicht zu beurteilen.*
       if and in.how.much that interesting is, dare I   not to judge
       'I don't dare judge if and to what extent that is interesting.'

Without going into the details of Kathol's account, we note here that such a head-XP coordination approach encounters a number of difficulties in many analyses of coordination (cf. Munn 1993, among others) and it does not provide a simple mapping to the semantics of these structures.

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2.   We limit the scope of this investigation to these types of conjunctions solely for space reasons. As noted by a reviewer, and explored in Merchant (1996), there is a natural extension of our analysis to cases of seeming adjunct-adjunct coordination such as *When and how did Abby climb the mountain?*, which contrast with non-*wh*-adjuncts, fronted or not: *??On Tuesday and by skirting the north face Abby climbed the mountain.*

The idea that we will pursue in this article is that configurations like (1)–(3) instantiate instances of CP-CP coordination as in (4), where the complement to the first C is an elided IP.

(4)
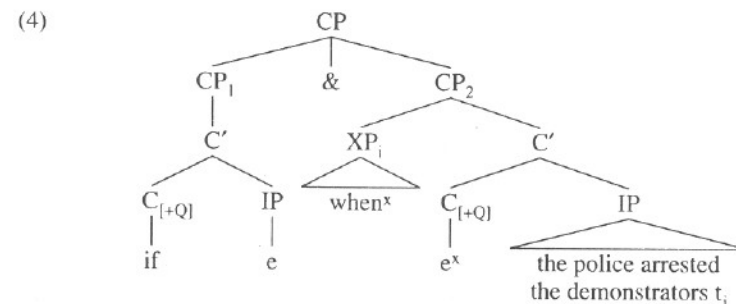
We propose that the interpretation of the missing IP in the first conjunct is supplied by copying the overt IP of the second conjunct. This is a case of surface anaphora (in Hankamer and Sag's 1976 sense), and is resolved by Chung *et al.*'s LF-operation of IP-copying. After the overt IP of CP_2 has been copied into the empty complement of the *wh*-complementizer in CP_1, we have the representation in (5):

(5)   [$_{CP}$ if [$_{IP}$ the police arrested the demonstrators]] and [$_{CP}$ when [$_{IP}$ the police arrested the demonstrators]]

Before turning to details of the analysis of reverse sluicing, let us briefly review the relevant portions of Chung *et al.*'s account of sluicing.

2.   Sluicing

Chung *et al.* propose an account of sluicing which makes use of three LF operations: IP-copy (or "IP-recycling"), sprouting, and merger. Here we will examine only the two basic cases: sluicing of adjuncts, and sluicing of arguments.

2.1.   *Sluicing of adjuncts*

Adjunct sluices are illustrated in (6) and (7). In these cases, an adjunct *wh*-phrase ('where', etc.) appears where an embedded CP normally would, and is taken as modifying some IP present in the linguistic context.

(6)   a.   *He's writing, but you can't imagine {where/why/how fast}.*
             (Ross 1969: 252)

        b.   *Joan ate dinner, but I don't know with whom.*
             (Chung *et al.* 1995: 246)

(7)   *I Roxani malose   me ton andra   tis ala dhen ksero   {jati/*
        the R.   argued.3SG with the husband her, but not   know.1SG why/
        pote/ ja pjo logo}.
        when/ for what reason
        'Roxani argued with her husband, but I don't know why/when/what
        for.'

Chung *et al.* analyze these as involving IP-copy, which copies in an antecedent
IP under the null complementizer, and sprouting. Sprouting is a freely available
structure-building operation which is subject to interpretability conditions at LF.
It supplies the empty category in the copied IP which is bound by the displaced
wh-phrase. Chung *et al.* hypothesize that sprouting is not unconstrained: it
respects the argument structure of the predicates involved, and respects the
category of the *wh*-phrase. After IP-copy and sprouting, the second conjunct in
(6b) will have the following LF:

(8)   . . .
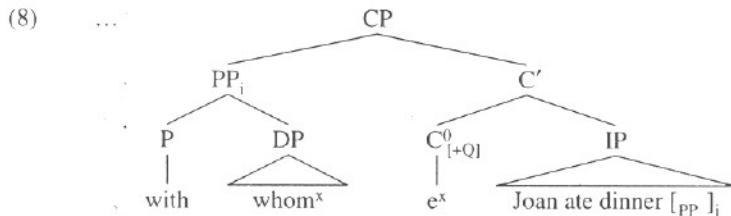
2.2. Arguments

The primary case of sluicing of arguments which will be of interest to us here
is the sluicing of overt (vs. implicit) arguments.[3] In these cases, the *wh*-phrase
in the sluice corresponds to some argument in the antecedent IP. Chung *et al.*
call this antecedent argument the "inner antecedent". This kind of sluicing is
illustrated in (9) (from Chung *et al.* 1995: 250) and (10).

(9)   *Joan ate dinner with someone, but I don't know with whom.*

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3.   We will ignore here sluicing of implicit arguments (which Chung *et al.* show to involve
     sprouting) for the most part.

(10)   *I Roxani malose   me kapjon   ala dhen ksero   me pjon.*
        the R.   argued.3SG with someone but not know.1SG with who
        'Roxani argued with someone but I don't know with whom.'

Under their account, the inner antecedent (necessarily a weak DP) undergoes
merger with the *wh*-phrase to provide the restriction on the semantic variable
(indicated by superscripting) bound by the Q-operator. This operation allows the
restriction of the variable to be given by the combination of the predicative
content of two phrases present overtly: the *wh*-phrase and the inner antecedent.
This yields the following LF for (9):

(11)   . . .
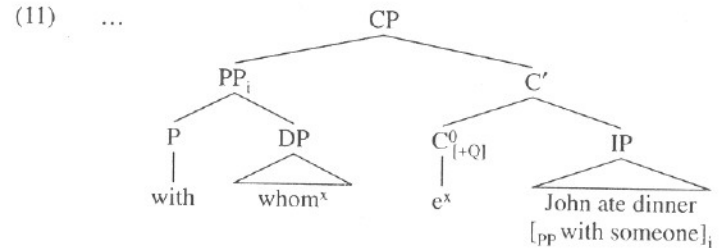
Merger will only be possible when the inner antecedent can be bound by the
Q-operator, that is, when the inner antecedent provides a variable which is free
in the domain of that operator. Therefore sluicing will be possible with unroofed
weak DPs, because they contribute free variables, but it will fail with necessarily
quantificational DPs, as well as with roofed, i.e., bound, weak DPs (roofed by
negation, quantificational adverbs, etc.) and DPs that specify reference, because
these do not provide the required free variable for binding. These restrictions are
illustrated in (12) (from Chung *et al.* 1995: 254); see Chung *et al.* for more
discussion.

(12)   a.   **Joan ate dinner with {most students, every student in her class, John,
             nobody} and we're all wondering (with) who.*

        b.   **Frank told his mom that he didn't talk to anyone, but she still asked
             him who.*

        c.   *She always reads a book at dinnertime. We can't figure out
             what/which one.* (only wide scope for *a book*)

As expected, the CP containing the *wh*-phrase in the sluice is interpreted as a
full interrogative clause. A straightforward mapping between syntax and
semantics is envisioned with the following crucial ingredients:

(13)   i.   an interrogative C   (the locus of the Q-operator)
        ii.   the *wh*-phrase in SpecCP   (the restriction)
        iii. the copied IP   (the scope)

This analysis assumes the familiar semantic theory of restricted quantification (Lewis 1975; Kamp 1981; Heim 1982), where quantificational structures are tripartite, consisting of an operator O which supplies the force of the quantification, a restriction, and a scope.

(14) $O_{x,y,...}(_{Restriction} x,y,...)[_{Scope} x,y,...]$

Following Berman (1991), constituent questions are also tripartite quantificational structures:

(15)   a.   ... which demonstrator the police arrested
        b. $\lambda p[(\exists x:demonstrator'(x))[p = \,^\wedge[arrest'(police', x)]]]$

The restriction in a sluice will be provided by the content of both the *wh*-phrase in SpecCP and the content of the inner antecedent, via merger.

With this brief background in sluicing, we are now ready to turn to an examination of reverse sluicing.

3.   Reverse sluicing in English

As noted above, the basic observation to be accounted for with respect to the English data is that reverse sluicing occurs with adjuncts, broadly speaking, but not with arguments. Cases of reverse sluicing with adjunct *wh*-phrases are illustrated in (16)–(19) for temporal, locative, manner, and reason adverbials, respectively.[4]

(16)   a.   *The journalists want to know if and when the suspect will make a statement.*
        b.   *Frank wondered whether and which day the guests would arrive.*
(17)   a.   *Holmes set out to discover whether and where Moriarty might set a trap.*
        b.   *The city council met to decide if and in which district the new bridge should be built.*

(18)   a.   *Magdalena worried about whether and how to break the news to her father.*
        b.   *Paul wanted to know if and how easily this spot might wash out.*
(19)   a.   *The journalists couldn't find out whether or why the letters might have been sent.*
        b.   *The journalists couldn't find out whether or for what reason the letters might have been sent.*

Although there is some variation subject to speaker preference, there doesn't generally seem to be any appreciable systematic difference in acceptability between reverse sluices with *if* vs. *whether*.[5]

Turning our attention now to cases of coordination with arguments, we see that reverse sluicing is impossible with subjects, direct objects, and objects of prepositions.

(20)   a.   **Lucy was wondering whether and who might come to her party.*
        b.   **The reporters asked if and who the FBI had arrested.*
        c.   **The babysitter discovered whether and who Laurie had talked to.*

The relevant notion of argumenthood extends to other selected complements such as PPs and selected manner and locative adverbials. We see in (21) that reverse sluicing is equally unacceptable in these cases:

(21)   a.   **We found out whether and on what materials the company relied.*
        b.   **Tony's mother asked if and how (well) he had behaved.*
        c.   **I asked you if and where you lived.*

Implicit arguments of various sorts are also difficult to find in reverse sluices for many speakers, though there is more variability in judgments in this domain. We will have nothing to say about these differences here. We illustrate the situation in (22) for indefinite implicit arguments (which do allow sluicing, however, as documented in Chung *et al.*) and in (23) for definite implicit arguments (see Fillmore 1986).

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4.   A note on the English data may be in order here. Some speakers find some of the examples of reverse sluicing in English slightly degraded. The examples (or ones equivalent in all relevant aspects) in this paper have been checked with on average eight native speakers of American English. We suspect that the slight degradation in judgments with some speakers derives from a register clash: while this type of coordination, due to its complexity, is not particularly common in colloquial speech and is more frequently found in more formal settings, it is nonetheless considered stylistically inelegant by prescriptive standards and is often paraphrased or otherwise reformulated in carefully written and edited texts (though it is attested in semi-formal writing especially, e.g., newspaper articles). Jim McCloskey (p.c.) also points out that similar facts were noticed informally and widely accepted in the early 1980s in GPSG work on coordination, though to our knowledge, none of these facts made it into print.

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5.   The only difference we've observed is related to the well-known contrast between *if* and *whether* in supporting infinitival complements.
    (i)   a.   *The intern wasn't sure {whether/*if} to perform the procedure.*
           b.   *The intern asked the chief resident to determine {whether/*if} and how to perform the procedure.*
    This contrast is expected under the structures we assign to these coordinations, if the relevant constraint mitigating against the use of *if* with infinitival complement clauses applies after IP-copy at LF. It is not immediately clear how to adapt such a constraint to a view of these coordinations which takes them to be some kind of complex Comp head, as Kathol (1995) does.

(22)   a.   ??*It was unclear whether and which songs the band would play.*
        b.   ??*The ranger needed to know if and what kind of game Sam wanted to hunt.*
        c.   ??*Sam asked if and what he should bake for the party tomorrow.*

(23)   a.   **The runner was unsure if and what leg of the race he would win.*
        d.   **It's anyone's guess if and what the censors will approve.*
        e.   **I can't remember whether or which patient he had bathed/shaved.*

Accounting for the ungrammaticality of reverse sluicing with arguments is straightforward. Let us examine the LFs that would result from an application of IP-copy, taking (20b) as our example. IP-copy copies the overt IP into the empty complement of the *wh*-complementizer, yielding (24):

(24) $[_{CP}$ if $[_{IP}$ the FBI had arrested $t_i]]$ and $[_{CP}$ who$_i$ $[_{IP}$ the FBI had arrested $t_i]]$

In (24) however, t_i in the copied IP is unbound; it therefore violates interpretability requirements, and gives rise to ungrammaticality. This account extends to the other examples involving displaced argument *wh*-phrases. For the implicit argument cases, we follow Chung *et al.* who show that the argument structure of a predicate cannot be changed under IP-copy (hence their preference for the term "IP-recycling" — the material in the copied IP is literally "reused" in interpreting the missing IP). This means that the intransitive use of the predicates in (22) and (23) cannot be substituted under IP-copy for the transitive use, with an overt argument, in the second conjunct.

The remaining analytical question given this account of the ungrammaticality of reverse sluicing with arguments is why reverse sluicing with adjuncts is licit. If IP-copying were the only operation available to generate the LFs of reverse sluices, the asymmetry in grammaticality would be inexplicable, assuming that the LFs of the adjunct cases are fully parallel to those of the argument cases, as in the following example (from [1]):

(25) $[_{CP}$ if $[_{IP}$ the police arrested the demonstrators $t_i]]$ and $[_{CP}$ when$_i$ $[_{IP}$ the police arrested the demonstrators $t_i]]$

As in (24), the trace of the moved *wh*-phrase in the copied IP is unbound and would be expected to give rise to ungrammaticality, contrary to fact.

We propose that the adjunct cases are saved by the reverse operation to sprouting: pruning. This pruning operation should be understood strictly in the context provided by Chung *et al.*'s sprouting, and not in the sense of the S'-pruning conventions or the like of the syntactic literature in the 1970's. Taking sprouting to be simply a general LF-structure altering operation, we might expect the corresponding deletion mechanism to be available as well (cf. the discussion in Lasnik and Saito 1992 and others of a generalized Affect-α as

subsuming Move-α and Delete-α). Pruning is subject to the same kinds of general constraints on its application as sprouting is: just as a sprouted category must satisfy the licensing constraints imposed by lexical items within the copied IP, pruning likewise cannot alter the argument structure or delete lexically licensed adverbials. As the reverse of sprouting, then, it will apply only to eliminate adjuncts and not arguments, just as sprouting can supply bindees for adjuncts but not arguments.

In (1a), pruning will exise the unnecessary empty PP node in the copied IP, yielding the LF in (26):

(26) $[_{CP}$ if $[_{IP}$ the police arrested the demonstrators]] and $[_{CP}$ when$_i$ $[_{IP}$ the police arrested the demonstrators $t_i]]$

Since this cannot be done for argument traces *ex hypothesi*, these traces will remain unbound at LF.[6]

The operations of sprouting and pruning should be understood as part of a more general theory of deviancies from strict identity allowable under ellipsis. The main goal of any theory of ellipsis must be to describe and account for the types of interpretations which are available to elided elements. Although it is an old observation that certain types of ambiguity must be resolved in the same way in ellipses and their overt counterparts (see Sag 1976 among others), it is equally well-known that the interpretations of ellipses need not be identical in all respects to those of their antecedents. While most of the literature has concentrated on the kind of deviancy that goes under the rubric of strict/sloppy pronominal interpretations, and some attention has been paid to the syntactic/morphological variances permitted in the forms of the verbs in VP-ellipsis, the present cases indicate that there is another area in which the reconstruction of an antecedent into an ellipsis site need not correspond in every way to the form and interpretation of its overt manifestation. We expect therefore that any comprehensive theory of elliptical deviancy will have to incorporate operations or devices corresponding to sprouting and pruning as conceived of here.

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6.   Another possible approach would be to follow Hegarty (1991) in assuming that adjunct *wh*–phrases leave no traces internal to the origin IP at all. We have chosen not to pursue this option here, since we think it runs into a number of difficulties in accounting for VP- vs. IP–level interpretations of adjuncts (see Johnston 1994, Stroik 1992). As a reviewer points out, the argument/adjunct asymmetry observed here is reminiscent of the asymmetry found in the reconstruction of relative clauses vs. CP arguments of nouns described in Lebeaux (1988). It is not immediately obvious though how the mechanism proposed in Chomsky (1995) to account for that difference could be extended to the cases under consideration here.

4. Reverse sluicing in Greek

We turn now to an examination of the distribution of reverse sluicing in Greek.
Greek differs from English in allowing reverse sluicing with both adjuncts and
arguments. The examples in (27) illustrate reverse sluicing with temporal,
locative, manner, and reason adjuncts, respectively.

(27)   a.   *Dhen ine akomi safes an ke {pote/pja   mera} sinelave   i*
            not   is yet   clear if and {when/which day} arrested.3sG the
            astinomia tus dhiadhilotes.
            police   the demonstrators
            'It's not clear yet if and {when/which day} the police arrested the
            demonstrators.'

       b.   *Dhen mathame telika an ke {pu/   se pjo   meros} krivotane*
            not   know.1PL finally if and {where/ in which place} hid.3sG
            i   Theodora.
            the Theodora
            'We didn't know for sure if and {where/in which place} Theodora
            was hiding.'

       c.   *Dhen ine akomi safes an ke {pos/me   pjon   tropo} tin*
            not   is yet   clear if and {how/with which manner} her
            apelisan.
            fired.3PL
            'It's not clear yet if and {how/in what way} they fired her.'

       d.   *Dhen ine safes an ke {jati/ ja pjo   logo} tin pandreftike.*
            not   is clear if and {why/ for which reason} her married.3sG
            'It's not clear if and {why/for what reason} he married her.'

In (28) we give examples of reverse sluicing with arguments: subjects, objects,
and selected PPs:

(28)   a.   *O Nikos theli   na   kseri   an ke pjos tilefonise.*
            the N.   want.3sG PART know.3sG if and who called.3sG
            'Nikos wants to know if anyone called and who it was.'
            lit. 'Nikos wants to know if and who called.'

       b.   *Dhen ine akomi safes an ke pjon sinelave   i   astinomia.*
            not   is yet   clear if and who arrested.3sG the police
            'It's not clear yet if the police arrested someone and who it was.'
            lit. 'It's not clear yet if and whom the police arrested.'

       c.   *Dhen ine akomi safes an ke pjus dhiadhilotes sinelave   i*
            not   is yet   clear if and who demonstrators arrested.3sG the
            astinomia.
            police
            'It's not clear yet if the police arrested some demonstrators and
            who they were.'
            lit. 'It's not clear yet if and which demonstrators the police arrested.'

       d.   *Dhen ine safes an ke se   pjes gnostes theories tha stirixti o*
            not   is clear if and with which known theories will rely.3sG the
            Andreas.
            Andreas
            'It's not clear if Andreas will rely on famous theories and which
            these theories will be.'
            lit.'It's not clear if and on which famous theories Andreas will
            rely.'

Since reverse sluicing with arguments is not an option in English, the immediate
question is why it is possible in Greek.

5. Explaining the difference: Null indefinite arguments

We link the possibility of argument reverse sluicing in Greek to the availability
of certain types of null indefinite DP arguments in that language. We propose
that arguments can be reverse sluiced in Greek but not English because Greek
possesses null (argumental) indefinite DPs while English does not. The trace of
the displaced argumental *wh*-phrase can be treated as one of these null indefinite
DPs and can be interpreted as such.

5.1. Null indefinites and wh-traces

Greek exhibits a phenomenon we will call *indefinite argument drop*. We
understand indefinite argument drop as a descriptive label for the phenomenon
whereby an argument, here a subject or an object, may be dropped under
identity with an indefinite antecedent, i.e., when the antecedent is a weak DP (in
the sense of Milsark 1974). In Giannakidou and Merchant (1997), we discuss
the phenomenon of indefinite argument drop, concentrating primarily on its
manifestation with respect to objects. We will take our proposal there as the
point of departure here. (29) provides a partial illustration of indefinite argument
drop: the understood object in the answer A is equivalent to the overt object in

the question Q:[7]

(29) Q: *Efere o Andreas*   *merika vivlia?*   'Did A. bring   several books?'
                           kapja   some
                           liga   a few
                           dheka   ten
                           tulaxiston tria   at least three
                           kanena vivlio?   any book
                           tipota?   anything

A: *Ne, (*ta) efere.*
    yes (them) brought.3SG
    'Yes, he brought {several, some, a few, ten, at least three books, some book, something, *them}.'

Since clitic pronouns are linked to referential (strong) readings of DPs, the unacceptability of the clitic in (29A) further illustrates the necessarily weak interpretation of the antecedent DP. In all cases, the missing argument is itself also interpreted weakly, as a Heimian indefinite with the quantificational force of its antecedent.

In Giannakidou and Merchant (1997), we analyze indefinite argument drop as an instance of indefinite DP-ellipsis which involves a null indefinite nominal element *pro* (for analyses of non-DP elliptical categories as null pronominal elements see Haïk 1987, Chao 1987, Lobeck 1991 among others). As is exemplified in the translation of (29A), where *Yes, he bought several e* can arguably be analyzed as involving noun phrase (NP) ellipsis, English allows for NP-ellipsis but not for indefinite DP-ellipsis; we may therefore conclude that English lacks this empty nominal category. The characterization of the null indefinite DP as *pro* is simply a useful mnemonic convention, and should be understood as indicating the [−anaphoric, +pronominal] values of the empty DP as a whole. It should not be taken to identify this kind of null indefinite argument with the definite subject *pro* familiar from the study of null subject languages (which is referential or generic; cf. the papers in Jaeggli and Safir 1991 in general and Condoravdi 1989 for Greek in particular).

On this analysis, the answer in (29A) contains an indefinite *pro* and it has the (pre-)LF representation given in (30):

(30)   efere [$_{DP}$ *pro*]

Returning now to the reverse sluicing cases, we propose that the *wh*-trace in a copied IP is interpreted as such an indefinite *pro*, as in (30). Yet given that *wh*-traces are variables in the standard typology (i.e., [−anaphoric, −pronominal] empty categories), the question arises as to how they end up being interpreted as pronominals. It appears we need a mechanism for converting traces into pronominals at LF, that is, for capturing the equivalence class behavior of certain traces and pronouns at LF. This pattern, however, is not novel. It is for exactly such cases that Fiengo and May (1994) propose their operation of *vehicle change*, which we summarize briefly in (31):

(31)   *Vehicle change* (Fiengo and May 1994: 218f.)
       Nominals can be treated as nondistinct with respect to their pronominal status under reconstruction [ellipsis resolution at LF].

At this stage in our understanding of ellipsis resolution, vehicle change is a little more than a name for the phenomenon and not a fully-worked out theory of it. Yet it is clear that such deviances from identity exist under ellipsis, and play a real role in the grammar, as Fiengo and May take pains to show.

The relevant instantiation of vehicle change for present purpose will convert the trace to its pronominal correlate as in (32), the general schema for which is given in (33):

(32)   [−a, −p] (*wh*-trace) =$_r$ [−a, +p] (*pro*),
       where =$_r$ stands for "is equivalent under LF-ellipsis resolution to".

(33)   [−pronominal] =$_r$ [+pronominal]

Vehicle change, like sprouting and pruning, is restricted by properties of the lexicon: in Greek, which has indefinite *pro*, the change licensed by vehicle change is licit, while in English, which lacks this *pro*, the product of vehicle change will be illicit. Since English lacks this option, it follows that reverse sluicing with arguments will not be possible.

After IP-copying and vehicle change, the LF for the first conjunct of (28b), repeated here as (34a), will be that given in (34b):

(34)   a. *Dhen ine akomi safes an ke pjon sinelave   i   astinomia.*
           not is yet clear if and who arrested.3SG the police
           'It's not yet clear if the police arrested someone and who it was.'
       b. [$_{CP}$ an [$_{IP}$ sinelave i astinomia [$_{DP}$ *pro*]]]

This accounts for the syntactic well-formedness of these structures in Greek. But this is not quite enough to derive all aspects of their interpretation. For example, the first embedded conjunct of (28c), repeated here as (35a), is interpreted not as meaning simply "whether the police arrested some person" (35b), but rather "whether the police arrested some demonstrators" (35c).

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7. Unlike Portuguese and Chinese (see Huang 1984), Greek does not allow definite object drop. The present cases also differ from the cases of topic drop in Spanish discussed in Campos (1986) and Luján (1996). For a detailed exhibition of the data and an analysis see Giannakidou and Merchant (1997).

(35)   a.   *Dhen ine akomi safes an ke pjus dhiadhilotes sinelave   i*
             not is yet clear if and which demonstrators arrested.3SG the
             astinomia.
             police
             '...if the police arrested some demonstrators and who they were.'
       b. $\lambda p[\ p = \,^{\wedge}[(\exists x: person'(x))\ [arrest'(police, x)]]]$
       c. $\lambda p[\ p = \,^{\wedge}[(\exists x: demonstrator'(x))\ [arrest'(police, x)]]]$

Apparently, the converted *wh*-trace contributes its descriptive content to the interpretation of the conjunct, in the form of the restriction on the indefinite variable. This is expected under Heim's (1987) analysis of *wh*-traces as indefinites as well as under the copy theory of movement (Chomsky 1995). Adopting this theory, the *wh*-trace will in fact contain the descriptive content of the moved *wh*-phrase. The copied IP is given in (36), where the descriptive content remains in the null DP licensed by vehicle change.

(36)   [$_{CP}$ an [$_{IP}$ sinelave i astinomia [$_{DP}$ dhiadhilotes]]]

The present approach thus provides independent motivation both for analyzing *wh*-traces as indefinites and for a particular conception of the copy theory of movement, namely one where the descriptive content of a *wh*-phrase, but not the quantificational force contributed by the *wh*-operator, remains *in situ* as part of the trace itself.

5.2.   *Roofing effects in reverse sluicing*

The idea that *wh*-traces in reverse sluicing are indefinite DPs has some interesting consequences. Recall the general constraint on sluicing which requires that there be a free variable available for binding by the Q-operator residing in C. From this constraint it follows, as we pointed out in 2.2, that the inner antecedents of sluices must be weak (i.e., variable-contributing DPs) and that the involved variables must be free. If a variable is already bound by some quantificational element, slucing will be impossible. This fact features prominently in Chung *et al.*'s analysis where it is characterized as a *roofing effect* (see Ladusaw 1994). This effect is also visible in non-elliptical contexts:

(37)   a.   *Lucy said that Mark didn't read a book, but she couldn't tell me which (one) it was.*
       b. $= \exists x: book'(x) \neg \dots$
       c. $\neq \neg \exists x: book'(x) \dots$

In (37a) the indefinite 'a book' must have wide scope with respect to negation, as in (37b), in order for 'which (one)' to be to able to establish an anaphoric

link with it. If the narrow scope interpretation of the indefinite, as in (37c), is necessary for independent reasons, as with the polarity item *any*, the anaphoric link between the indefinite and the *wh*-phrase cannot be established, resulting in deviance:

(38)   #*Lucy said that Jim didn't read any book, but she couldn't tell me which (one) it was.*

Similarly in reverse sluicing, the indefinite *wh*-trace must have wide scope with respect to other operators in the elided clause. We illustrate this in two environments: with negation and adverbs of quantification.[8]

With sentential negation, the indefinite must take scope over negation, as in (37) above:

(39)   I *Sofia theli   na mathi   an ke pjon fititi   dhen idhe*
           the S. want.3SG PART know.3SG if and which student not   saw.3SG
           o   Pavlos.
           the Pavlos
           'Sophia wants to know if and which student Pavlos didn't see.'
           $= \exists x{:}student'(x)\ [\neg\ see'\ (P,x)]$
           $\neq \neg\ \exists x{:}student'(x)\ [see'\ (P,x)]$

Likewise, the indefinite must scope over an adverb of quantification ($\exists >$ usually, *usually $> \exists$):

(40)   I *Sofia theli   na mathi   an ke pjo   periodhiko ksefilizi*
           the S. want.3SG PART know.3SG if and which magazine   browse.3SG
           sinithos o   Andreas meta to fagito.
           usually the A.   after the meal
           'Sofia wants to know if Andreas usually browses a magazine after dinner and which one it is.'

These contrasts are expected under the current approach, which assimilates the copied trace to a Heimian indefinite, since the scope of such indefinites is

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8.   Chung *et al.* claim that roofing effects also arise with intervening quantifiers. This claim is not uncontroversial, however (see Nishigauchi 1998 for some discussion). It seems in fact that a narrow scope interpretation of the indefinite is at least marginally available both in the relevant sluicing and reverse sluicing cases:

(i)   ?*Every student read some book, and I can tell you exactly which ones.*

(ii) *I epitropi theli   na mathi   an ke pjo vivlio diavase kathe fititis.*
      the committee want.3SG PART know.3SG if and which book read.3SG every student
      $(\exists > \forall, ?\forall > \exists)$

      'The committee wants to know if every student read a book and which ones they were.'
      We note this as another case where a similarity between sluicing and reverse sluicing is evident.

exactly that which Chung *et al.* show to be sensitive to the roofing effects of intervening negation and quantificational adverbs.

6. Comparison with Right Node Raising

At first glance, some of the phenomena we have grouped under the rubric of reverse sluicing might seem to be cases of Right Node Raising. In this section, we explore this possibility and compare reverse sluicing to Right Node Raising.[9] From the comparison it will become evident that there are a number of reasons that reverse sluicing cannot easily be reduced to Right Node Raising.

Right Node Raising is an ellipsis phenomenon found in coordination which affects parts of nonfinal conjuncts. Just as in reverse sluicing, the ellipsis site in Right Node Raising appears in the nonfinal conjunct and is licensed by overt material in the final one, as illustrated in (41):

(41) a.   Lucie bought *e*, and Alfred read [today's newspaper].
      b.   Lucie bought [today's newspaper] and Alfred read [today's newspaper]

We follow the analyses of Swingle (1995) and Wilder (1995), who argue convincingly that Right Node Raising is prosodically constrained deletion. If reverse sluicing were to be reduced to Right Node Raising then we would expect it to exemplify the same properties as Right Node Raising. Below, we examine these properties one by one.

6.1. Intonation

Right Node Raising has a very characteristic intonation, generally consisting of a constrastive stress or list-intonation, followed by a substantial pause at the end of each host remnant (see Swingle 1995 for discussion). This property is observed for Right Node Raising in English (see [42]) as well as in Greek (see [43]). In the (b) and (c) clauses the contrastive stress is indicated by the upper-case letters and the pause by the commas:

(42) a.   *Frank wondered if, and if so, when [the guests would arrive].*
      b.   [...*if, and if so, WHEN,* ...]
      c.   [...*if, and if SO, WHEN,* ...]

(43) a.   *I Sofia theli   na   mathi   an, ke an ne, pjon [idhe*
          the S.   want.3SG PART know.3SG if, and if yes, whom saw.3SG
          o   Pavlos].
          the P.
          lit.: 'Sofia wants to know whether, and if so, who Paul saw.'
      b.   [*an, ki an ne, PJON*]
      c.   [*an, ki an NE, PJON*]

Example (44) illustrates reverse sluicing. As we see in (44a, b), the intonation characteristic of Right Node Raising is absent, these examples having a rather even intonational contour over the complementizer and the *wh*-phrase, not essentially different from the intonation attested in isolation.

(44) a.   *Frank wondered if and when the guests would arrive.*
          [...*if and when...*]
      b.   *I Sofia theli   na   mathi   an ke pjon idhe*
          the S.   want.3SG PART know.3SG if and whom saw.3SG
          o   Pavlos.
          the P.
          [...*an ke pjon...*]

If the function of the intonational contour in (42–43) is to signal the prosodic constituency required in Right Node Raising, then its absence in reverse sluicing is expected under our analysis.

6.2. Wh-*complementizer vs. non-*wh-*complementizer contrasts*

Reverse sluicing is not possible with a non-*wh*-complementizer, as we see in (45). We attribute this to the fact that the phenomenon occurs only with predicates selecting an embedded question. Right Node Raising is constrained only by prosodic identity and is hence oblivious to this distinction; we see this in (46), where coordination with the non-*wh*-compementizer *oti* 'that' is allowed.

Reverse sluicing

(45) **I dhimosiografi emathan   oti ke pjus dhiadhilotes sinelave*
      the journalists   learned.3PL that and which demonstrators arrested.3SG
      i   astinomia
      the police
      lit.: 'The journalists found out that and which demonstrators the police arrested.'

Right Node Raising

(46)   *I   dhimosiografi emathan   oti, ala dhen kataferan   na   mathun*
       the journalists   learned.3PL that, but not   managed.3PL PART learn.3PL
       pjus   [sinelave   i   astinomia].
       who.PL arrested.3SG the police
       'The journalists found out that the police arrested some people but they
       didn't manage to find out who.'
       lit.'The journalists found out that, but they didn't manage to find out
       who, [the police arrested].'

The contrast carries over to English, where Right Node Raising but not reverse
sluicing is marginally possible with a non-*wh*-complementizer (see Bresnan
1974; Swingle 1995 for discussion of the marginality of this type of Right Node
Raising, which is due to the Right Node Raising restriction on contrastiveness).

(47)   *I didn't remember that or when Jack got married.*

(48)   a. ?*I've been wóndering whether, but wouldn't want to positively státe
           that, your theory was correct.*
       b. ?*Lucy claimed that, but couldn't say exactly when, the strike would
           take place.*

6.3.   Ordering effects

In Right Node Raising constructions, the order of the conjuncts may be altered
without any significant consequence for the grammaticality of the sentence. Note
that in (49) below, which is marked with the appropriate Right Node Raising
intonation, both orders are legitimate: (a) *wh*-phrase + *wh*-complementizer, and
(b) *wh*-complementizer + *wh*-phrase:

(49)   a. *Dhen ine akomi safes pote, ute kan AN, sinelave   i*
           not is yet   clear when, nor even if, arrested.3SG the
           astinomia tus dhiadhilotes.
           police   the demonstrators
           'It's not clear yet when, not even WHETHER, the police arrested
           the demonstrators.'
       b. *Dhen ine akomi safes an, poso malon   POTE, sinelave   i*
           not is yet   clear if, what perhaps when, arrested.3SG the
           astinomia tus dhiadhilotes.
           police   the demonstrators
           'It's not clear yet whether, let alone WHEN, the police arrested the
           demonstrators.'

In (50) we see what we can call an *ordering effect* in reverse sluicing: the order
wh-phrase + *wh*-complementizer is excluded, for arguments as well as for
adjuncts. This effect holds in English as well, as seen by the ungrammaticality
of the English equivalents given in place of glosses:

(50)   a. *Dhen ine akomi safes pote ke an sinelave   i   astinomia tus*
           not is yet   clear when and if arrested.3SG the police   the
           dhiadhilotes.
           demonstrators
           *'It's not clear yet when and if the police arrested the demonstrators.'
       b. *Dhen ine akomi safes pjon ke an sinelave   i   astinomia.*
           not is yet   clear who and if arrested.3SG the police
           *'It's not clear yet whom and if the police arrested.'

We believe that the ordering effect in reverse sluicing arises for semantic and
pragmatic reasons. It appears that reverse sluicing requires a transition from
general to specific information. This requirement should be viewed against the
distinct semantics of polar (yes/no) vs. constituent questions. As is standardly
assumed, questions have as their denotation the set of propositions that corre-
sponds to their (true) answers (see Karttunen 1977; cf. Groenendijk and Stokhof
1982). Polar questions denote a set which consists of two propositions: a
negative and an affirmative one. This is illustrated in (51b, c) (abstracting away
from tense):

(51)   a. *Did Paul see Lucie?*
       b. $\lambda p \ [p = \wedge[saw' \ (Paul, Lucie)]] = A$
       c. A= {Paul saw Lucie, Paul didn't see Lucie}

At the time of utterance, the speaker cannot decide which of the two proposi-
tions in A supplies the true answer to (51a). Constituent questions, on the other
hand, denote (possibly infinite) sets of propositions which have the tripartite
structure given in (52b) (for the latter, see Berman 1991):

(52)   a. *Who did Paul see?*
       b. $\lambda p \ [(\exists x: person' \ (x)) \ [p = \wedge[saw' \ (Paul, x)]]] = A$
       c. A= {Paul saw Lucie, Paul saw Kim, Paul saw Lucie and Kim, ...}

When uttering (52a), the speaker has already decided that *Paul saw somebody* is
true, but he or she is uncertain with respect to the part of it that corresponds to
the restriction in (52b). Because of their semantics, in other words, polar and
constituent questions give rise to different presuppositions. The former presup-
pose ignorance of the truth or falsity of the interrogated propositional content,
whereas the latter presuppose its truth. We see here the effects of the general
constraint of informativeness, which requires that information proceed from

general to partial. In the present cases, this rules out the presupposition clash that would arise if the true were to precede the undefined.

In Right Node Raising, however, this presuppositional conflict can be voided by the nature of the coordination, through the use of presupposition-reversing particles such as 'even' or 'let alone'; see Horn (1972).

6.4.   Multiple Right Node Raising

In general, Right Node Raising cannot apply in a right-node-raised constituent, as is illustrated in (53):

(53)   a.   *Nathan chose, and Lucy paid for, [a book for their nephew about, and a video on, [sea-dwelling dinosaurs]].

   b.   ??The lawyer wanted to know [if, and if so, where [Nathan said he kissed, and Lucy claimed he had bit, [his wife of 25 years]].

If reverse sluicing were Right Node Raising, we would expect it to behave accordingly and thus (54) to be ungrammatical, contrary to fact:

(54)   The lawyer wanted to know [if and where Nathan said he kissed, and Lucy claimed he had bit, [his wife of 25 years]].

6.5.   Implicit argument differences

Certain predicates that license implicit arguments can be embedded in a final IP under Right Node Raising, as seen in (55a,b). Of course, when the predicate does not license implicit arguments the result will be ungrammatical (hence the contrast between eat and ingest in [55a]):

Right Node Raising

(55)   a.   The surgeon needed to know if, and if so, what [the patient had {eaten/*ingested} before the operation].

   b.   Ben's dad asked him if, and if so, for whom [he had been baking].

As we have seen, however, predicates that allow implicit arguments are degraded in reverse sluicing for many speakers:

Reverse sluicing

(56)   a.   ??The surgeon needed to know if and what the patient had {eaten/ingested} before the operation.

   b.   ??Ben's dad asked him if and for whom he had been baking.

If the two phenomena were identical, this difference in grammaticality would be quite unexpected.

6.6.   Nonfinal conjunct interpretation

As mentioned at the beginning of this section, we follow recent accounts of Right Node Raising that analyze it as PF-deletion of strings in nonfinal conjuncts under prosodic identity with a string in the final conjunct. Under an analysis of reverse sluicing as Right Node Raising, sentences where an argument is reverse sluiced, like (57a) below, present a serious difficulty. It is hard to see how the IP-domains could be prosodically identical in both conjuncts, given that if they were, the first conjunct would be assigned the wrong interpretation:

(57)   a.   Pes   mou amesos   an ke pjos [ekripse ta klidhia]
            tell.imp.2SG me immediately if and who hid.3SG the keys
            'Tell me immediately if anybody hid the keys and who it was.'
      b.   Pes mou amesos an *[ekripse ta klidhia] ke pjos [ekripse ta klidhia]

The first conjunct in (57a) contains a referential pro subject and the second contains the trace of the subject wh-phrase pjos. For the phonology, there is no difference between a null pronoun and a trace, hence the requirement on phonological identity is satisfied, and deletion could proceed as illustrated in (57b). In such a situation, however, given the referential status of subject pro, the interpretation of the first conjunct in (57b) would have to be about a particular individual, something like "tell me whether he hid the keys". But this is not what this conjunct means. The whether-clause is not a question about whether a particular individual, say Paul, hid the keys; rather, it is a question as to whether any individual did. We see, then, that the prosodic identity approach to reverse sluicing makes the wrong predictions in these cases.

To sum up, in this section we have considered the possibility of analyzing reverse sluicing as an instance of Right Node Raising. Examination of a number of diagnostics has made it clear that reverse sluicing differs from Right Node Raising in many important respects. Many of the differences between the two phenomena, however, have a somewhat gradient nature, and it may be the case that reverse sluicing and Right Node Raising are two ends of a scale, with minimal construction specific properties. Nevertheless, we remain convinced that there is a qualitative difference between the two constructions, namely that Right Node Raising is phonological ellipsis (PF-deletion), while reverse sluicing is true syntactic ellipsis (resolved by LF-copying).[10]

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10. This dichotomy recalls the similar distinction drawn in Wilder (1995), where the directionality properties of the two types of ellipsis are investigated in much greater detail than here.

7. Conclusion

The analysis of reverse sluicing in English and Greek presented in this article has led to a number of interesting conclusions. First, we have provided independent motivation for Chung, Ladusaw, and McCloskey's 1995 operation of IP-copy, and shown how this approach in conjunction with the copy theory of movement and the Heimian theory of indefinites can account for the interpretation of the missing IP. This approach was seen to be superior to a PF-deletion approach assimilating reverse sluicing to Right Node Raising, which differs from reverse sluicing in a number of respects.

The difference between English and Greek with respect to argument licensing in reverse sluicing was reduced to an independent difference between these two languages in the availability of null indefinite DPs. A *wh*-trace in a copied IP in Greek but not in English can be interpreted as such a null indefinite by virtue of vehicle change.

As with any initial investigation into novel territory, we have had to leave a number of questions and issues for future research. The exploration of many of these issues will also, we hope, shed light on more general questions in the theory of ellipsis and refine our understanding of the nature of elliptical resolution.

References

Berman, Steven (1991). The semantics of open sentences. Unpublished Ph.D. dissertation, University of Massachusetts at Amherst.

Bresnan, Joan (1974). The position of certain clause particles in phrase structure. *Linguistic Inquiry* 5: 614–619.

Campos, Hector (1986). Indefinite object drop. *Linguistic Inquiry* 17: 354–359.

Chao, Wynn (1987). On ellipsis. Ph.D. dissertation, University of Massachusetts at Amherst. Published in 1988 by Garland, New York.

Chomsky, Noam (1995). *The Minimalist Program*. Cambridge, Mass.: MIT Press.

Chung, Sandra, William Ladusaw, and James McCloskey (1995). Sluicing and logical form. *Natural Language Semantics* 3: 239–282.

Condoravdi, Cleo (1989). Arbitrary reference and the theory of *pro*. Unpublished manuscript, Yale University.

Fiengo, Robert, and Robert May (1994). *Indices and Identity*. Cambridge, Mass.: MIT Press.

Fillmore, Charles (1986). Pragmatically controlled zero anaphora. *Berkley Linguistic Society* 12: 95–107.

Giannakidou, Anastasia, and Jason Merchant (1997). On the interpretation of null indefinite objects in Greek. *Studies in Greek Linguistics* 17: 290–304.

Groenendijk, Jeroen, and Martin Stokhof (1982). Semantic analysis of *wh*-complements. *Linguistics and Philosophy* 5: 175–233.

Haïk, Isabelle (1987). Bound VPs that need to be. *Linguistics and Philosophy* 10: 503–530.

Hankamer, Jorge, and Ivan Sag (1976). Deep and surface anaphora. *Linguistic Inquiry* 7: 391–426.

Hegarty, Michael (1991). Adjunct extraction without traces. *West Coast Conference on Formal Linguisitics* 10.

Heim, Irene (1982). The semantics of indefinite noun phrases. Unpublished Ph.D. dissertation, University of Massachusetts at Amherst.

—— (1987). Where does the definiteness restriction apply? In *The Representation of (In)definiteness*, E. Reuland and A. ter Meulen (eds.), 21–42. Cambridge, Mass.: MIT Press.

Horn, Laurence (1972). On the semantic properties of logical operators in English. Unpublished Ph.D. dissertation, University of California, Los Angeles.

Huang, James (1984). On the determination and reference of empty pronouns. *Linguistic Inquiry* 15: 531–574.

Jaeggli, Osvaldo, and Ken Safir (eds.) (1991). *The Null Subject Parameter*. Dordrecht: Kluwer.

Johnston, Michael (1994). The syntax and semantics of adverbial adjuncts. Unpublished Ph.D. dissertation, University of California, Santa Cruz.

Kamp, Hans (1981). A theory of truth and discourse representation. In *Formal Methods in the Study of Language*, J. Groenendijk, T. Janssen, and M. Stokhof (eds.), 277–322. Amsterdam: Mathematical center.

Karttunen, Lauri (1977). Syntax and semantics of questions. *Linguistics and Philosophy* 1: 3–44.

Kathol, Andreas (1995). Linearization-based syntax. Unpublished Ph.D. dissertation, Ohio State University.

Ladusaw, William (1994). Thetic and categorical, stage and individual, weak and strong. *Semantics and Linguistic Theory* (SALT) IV: 220–29. Cornell University, Ithaca, NY.

Lasnik, Howard and Mamoru Saito (1992.) *Affect-α: A Study of One Rule of Grammar and its Applications*. MIT Press: Cambridge.

Lebeaux, David (1988). Language acquisition and the form of the grammar. Unpublished Ph.D. dissertation, University of Massachusetts at Amherst.

Lewis, David (1975). Adverbs of quantification. In *Formal Semantics of Natural Language*, Keenan (ed.), 3–15. Cambridge University Press: Cambridge.

Lobeck, Anne (1991). The phrase structure of ellipsis. In *Perspectives on Phrase Structure*, Rothstein (ed.), 81–103. San Diego: Academic Press.

Luján, Marta (1996). Indefinite object drop in Spanish. Paper presented at the 70th annual meeting of the LSA, San Diego.

Merchant, Jason (1996). Deviance from identity under ellipsis. Colloquium talk given at the University of Groningen.

Milsark, Gary (1974). Existential sentences in English. Unpublished Ph.D. dissertation, MIT.

Munn, Alan (1993). Topics in the syntax and semantics of coordinate structures. Unpublished Ph.D. dissertation, University of Maryland, College Park.

Nishigauchi, Taisuke (1998). 'Multiple sluicing' in Japanese and the functional nature of *wh*-phrases. *Journal of East Asian Linguistics* 7: 121–152.

Reis, Marga (1985). Satzeinleitende Strukturen im Deutschen. In *Erklärende Syntax des Deutschen*, W. Abraham (ed.), 271–312. Narr: Tübingen.

Ross, John (1969). Guess who? In *Chicago Linguistic Society* 5, R. Binnick *et al.* (eds.), 252–286.

Sag, Ivan (1976). Deletion and logical form. Unpublished Ph.D. dissertation, MIT.

Stroik, Thomas (1992). Adverbs and antecedent-contained deletions. *Linguistics* 30: 375–380.

Swingle, Kari (1995). On the prosody and syntax of right node raising. Unpublished manuscript, University of California, Santa Cruz.

Wilder, Chris (1995). Some properties of ellipsis in coordination. *Geneva Generative Paper* 2.2: 23–61.