An intersection approach to syncretism in ATB dependencies[*]

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Abstract

Syncretism has been reported to have the peculiar property of repairing violations of syntactic constraints, e.g. with agreement (Schütze 2003; Bhatt & Walkow 2013) and case matching (Citko 2005; van Craenenbroeck 2012). This paper puts forward the view that in one well-reported instance of syncretism repair of case-matching violations with ATB-movement, this repair follows directly from the nature of ATB movement. We pursue a novel movement-based analysis in which ATB movement involves the actual fusion of two syntactic objects, via intersection of feature sets. As well as deriving the one-to-many relation between fillers and gaps in ATB, we show how the 'repair' effect of syncretism with case matching violations follows naturally under this approach.

1 Introduction

This paper addresses a widely discussed instance of the 'repair effect' of syncretism with violations of the case matching requirement in so-called Across-The-Board (ATB) constructions such as (1); see e.g. Ross (1967), Williams (1978), and de Vries (2017) for an overview.

(1) a. What does [John like ___] and [Mary hate ___] ?
     b. The man who [John saw ___] and [Bill hit ___]

In languages with rich case morphology such as Polish, ATB constructions are subject to a case matching requirement, that is, ATB movement is only possible if the case assigned at each extraction site is the same:

(2) a. *Czego   Jan nienawidzi ___GEN a   Maria lubi ___ACC?
         what.GEN Jan hates   and Maria likes
     b. *Co   Jan nienawidzi ___GEN a   Maria lubi ___ACC?
         what.ACC Jan hates   and Maria likes
         'What does Jan hate and Maria like?'   (Citko 2005:487)

However, as noted by Borsley (1983); Dyła (1984); Franks (1995); Bondaruk (2003) and Citko (2005, 2011), this case matching requirement can be circumvented if the extracted item is syncretic, i.e. has the same morphological form for the cases in question. Whereas the equivalent of 'what' in Polish has different forms in genitive and accusative (1), 'who' is syncretic for genitive and accusative, and subsequently, ATB movement is possible despite the case mismatch (3).

(3) Kogo   Janek lubi ___ACC a Jerzy   nienawidzi ___GEN ?
     who.ACC/GEN John likes   and George hates
     'Who does John like and George hate?'   (Borsley 1983:170)

Taken at face value, this 'repair by syncretism' seems to pose a challenge to a postsyntactic view of morphology such as Distributed Morphology (DM) (Halle & Marantz 1993; Harley & Noyer 2003; Embick & Noyer 2007), since it seems that a syntactic operation such as ATB movement is licensed by morpho-phonological form. However, if syntax operates on abstract feature bundles with no morphological reality, as DM assumes, then it is difficult to reconcile this view with the observation that the case matching appears to be sensitive to the form of the elements in question. While some authors have attempted to maintain a DM view in the face of these facts by appealing to underspecification (cf. Citko 2005; Dalrymple et al. 2009; Asarina 2011), we will show that none of these approaches is entirely satisfactory (see section 3.1.4).

In this paper, we argue that the ameliorating effect of syncretism on case matching violations in ATB dependencies can be made to follow naturally under the view that ATB movement and syncretism have a common denominator, namely *intersection of feature sets*. The central characteristic of ATB is a one-to-many relation between fillers and gaps. From a derivational perspective, we capture the fact that two items seem to 'become one' by assuming that ATB movement involves movement of two items in parallel to an external workspace, where they are intersected to create a new item bearing the shared features of the movees. We argue that this view of ATB movement, and indeed the idea that movement in general (i.e. Internal Merge) must first proceed via an external workspace is independently motivated. More importantly, under this view of ATB movement, the syncretism facts come for free if we assume that syncretic forms result from an underspecified exponent realizing a feature shared by both elements. For example, if a language has a syncretism between nominative and accusative, this can be captured by assuming that the syncretic form only realizes a feature such as [−OBL(IQUE)] that is present in both the specification of nominative and accusative. Under an intersection approach to ATB, the result of intersecting the feature sets of two DPs, each bearing nominative and accusative, would result in a new item bearing [−OBL], that is, the feature realized as the syncretic form. If two cases are non-syncretic, then their feature sets do not overlap. Intersection of case features thus results in the empty set, and therefore a crash in the derivation. In this way, the ameliorating effect of syncretism on case mismatches follows independently from the mechanism of ATB movement and must not be independently stipulated. Since ATB movement involves intersection of feature sets, the only way for DPs bearing different cases to successfully undergo ATB movement is if they happen to have a case feature in common that is also realized by a syncretic exponent.

The following paper is structured as follows. Section 2 discusses the data surrounding 'repair

by syncretism' in ATB constructions in more detail and discusses the problems surrounding two previous DM-based approaches to this problem by Citko (2005) and Asarina (2011). Section 3 provides the analysis of ATB based on intersection. In particular, section 3.1 discusses previous approaches to ATB movement, section 3.2 lays out a novel approach to ATB utilizing intersection of feature sets, section 3.3 shows how this approach can derive the syncretism facts in Polish and section 3.5 presents an analysis of syncretism repair in Right Node Raising constructions in Russian. Finally, section 4 concludes the paper.

2 Syncretism and case matching with ATB movement

In languages with rich case morphology, ATB constructions are characterized by an asymmetric dependency between one filler and two gaps. There are various restrictions on what kind of gaps are possible in these constructions (see section 3.1), one of the more interesting ones being case matching. In languages with rich case morphology, the case assigned by the verb to each of the 'gaps' has to match. For example in Polish, the verbs *widzieć* 'see' and *lubić* 'like' both assign accusative and ATB movement is licensed (4).

(4)   *Kogo*   Janek widział ——ACC a   Maria lubiła ——ACC ?
     who.ACC John saw   and Mary liked
     'Who did John see and Mary like?'   (Borsley 1983:170)

However, if the cases assigned by the verbs differ, for example with *lubić* 'like' (accusative) and *nienawidzić* 'hate' (genitive), then it is not possible for a single wh-phrase to fulfil the conflicting case matching requirements of each verb simultaneously.

(5)   a.   **Czego*   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
        what.GEN Jan hates   and Maria likes

     b.   **Co*   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
        what.ACC Jan hates   and Maria likes
        'What does Jan hate and Maria like?'   (Citko 2005:487)

An interesting exception to this, discussed by Borsley (1983); Dyła (1984); Franks (1995); Bondaruk (2003) and Citko (2005), is if the forms of two cases happen to be syncretic. For example, in the inanimate wh-series, the accusative and genitive forms of 'what' are not syncretic (*co* vs. *czego*). However, this is the case for genitive and accusative forms of 'who' (*kogo*). What we then observe is that violations of the otherwise strict case matching requirement in ATB constructions can be repaired by syncretism:

(6)   *Kogo*   Janek lubi ——ACC a   Jerzy   nienawidzi ——GEN ?
     who.ACC/GEN John likes   and George hates
     'Who does John like and George hate?'   (Borsley 1983:170)

Furthermore, we find this effect in languages other than Polish. For example, in German it is also not possible to have ATB movement from positions with mismatching cases (accusative vs. dative):

(7)   *Wen   / wem   hat der Hans (in der Stadt) ——ACC getroffen und (mit ihren
who.ACC   who.DAT has the Hans in the city   met   and with their
Einkäufen) ——DAT geholfen?
shopping   helped
'Who did Hans meet (in the city) and help (with their shopping)?'

However, as with Polish, this effect is ameliorated if the forms are syncretic:[1]

(8)   *Was   für Frauen   hat der Hans (in der Stadt) ——ACC getroffen und
what.ACC/DAT for women.ACC/DAT has the Hans in the city   met   and
(mit ihren Einkäufen) ——DAT geholfen?
with their shopping   helped
'What women did Hans meet and help (with their shopping)?'

<div align="right">(Hartmann et al. 2016:81)</div>

Furthermore, this effect is by no means restricted to ATB wh-questions. There are examples of syncretism repair with ATB relativization. In (9) and (10), the Polish relative pronoun *której* is syncretic for genitive and dative and is thus licensed in relative clauses with mismatching verbs.

(9)   Dziewczyna, *której*   Janek nigdy przedtem nie widział ——GEN a   dzisiaj
girl   who.GEN/DAT John never before   NEG saw   and today
pożyczył ——DAT pieniędzy
lent   money
'The girl who John had never seen before and today lent some money'

<div align="right">(*Polish*; Dyła 1984:704)</div>

(10)   Dziewczyna, *której*   ——DAT było zimno i   z   powodu tego   ——GEN nie
girl   who.GEN/DAT   was cold   and from reason this.GEN   not
było na zajęciach
was at class
'The girl who was cold and therefore not in class'   (*Polish*; Franks 1995:64)

However, since there is no syncretism between accusative and genitive, a mismatch between the two cases is ungrammatical:

(11)   *Dziewczyna, *którą*   Janek lubi ——ACC a   Jerzy nienawidzi ——GEN
girl   who.ACC John likes   and George hates
'The girl who John likes and George hates'   (*Polish*; Dyła 1984:703)

In addition, Franks (1995) discusses case mismatches in relative clauses in Russian. In (12), the relative pronoun *kotoroj* is syncretic for instrumental and dative, meaning that case matching is satisfied.

(12)   devuška, *kotoroj*   ja byl uvlečën   ——INST i   daval den'gi ——DAT
girl   who.INST/DAT I was carried-away-with   and gave money
'The girl who I was carried away with and gave money to'

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[1]However, note that Hartmann et al. (2016) show experimental evidence that case mismatches under ATB topicalization in German do not seem to be repaired by syncretism (but cf. (16) below). Nevertheless, they concede that ATB wh-movement examples such as (7) seem perfectly acceptable, in contrast to the sentences they tested.

ATB topicalization also shows a case matching requirement that is obviated by syncretism. The third person masculine personal pronoun in Polish is syncretic for genitive and accusative (*jego*), whereas its feminine pendant is not (*ją* vs. *jej*). Consequently, only the former is possible in ATB topicalization structures with mismatched verbs.

(13)　a.　*Jego*　　　　Janek lubi ＿＿ACC a　Jerzy　nienawidzi ＿＿GEN
　　　　　him.ACC/GEN John　likes　　　and George hates
　　　　　'Him, John likes and George hates.'

　　　b.　**Ją*　　　Janek lubi ＿＿ACC a　Jerzy　nienawidzi ＿＿GEN
　　　　　her.ACC Janek likes　　　and George hates
　　　　　'Her, John likes and George hates.'　　　　　　(*Polish*; Dyła 1984:703)

A similar effect is reported for German by te Velde (2005) (with an example that he attributes to van Oirsouw 1993) (14) and also by Blümel (2014) (15). The definite determiner in German is not syncretic for nominative and accusative (*dieser* vs. *diesen*) and is therefore impossible in ATB configurations. On the other hand, the form of the bare noun is invariant in all cases and therefore (14b) is reported to be grammatical by te Velde (2005).[2]

(14)　a.　**Dieser　Käse*　　　mag ich nicht ＿＿ACC und ＿＿NOM ist auch nicht gut　für mich.
　　　　　this.NOM cheese.NOM like I　not　　　and　　　is also　not　good for me
　　　　　'I don't like this cheese and it isn't good for me.'

　　　b.　?*Käse*　　　　　mag ich nicht ＿＿ACC und ＿＿NOM ist auch nicht gut　für mich.
　　　　　cheese.NOM/ACC like I　not　　　and　　　is also　not　good for me
　　　　　'I don't like cheese and it isn't good for me.'

　　　　　　　　　　　　　　　　　　　　　　　　　　(*German*; te Velde 2005:229)

(15)　?Bär-en　　　　　hat er ＿＿ACC geliebt und ＿＿DAT geholfen.
　　　bear-PL.ACC/DAT has he　　　loved　and　　　helped
　　　'He has loved and helped bears.'　　　　　　　　　　(Blümel 2014:30)

A similar repair effect in German is also discussed by Ott (2012) for cases of so-called 'split topicalization' as in (16) (cf. Fanselow & Ćavar 2002). Whereas the word for 'women' is syncretic in dative and accusative (*Frauen*), 'men' is not (*Männern* vs. *Männer*). Accordingly, only the syncretic form is possible in split topicalization (16).

(16)　a.　?Frauen　　　　vertraut er nur blonden　　　＿＿DAT und küsst er nur　hübsche
　　　　　women.ACC/DAT trusts　he only blonde.DAT　　　and kisses he only pretty.ACC
　　　　　＿＿ACC

　　　　　'As for women, he only trusts blonde ones and kisses pretty ones.'

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[2]This does not seem to be the case for all speakers, as noted by te Velde himself. One plausible reason for this is that the example in (14b) violates the parallelism constraint on ATB movement proposed by Franks (1993, 1995) stating that ATB movement must take place from somehow parallel structural positions (also see Kasai 2004; Citko 2006). Here, the movement originates from an object position and a subject position, see section 3.2.2 for further discussion.

b. *Männer(*-n)   hilft sie nur blonden   ____DAT und küsst sie nur
    men.ACC(-DAT) helps she only blonde.DAT   and kisses she only
    hübsche   ____ACC
    handsome.ACC
    'As for men, she only helps blonde ones and kisses handsome ones.'

(*German*; Ott 2012:35)

Finally, we also find a similar 'repair by syncretism' effect in another ATB construction, Right-Node Raising (RNR). In many respects, RNR is similar to ATB movement, only to the right (see section 3.5 for further discussion). Asarina (2011:174) shows that, in Russian, RNR imposes case matching requirements on the displaced element. The feminine noun 'plate' is not syncretic in the nominative and accusative cases (*tarelka* vs. *tarelku*) and is therefore not licensed in RNR construction (17).

(17) *On ne ostavil ____ACC , tak kak emu nadoela ____NOM , *tarelk-a/-u*   s   chürnoj
      he not kept   as   him sick.of   plate-NOM/-ACC with black
      kaёmkoj.
      border
      'He didn't keep, as he was sick of, the plate with the black border.'

Interestingly, if the nominative and accusative forms are syncretic, as with the neuter noun *bljudce* ('saucer'), then a case mismatch is permitted (18).

(18) On ne ostavil ____ACC , tak kak emu nadoela ____NOM , *bljudc-e*   s   chürnoj
      he not kept   as   him sick.of   saucer-ACC/NOM with black
      kaёmkoj.
      border
      'He didn't keep, as he was sick of, the saucer with the black border.'

Whether or not RNR actually involves movement is a controversial issue that we return to in section 3.5.

2.1 Interim summary

We have seen that in Polish and German, there are case matching effects that arise with ATB constructions in which there is a one-to-many relation between fillers and gaps.[3] On an intuitive level, it seems that what look like *bona fide* syntactic constraints are sensitive to the morpho-

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[3] There are also other constructions in which case matching has been reported. For example, in free relative clauses (Gross & van Riemsdijk 1981; Vogel 2001; Trommer 2002; van Riemsdijk 2006; Himmelreich 2017). The following examples from Schütze (2003:300) shows that only the form *was*, which is syncretic for nominative and accusative, is possible if the free relative requires a different case to the matrix verb:

(i)   a. *Ich zerstöreACC [CP *wer*   / *wen*   mich   ärgertNOM]
          I   destroy   who.NOM   who.ACC me.ACC annoys
          'I destroy who(ever) annoys me.'
      b. Ich zerstöreACC [CP *was*   mich   ärgertNOM]
          I   destroy   what.NOM/ACC me.ACC annoys
          'I destroy what(ever) annoys me.'

phonological form of linguistic objects. Taken at face value, the existence of 'repair by syncretism' would seem to be incompatible with postsyntactic 'late insertion' approaches to morphology, e.g. Distributed Morphology (Halle & Marantz 1993; Harley & Noyer 2003; Embick & Noyer 2007; Nevins 2015). Proponents of this view assume that syntax operates on abstract feature bundles that do not contain any morpho-phonological information. Consequently, if matching violations can be overridden by paradigmatic identity of distinct cases, then this would seem to pose a serious challenge to this view. On the other hand, one could claim that the syncretism facts indicate that case matching should be a processing or PF constraint, rather than a syntactic one (Smits 1991). However, implementing a matching restriction in this module of the grammar would entail PF (or the parser) having access to syntax-specific information about the case-assigning properties of individual verbs. This seems to be undesirable if we want to maintain a strictly modular view of grammar. As a result, we seem to be faced with the problem of 'domain leakage', that is, whichever module of grammar case matching is implemented in, it will require access to information ordinarily reserved for a different module.

In what follows, we argue that this is not necessarily the case under the view that both the mechanism for ATB movement and the approach to syncretism share a common property; non-empty intersection of feature sets. In the following section, we propose a new approach to ATB that can explain the syncretism facts while still remaining compatible with a DM view of morphology.

3 An intersection approach to ATB constructions

In this section, we present a new take on ATB constructions in which the one-to-many relation between fillers and gaps is derived by an intersection operation that creates a single item from those originating in the gaps. It will be shown how this can directly derive the link between syncretism and ATB movement under the assumption that syncretism is derived by means of underspecification. First, section 3.1 discusses the main approaches to ATB in the literature and how these struggle to capture 'repair by syncretism' in a satisfactory way. Section 3.2 will lay out some of the core assumptions required for the analysis to follow. The following section 3.3 illustrates how an intersection-based approach to ATB can explain why case matching violations can only be repaired by syncretic forms. section 3.4 explicates the formalism of intersection further and, finally, section 3.5 extends this analysis to Right Node Raising in Russian.

3.1 Previous approaches to ATB

A number of different theories of ATB movement have been proposed in the literature. Broadly speaking, they fall into one of two camps: Those that assume that there is 'extraction' from both conjuncts in parallel, what we might call 'symmetric approaches', and those that assume that genuine extraction only takes place from one conjunct and the other gap is not related to movement ('asymmetric approaches'). Asymmetric approaches derive the second gap in an ATB structure either via a parasitic gap, sideward movement or ellipsis. Each of these approaches will be dis-

cussed in turn, considering the extent to which they can account for the syncretism facts. Subsequently, we will do the same for symmetric approaches which either assume genuine movement from both conjuncts or a multidominant structure.

3.1.1 Parasitic gaps

The first kind of asymmetric approach to ATB assumes that extraction only takes place from the first gap (e.g. Munn 1992, 1993, 1999; Franks 1995; Reich 2007), and the second gap contains a parasitic gap derived by empty operator movement (following the analysis of parasitic gaps in Chomsky 1981):

(19)   *Parasitic gap approach to ATB*
       What$_1$ does [$_{\&P}$ [$_{TP}$ John like t$_1$] and [$_{TP}$ Op$_2$ Mary hate t$_2$]] ?

Some motivation for this comes from the observation that certain reconstruction phenomena seem to behave asymmetrically, that is, they seem to only be able to reconstruct into the first conjunct.[4] In terms of deriving syncretism, one could appeal to the fact that it has sometimes been argued that parasitic gaps also exhibit case matching effects similar to the ones we find in ATB (Huybregts & van Riemsdijk 1985; Bayer 1988; Kathol 2001; Himmelreich 2017).[5] Consider the German examples from Bayer (1988:420) in (20) and (21). In (20), the parasitic gap is assigned dative by the verb *anbieten* 'offer', whereas the real gap is assigned genitive by *entsinnen* 'remember'. There seems to be the familiar case matching requirement (20) that is alleviated by syncretism (21).

(20)   *Dieses Polizisten   hätte   er sich [ohne   ___$_{DAT}$ schon mal Geld   angeboten
        this   policeman.GEN has.SUBJ he REFL without   already once money offered
        zu haben] niemals ___$_{GEN}$ entsinnen können
        to have   never   remember can
        'He would have never been able to remember this policeman without having once offered money to (him).'

(21)   ?Der Polizei   hätte   er sich [ohne   ___$_{DAT}$ schon mal Geld   angeboten zu
        the police.DAT/GEN has.SUBJ he REFL without   already once money offered   to
        haben] niemals ___$_{GEN}$ entsinnen können
        have   never   remember can
        'He would have never been able to remember the police without having once offered money to (them).'

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[4]However, this is only true for some diagnostics (Principle A, Principle C and Weak Crossover). Other diagnostics such as Strong Crossover, variable binding, idiom reconstruction and scope reconstruction behave symmetrically (see Citko 2005; Salzmann 2012*a*,*b* for discussion). This suggests that the phenomena that seem to behave asymmetrically are probably sensitive to effects of linear proximity.

[5]Although the implementation of case matching with parasitic gaps inevitably involves restating the facts in some way, as É. Kiss (2001:109, ex. (21)) does:

(i)   In a parasitic gap construction, the Case of both the real gap and the parasitic gap must be properly transmitted to the phonologically realized operator.

However, the idea that case matching in ATB is related to parasitic gaps is undermined by the fact that not all languages show case matching effects with parasitic gaps, as also discussed by Himmelreich (2017). Bondaruk (1996, 2003) shows that Polish, the language with the most widely discussed examples of case matching in ATB, does in fact not seem to impose the same case matching requirement on parasitic gaps. In (22), the form *którą* is unambiguously accusative and not syncretic for genitive. Nevertheless, a mismatch between the real gap and the parasitic gap is tolerated, in contrast to ATB constructions.

(22)   Którą książkę   obejrzał   ___ACC [nie zabierając ___GEN]?
       which book.ACC looked.through   not taking
       'Which book did he look through without taking?'   (Bondaruk 2003:230)

If the explanation for case matching in ATB constructions came from the fact that ATB involves parasitic gaps, then this difference in Polish would be entirely unexpected. Furthermore, there are a number of other more fundamental asymmetries across languages between ATB and parasitic gaps, in particular the much more restricted nature of parasitic gaps cross-linguistically (see Salzmann 2012*a* for relevant discussion).

   Another challenge for the 'parasitic gap' view of ATB-dependencies comes from the fact that we would, all else being equal, expect languages with ATB-movement to also have parasitic gaps. As Blümel (2017:114) points out, this is not the case, as there are many languages with ATB-movement that do not seem to have parasitic gaps of the English kind. Blümel (2017) points to Welsh as a good example of this. Borsley (2013) provides the data in (23) showing that Welsh respects the CSC (23a), and that extraction from conjunctions must involve ATB-movement (23b).

(23)   *ATB-movement in Welsh* (Borsley 2013:10):

   a. *y   dyn₁ [TP welais   i ___₁] a   [TP gwelaist   tihau Megan]
       the man   see.PST.1SG I   and   see.PST.2SG you   Megan
       'The man that I saw and you saw Megan'

   b. y   dyn₁ [TP welais   i ___₁] a   [TP gwelaist   tihau ___₁ hefyd]
       the man   see.PST.1SG I   and   see.PST.2SG you   too
       'The man that I saw and you saw too'

However, Borsley (2013) also argues that Welsh does not allow for true parasitic gaps (24).

(24)   *Dyna 'r   adroiddiad₁ dw   i wedi ei   daflu ___₁ ffwrdd [heb   ddarllen
       there.is the report   be.PRS.1SG I PERF 3SG.M throw   away   without 3SG.M
       pg₁]
       read
       'There is the report which I threw away without reading.'

                                                                  (Borsley 2013:23)

Thus, if the derivation of ATB-movement involved a parasitic gap in the second conjunct, then would we would expect parasitic gaps to be available independently. As Welsh shows, this often not what we find.

   A final unexpected asymmetry between ATB-movement and parasitic gaps pertains to what

Postal (1998) calls *antipronominal contexts*. These are environments in which pronouns and traces of certain types of Ā-movement are not permitted, for example *change-of-color* verbs (25a) (also see **?**). If ATB-movement involved a parasitic gap in the second conjunct, then we would expect parallel behaviour with regard to antipronominality. This is not what we find, however, since traces of ATB-movement is possible in this position (25a), whereas parasitic gaps are not (25b).

(25) *Asymmetry between ATB and PGs in antipronominal contexts* (Postal 1993:744):

    a.   Blake painted his house {green /*it}

    b.   What color$_1$ did Blake paint his house t$_1$ and Mary paint her shed t$_1$?

    c.   *What color$_1$ did they criticize t$_1$ after painting their house *pg*$_1$?

3.1.2   Sideward movement

A closely-related approach involves the application of Nunes' (2001; 2004) *Sideward Movement* operation to ATB (Hornstein & Nunes 2002; Fernández-Salgueiro 2008). In this approach, the filler in the ATB configuration undergoes 'interarboreal' movement (i.e. between workspaces; cf. Bobaljik & Brown 1997). In the derivation of ATB, the moved item originates in the second clause of the conjunction, which is built in its own workspace (26a). It then undergoes sideward movement to the workspace in which the first conjunct is built, where it is merged as the object of *like* (26b). At a later step, the *v*Ps form a conjunct (now in the same workspace) (26c). Finally, the wh-phrase in the first conjunct is extracted to SpecCP (26d).[6]

(26) *Sideward movement approach to ATB*

    a.   Workspace 1: [$_{v\text{P}}$ Mary [$_{\text{VP}}$ hate ⟨what⟩]]   ⇒

    b.   Workspace 2: [$_{\text{VP}}$ like what]   ⇒

    c.   [$_{\&\text{P}}$ [$_{v\text{P}}$ John [$_{\text{VP}}$ like what]] & [$_{v\text{P}}$ John [$_{\text{VP}}$ like ⟨what⟩]]]   ⇒

    d.   [$_{\text{CP}}$ what … [$_{v\text{P}}$ [$_{\text{VP}}$ like ⟨what⟩]] & [$_{v\text{P}}$ [$_{\text{VP}}$ hate ⟨what⟩]]]

This approach can neatly derive the fact that there is a gap in both conjuncts, however it does suffer from a number of technical issues regarding cyclicity and activity (see Salzmann 2012*a*:401f. for critical discussion). More importantly for our present purposes, it is not clear that this approach can derive 'repair by syncretism' in any insightful way. Since there is only a single element to which case is assigned, we require that cases can be assigned multiple times to the same item, or 'stacked' (see e.g. McCreight 1988; Yoon 2004; Merchant 2006; Richards 2013; Pesetsky 2013; Assmann et al. 2014). The case matching requirement could be (also see Salzmann 2012*a*:431, fn.41 for discussion).

    One challenge that seems to be particularly difficult for the sideward movement approach

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[6]This approach is therefore not entirely asymmetric since, in a sense, extraction does take place from both conjuncts, but crucially movement to SpecCP proceeds only from the first conjunct and is therefore asymmetric.

is the *parallelism requirement* on ATB-extraction (to be discussed further in Section 3.2.2). It has been long noted that ATB movement must take place from 'parallel positions' (Williams 1978; George 1980; Franks 1993, 1995; Kasai 2004; Citko 2006). This refers to the fact that ATB extraction from a subject and object position is not possible, as in (27).

(27)   *I know a man who [Bill saw t_1] and [t_2 likes Mary]   (Williams 1978:34)

In symmetric theories of ATB (such as parallel movement and multidominance), a constraint ensuring this can be formulated in a rather direct way since the filler position is associated to the ATB-gaps directly either by movement or re-merge. In the sideward movement approach, however, this is far particularly difficult to capture in the sideward movement account since the gap positions in the respective conjuncts are only related indirectly, almost accidentally. Thus, the constraint required to capture (27) could no longer simply state that a filler must associate gaps in structurally parallel positions without use of a global rule correlating non-adjacent derivational steps (cf. **?**). Thus, this must be a property associated with the moved item itself. One way to approach this would be to assume that parallelism follows from case-matching. In other words, ATB-extraction of a subject and object would lead to a case-mismatch involving nominative and accusative assigned to the same wh-phrase. The problematic aspect of this is that we independently require that case-matching can be alleviated by syncretism to account for the Polish cases. If we allow for syncretism to license to case mismatches, then we immediately lose our explanation for parallelism, since the form *what* in (28) is syncretic for nominative and accusative, but does not result in grammaticality.

(28)   *What does [John like t_1] and [t_2 annoys Mary] ?

Thus, it seems that the parallelism requirement is best captured by symmetric theories in which the filler in Spec-CP is linked to the gap in each conjunct directly (i.e. by a single movement step or instance of re-merge). Trying to capture this via some property of the moved item itself runs, e.g. case-matching, runs into immediate problems.

3.1.3   Ellipsis

A different kind of asymmetric approach derives one of the ATB gaps via ellipsis (Ha 2008; Salzmann 2012*a*,*b*). In Ha's (2008) approach, it is the gap in the first conjunct that is derived by ellipsis (29a), whereas Salzmann (2012*a*,*b*) assumes that it is the second one (29b).

(29)   *Ellipsis approaches to ATB*

   a.   *RNR & ATB* (Ha 2008):
        What₁ does [$_{TP}$ John like$_{[E_{RNR}]}$ ~~what~~] and [$_{TP}$ Mary hate t_1] ?
   b.   *Derivational ellipsis* (Salzmann 2012*a*):
        What₁ does [$_{TP}$ John like t_1] and$_{[E_{ATB}]}$ [$_{TP}$ Mary hate ~~what~~] ?

Ha appeals to ellipsis approaches to Right Node Raising (cf. Hartmann 2000; and see section 3.5), whereas Salzmann follows Aelbrecht's (2011) Agree-based approach to ellipsis licensing. In a

sense, both approaches are similar in that they involve some special version of Merchant's (2001) [E]-feature (however, only Salzmann (2012*a*) predicts asymmetric reconstruction in the first conjunct). The ellipsis analysis, as all asymmetric approaches, faces the challenge that ATB has been argued to require a 'single identity reading', which seems to implicate a movement gap in each conjunct (see e.g. Citko 2005:489, but cf. Munn 1999, Salzmann 2012*a*:402, fn.4). However, let us focus on the question of 'repair by syncretism'. Salzmann (2012*a*:431, fn.41) claims that 'once ellipsis is involved and if morphological mismatches are tolerated, one may expect case mismatches in ATB'. Indeed, one central characteristic of ellipsis is that it is known to tolerate form mismatches of various kinds (see e.g. Fiengo & May 1994; Merchant 2013), they have a different profile to mismatches with ATB-movement. In ellipsis constructions, mismatches in the form of the verb, for example, are readily tolerated (30) (e.g. **?**Fiengo & May 1994; Merchant 2001).

(30)   The boys bought the book and the girls did [$_{VP}$ ~~buy the book~~] too.

The plausible reason for this is that the mismatching finiteness/tense features are actually located outside the ellipsis site in (30), i.e. on T. In fact, Merchant (2013) shows that there is an asymmetry between VP- and TP-ellipsis with regard to voice mismatches. TP ellipsis (or *sluicing*) does not allow for mismatches in voice features between the verb, even if the the forms of the verb match (31). This is because, unlike in (30), the mismatching features are contained in the ellipsis site.

(31)   *This book was put$_{[PASS]}$ on my table, but I don't know who [$_{TP}$ ~~put$_{[ACT]}$~~ ~~this book on my~~ ~~table~~]

Thus, the standard identity conditions on ellipsis are there that mismatches in form are tolerated, but mismatches in features are not. If we apply the same matching conditions to ATB-movement, we would expect that mismatches in form of wh-phrases are possible, but mismatches in feature values are not. However, this is clearly the opposite of what we need to say. The syncretism facts require that the wh-phrases can mismatch in terms of features, only if they have the same phonological form, i.e. are syncretic. In fact, if the ellipsis identity conditions applied to ATB-gaps, then we would not expect to find a case-matching requirement at all. For example, case mismatches such as (2a), repeated as (32), could be analyzed as in (33).

(32)   *Czego   Jan nienawidzi ——$_{GEN}$ a   Maria lubi ——$_{ACC}$?
        what.GEN Jan hates   and Maria likes
        'What does Jan hate and Maria like?'

(33)   Czego$_1$ [$_{TP}$ Jan nienawidzi t$_1$] a$_{[E_{ATB}]}$ [$_{TP}$ Maria lubi ~~co~~] ?

If mismatches of the kind regularly found in phrasal ellipsis were tolerated in (33), then On the other hand, if it were the contradictory features on the wh-phrases that were responsible for the deviancy of (32), then it is unclear why having the same form (i.e. being syncretic) should fix this. The only way around this would be to propose that ellipsis in ATB-constructions permits feature mismatches only in cases of syncretism, but never if there is also a mismatch in form. However, this is radically different to the identity conditions normally imposed by ellipsis and

thereby seriously undermines ellipsis-based analyses of ATB.

3.1.4 Multidominance

Now, we turn to the symmetric approaches that assume that each of the ATB gaps is directly related to the filler. One particular approach that has gained much traction in recent years is the multidominance approach to ATB (Citko 2005, 2011; Gračanin-Yüksek 2007, 2013; Bachrach & Katzir 2009). This approach assumes that the filler is related to each gap, however this is not derived by movement. Instead, a multidominant view of syntax is adopted in which an element can be in more than one position simultaneously. In an ATB construction, the wh-phrase is associated with both gaps and its derived position in SpecCP, however it is only pronounced in one of these positions (34).

(34)   *Multidominance approach to ATB*
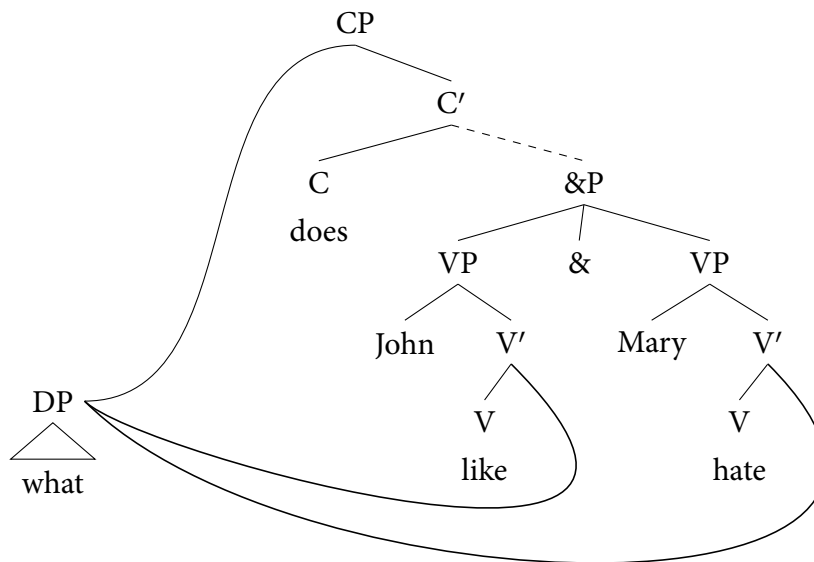
This approach has the direct advantage that it can derive 'single identity readings' of ATB, that is, it is only possible to give a single individual answer, rather than a pair-list answer, to an ATB question:

(35)   A: Who does John like and Mary hate?

     B: Jane

   #B: John, Bill and Mary, Jane

For other arguments in favour of a multidominance approach to ATB, see Citko (2005, 2011). However, a problematic data point that is not often discussed in conjunction with the multidominance approach is the fact that, in some languages, ATB movement can have resumptive pronouns in the gaps. For example in Akan (Niger Congo: Ghana), Ā-movement of animate DPs triggers obligatory resumption, also in ATB wh-questions (Saah 1994) (36).

(36)   [$_{CP}$ Hwáń$_1$ na   [$_{TP}$ Kofi pɛ́   *nó*$_1$] nańsó [$_{TP}$ Ámmá tán   *nó*$_1$] nó] ?
       who   FOC   Kofi like 3SG   but   Ama   hate 3SG   CD

'Who does Kofi like (him) but Ama hate (him)?'

<div align="right">(*Akan*; Sampson Korsah p.c.)</div>

Furthermore, Salzmann (2012*b*) shows that it is possible to have resumptive pronouns in both gaps in ATB relativization in Zurich German (37).

(37)   de Lehrer$_1$, wo [$_{TP}$ de Hans von *em*$_1$ schwärmt] und [$_{TP}$ d   Susi über *en*$_1$ fluecht]
        the teacher C   the Hans of him is.excited and   the Susi about him swears
        'The teacher that Hans is excited about (him) and Susi hates swears about (him)'

<div align="right">(*Zurich German*; Salzmann 2012*b*:356)</div>

These data are problematic for multidominance accounts of ATB since, as is clear in (34), they assume that the wh-phrase is syntactically present in both of the gaps. Whereas the multidominance account straightforwardly derives the fact that ATB movement leaves gaps, it does not seem to be possible to account for resumptive pronouns if the filler is also structurally present in its base positions.[7]

    Turning now to 'repair by syncretism', Citko (2005:486ff.) explicitly addresses the question of how her multidominance approach can derive the fact that syncretism can repair case matching violations. Citko puts forward an explanation based on underspecification couched in the framework of Distributed Morphology. She assumes that 'the lexicon contains a single *wh*-form, underspecified in such a way that it is compatible with both genitive and accusative' (Citko 2005:487). Consider again example (3), repeated below, where syncretic forms license a mismatch in case.

(38)   Kogo   Janek lubi ——$_{ACC}$ a   Jerzy   nienawidzi ——$_{GEN}$?
        who.ACC/GEN John likes   and George hates
        'Who does John like and George hate?'   (Borsley 1983:170)

Citko assumes that the wh-phrase is simultaneously present in the object position of both verbs (and also in SpecCP, of course). The element receives both case features assigned by the verbs in question (GEN and ACC) (39).

(39)

Citko (2005:488) then states that 'the lexicon contains a single form that is compatible with both

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[7]Martin Salzmann (p.c.) suggests that this might not necessarily be fatal for a 'big DP' approach to resumption, in which the DP starts out in the same phrase as the resumption pronoun and is extracted (e.g. [$_{DP}$ DP [$_{D'}$ D resumptive]]) (e.g. Boeckx 2003). If the ATB-moved item multiply dominated the specifier of both 'big DPs', then this might work. However, if one no longer has a movement approach, in which the resumptive pronoun is stranded, then it is unclear what the status of the 'big DP' is in such an analysis. A perennial problem is that these complex elements never occur overtly, so it is unclear what their motivation would be in a multidominance approach.

accusative and genitive case feature by virtue of underspecification' (*kogo*) and this can be inserted into the terminal. The ungrammaticality of case mismatches in the inanimate wh-series where there is no syncretism (2) (repeated below) is explained by the assumption that 'there is no single lexical item that can be inserted into this slot without a feature clash, [...] the result is ungrammatical'.

(40)   a.   *Czego   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
            what.GEN Jan hates   and Maria likes

       b.   *Co   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
            what.ACC Jan hates   and Maria likes
            'What does Jan hate and Maria like?'   (Citko 2005:487)

There are, however, a number of fundamental problems with Citko's analysis. First, Citko seems to assume privative case features (GEN, ACC). As is clear from (39), the wh-phrase receives both ACC and GEN and bears [CASE:ACC,GEN] at the point at which Vocabulary Insertion takes place. In order for *kogo* to be inserted, the Vocabulary Item would have to bear either the features [CASE:ACC,GEN], [CASE:ACC] or [CASE:GEN]. The first option, which is actually not underspecification, would render it unfit for insertion into terminals with [CASE:ACC] and [CASE:GEN] specifications, that is, non-ATB environments where the wh-phrase is assigned only one case, following the Subset Principle (see (41) below). The second and third options would incorrectly restrict the distribution of *kogo* to either genitive or accusative contexts respectively, but do not capture the fact that the forms are syncretic.[8]

Furthermore, regarding the illicit case mismatches without syncretism in (40), Citko attributes the ungrammaticality to the fact that 'there is no single lexical item that can be inserted into this slot without a feature clash' (2005:488). However, this is not a standard approach in DM, where Vocabulary Insertion relies on underspecification and the Subset Principle to regulate competition between exponents (41).

(41)   *Subset Principle* (Halle 1997; our emphasis):
       The phonological exponent of a Vocabulary Item is inserted into a morpheme in the terminal string if the item matches *all or a subset of the grammatical features specified in the terminal morpheme*. Insertion does not take place if the Vocabulary Item contains features not present in the morpheme. Where several Vocabulary Items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

Thus, if we have a terminal corresponding to an inanimate wh-phrase assigned both genitive and accusative, it is not true that we have a feature clash. Instead, the Subset Principle predicts that we should be able to insert either exponent since both fulfil the Subset Principle and are equally specific (42).[9]

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[8] One would be forced to have multiple entries for *kogo*, which would reduce the syncretism here to accidental homophony, see Asarina (2011).

[9] Furthermore, the way the analysis in Citko (2005) is presented seems to suggest that inanimate wh-phrases involve the absence of an [ANIMATE] feature. If this is the case, then the single Vocabulary Item for *kogo* 'who' would

(42)
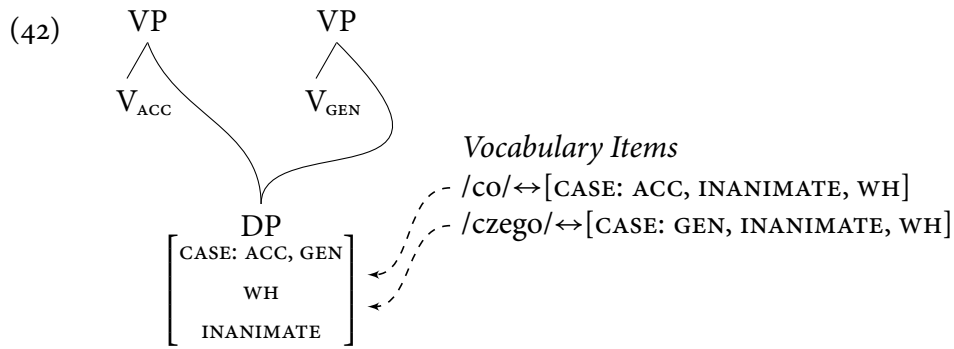
Consequently, we would expect that there should not be a case matching requirement to begin with. We could get around the first problem by decomposing the privative case features ACC and GEN into smaller features such as $[\pm\alpha]$ and $[\pm\beta]$ such that ACC:$[+\alpha,+\beta]$ and GEN:$[+\alpha,-\beta]$. By specifying *kogo* for $[+\alpha]$ only, it would be compatible with ACC:$[+\alpha,+\beta]$ and GEN$[+\alpha,-\beta]$, as well as a situation where a terminal bears both ACC and GEN, i.e. $[+\alpha,+\beta,+\alpha,-\beta]$. The second problem, however, remains. Even if we leave aside the conceptual question of how a terminal can bear $+\beta$ and $-\beta$ simultaneously, we would still expect that either /co/$\leftrightarrow[+\alpha,+\beta]$ or /czego/$\leftrightarrow[+\alpha,-\beta]$ could be inserted into a terminal with both genitive and accusative features $[+\alpha,+\beta,+\alpha,-\beta]$ in accordance with the Subset Principle (41). In order for the derivation with the inanimate wh-phrase to actually crash, one would have to introduce an *ad hoc* condition on Vocabulary Insertion, which demands that features on the VI are not in conflict with features on the terminal (which only ever seems to be the case in ATB constructions). Insertion of either *co*$\leftrightarrow[+\alpha,+\beta]$ or *czego*$\leftrightarrow[+\alpha,-\beta]$ would be precluded by their respective value of $[\pm\beta]$ conflicting with the value of $[\pm\beta]$ on the terminal ($[+\beta]$ on *co* conflicting with $[-\beta]$ on the terminal and $[-\beta]$ on *czego* conflicting with $[+\beta]$ on the terminal). However, going down this route entails giving up the Subset Principle, one of the core assumptions of DM.[10]

Alternatively, one could impose a ban against conflicting features on a terminal itself which would trigger a repair that deletes both conflicting features. Thomas (2015) actually pursues this alternative strategy. She proposes a rule of *Case Unification* defined in (43).

(43)   *Case Unification*:

realize the features [CASE:ACC,GEN,WH] and constitute a subset of the terminal in (i). Furthermore, it would count as equally specific for insertion (since it also realizes three features of the terminal; [CASE:ACC, CASE:GEN, WH] and should therefore also be an option for insertion here; clearly an undesirable result.)

[10]Asarina (2011) proposes a different way of dealing with conflicting case values on a single terminal in a multidominance analysis. When an element with a given feature matrix is assigned a second, different value for the already valued case feature, the whole feature matrix is duplicated to accommodate that value. The element then has two feature matrices that differ only in the value for the case feature. As long as both matrices can be spelled out by the same morphological rule (i.e. one that does not make reference to the distinct feature and is thus underspecified), the result is grammatical. However, even though the rule should actually be able to spell out both feature matrices only one exponent exists on the surface. In effect, this ties insertion of a VI into a terminal's feature matrix to a potential insertion of the same VI in the other feature matrix on the terminal even though that second insertion never actually happens. Roughly paraphrased: A VI may be inserted into a terminal with two feature matrices as long as it remains unclear which of the two it actually realizes. Thus, this leads back to the additional ban against a feature clash for vocabulary insertion: A VI may only be inserted into a terminal if it is not in conflict with any features on that terminal (even if they are in a different feature matrix). Another potential problem is that if syntactic objects are understood as being just bundles of features duplicating an element's feature matrix is the same as duplicating the actual element itself.

Every DP can only have one case, i.e. bear maximally one specification of each case subfeature ($[\pm\alpha]$ and $[\pm\beta]$ in our discussion). If this number is exceeded, the subfeatures must be reduced by:

a.   deleting all but one subfeature of a kind if they coincide in value (i.e. $[+\alpha]$ here)or

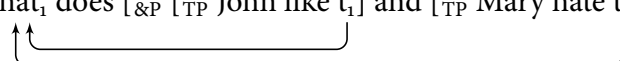b.   deleting all subfeatures of a kind if instances with differing values are present (i.e. $[+\beta,-\beta]$ here).

In (43) though, the different treatment of subfeatures with equal values as opposed to those with different values seems to be an *ad hoc* stipulation tailor-made for the problem at hand. Additionally, it is dubious that both conflicting subfeatures $[+\beta,-\beta]$ need to be deleted since deletion of only one of them would be sufficient to resolve the conflict here. Obviously, both subfeatures have to be deleted in order to account for the empirical facts. If only $[+\beta]$ were deleted the resulting feature specification would be $[+\alpha,-\beta]$, i.e. a proper genitive, in which *czego* could be inserted, contrary to fact. Equally, if $[-\beta]$ were deleted the resulting specification would be that of the accusative ($[+\alpha,+\beta]$) and *co* would be expected to occur, counterfactually.

A resolution of the feature conflict on the terminal in terms of an impoverishment rule faces similar issues. Such a rule would have to delete both conflicting subfeatures, i.e. any occurrence of $[\beta]$. This, however, causes problems for stating its domain of application. The only feature that the rule can make reference to in order to determine its application is $[+\alpha]$ here. We would have to state the rule as follows: $[\pm\beta] \rightarrow \emptyset/[+\alpha]$. Crucially, this rule also deletes $[\pm\beta]$ in regular genitive and accusative contexts where $[+\alpha]$ is present. Although it might technically be possible to formulate a rule like $[\pm\beta] \rightarrow \emptyset/[+\beta,-\beta]$ we would have to have similar rules for all possible feature conflicts. Equally, as impoverishment rules are language-specific, we would expect there to be languages that do not have them and therefore should allow optionality between non-syncretic accusative and genitive exponents in ATB constructions. There are, however, no reports of such languages.

Thus, while Citko's vague proposal based on underspecification may sound plausible initially, it actually emerges as problematic, if not untenable, when implemented explicitly. And even if some working implementation can be formulated, it would still come as an additional mechanism imposed on top of the multidominance that derives the one filler multiple gap property of ATB constructions and is basically a tailor-made solution to capture 'repair by syncretism'.

3.1.5   Parallel extraction

The last approach is the most traditional one and assumes that we can simply extract from both conjuncts simultaneously (44) (e.g. Ross 1967; Williams 1978; Dyła 1984; Blümel 2013, 2014).

(44)   *Parallel extraction approach to ATB*
       What$_1$ does [$_{\&P}$ [$_{TP}$ John like t$_1$] and [$_{TP}$ Mary hate t$_1$]] ?

For reasons that are still poorly understood (but see section 3.2.2), this particular kind of extrac-

tion can circumvent the *Coordinate Structure Constraint*, stating that extraction from a single conjunct is not possible (Ross 1967; Grosu 1973). Furthermore, it is unclear how moving two items can result in a single filler (cf. Blümel 2017, Weisser 2015:147). This has typically been handled by construction specific rules (Ross 1967; Williams 1978), however this is something that the analysis to follow will explain. Since this approach is also symmetric, it shares with multidominance analyses the virtue of being able to explain single identity readings in ATB constructions.

Regarding the question of 'repair by syncretism', current parallel extraction approaches have to more or less stipulate the case matching requirement in one way or another (e.g. Dyła 1984:702). For example, Blümel (2014, 2017) simply states the matching requirement as in (45b):

(45)   A movement chain must

      a.   comprise non-distinct members (i.e. they must be featurally identical)

      b.   be headed by a syntactic object which receives an exponent compatible with all lower chain members.

<div align="right">(Blümel 2017:144)</div>

Since chain formation is most plausibly syntactic in nature, Blümel's approach is clearly incompatible with a postsyntactic view of morphology (despite his claims to the contrary; Blümel 2014:31). The new approach that we pursue is also a symmetric extraction approach. However, the crucial difference to existing symmetric extraction approaches is that it can explain both the one-to-many relation between fillers and gaps and the syncretism repair property.

3.2 Theoretical assumptions

In the following, we propose an account of ATB dependencies that utilizes an intersection of the ATB-moved elements to create a single filler. In order to derive this, we will introduce new assumptions, or make some already existing ideas more explicit. The motivation for each of these assumptions will be discussed in turn.

3.2.1 Movement via an external workspace

The existence of complex specifiers necessitates more than one workspace in a syntactic derivation. In (46), the complex subject *the man with the hat* undergoes External Merge with v' as its specifier, however, this complex DP must have been built somewhere other than the current workspace, i.e. from another numeration, see e.g. Nunes & Uriagereka (2000:22), Nunes (2004:174), Putnam (2007:99), Di Sciullo & Isac (2008:287), and Collins & Stabler (2016:47).

(46)
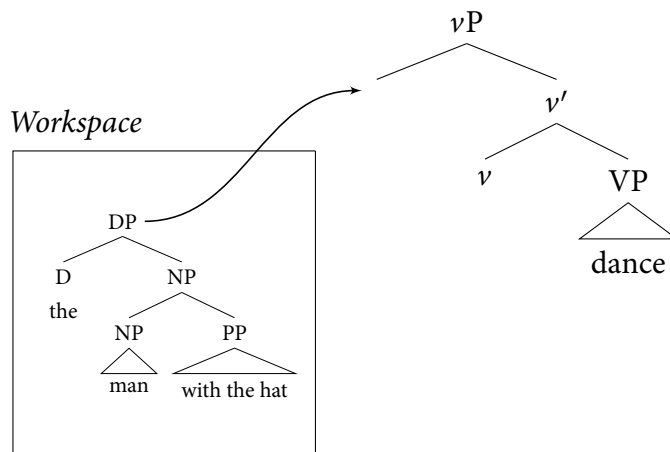
This existence of an additional workspace has been exploited by Nunes (2001, 2004) who assumes that it is possible for elements to undergo 'sideward' movement to another workspace of the local tree. Furthermore, there has been an effort to dispense with a separate operation for movement, and instead view movement as a kind of Merge (e.g. Chomsky 1995; Starke 2001). In particular, movement is assumed to be a variant of External Merge, with the difference being whether the target of the operation is included in the same workspace (Collins & Stabler 2016:48). Both operations have in common that they obey Chomsky's (1995) *Extension Condition*, stating that Merge must apply at the root node (i.e. extend the tree). We claim that one natural way to capture this is to actually decompose Internal Merge into two steps: Sideward Movement & External Merge. In the Copy of Theory of Movement, it seems that Internal Merge is already often (tacitly) assumed to consist of two steps: the first step creates a copy, and the second step involves External Merge of this copy at the root (this is made explicit in Putnam 2007, Stroik 2009 and Stroik & Putnam 2013:22). One question that is not often addressed is where exactly this moving copy is generated and stored. It seems desirable to assume that External Merge always accesses an item in a separate workspace. Thus, we assume that all instances of Internal Merge proceed in a two-step fashion as in (47): 'sideward' movement to an external workspace (creating a copy) followed by External Merge at the root node.

(47)   Who did John see?
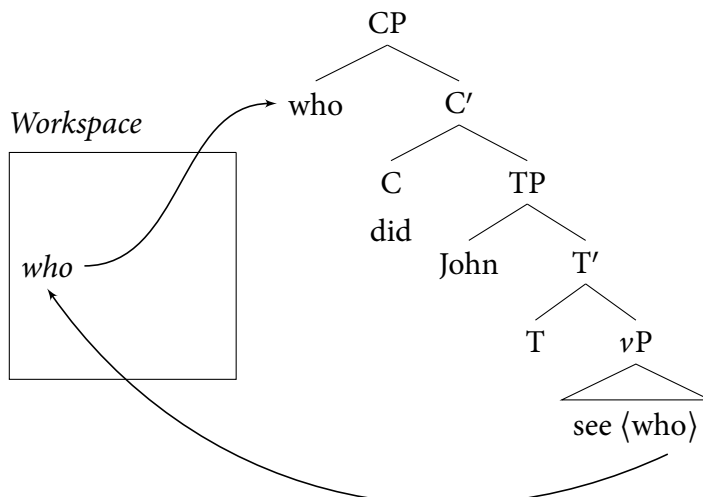
3.2.2 Parallel movement

Another assumption we make is that ATB involves parallel movement, that is, simultaneous movement from two distinct positions to a single landing site.

It has been long noted that ATB must take place from 'parallel positions' (Williams 1978; Franks 1993, 1995; Kasai 2004; Citko 2006). For example, ATB extraction from a subject and object position is not possible:

(48) *I know a man who [Bill saw t_1] and [t_2 likes Mary]   (Williams 1978:34)

This can be captured by the derivational constraint in (49).[11]

(49) *Parallelism Condition on ATB movement* (Kasai 2004:181):
       ATB movement must take place from syntactically parallel positions.

Furthermore, Franks (1993, 1995) discusses ungrammatical examples of ATB movement from Russian, in which the case matching requirement is met, but the extraction is from different structural positions, and therefore illicit. Given the Strict Cycle Condition (SSC) (Chomsky 1973), we can derive the parallelism requirement by assuming that ATB involves simultaneous movement to an external workspace as in (50).

(50)
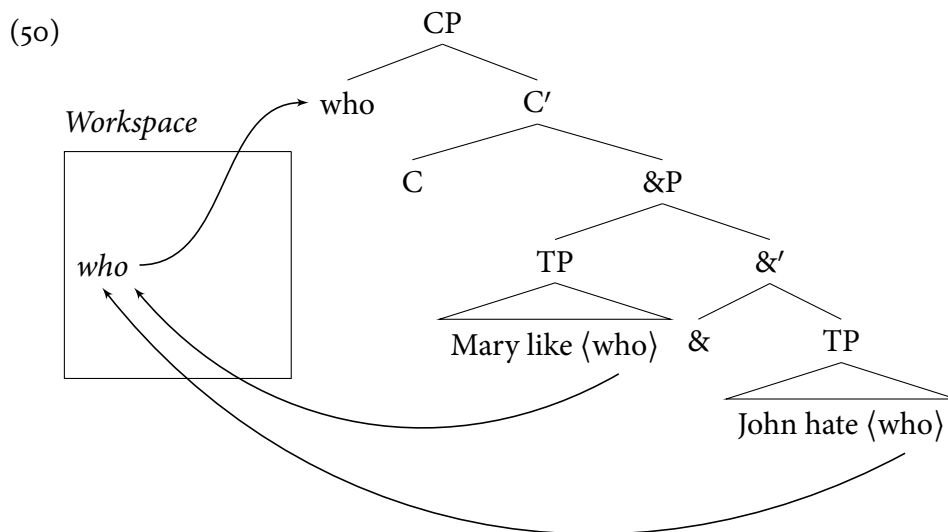
For reasons that will be made clear in the following section, parallel movement to an external workspace results in a single item, which is subsequently remerged into the structure. Assuming that the SSC holds across conjuncts (i.e. they are built in parallel), extraction from the same position (i.e. subject or object) will be possible, whereas extraction from different positions will result in a SSC violation.Parallel movement would therefore seem to be restricted to coordinate

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[11]There are some examples, in which this condition appears to be flouted. One such example is from Williams (1978:34) in (i):

(i)   I know the man who [John likes ___] and [we hope ___ will win]

Here, it looks like we extracted from the embedded subject position, however since *hope* is a raising-to-object verb, we can assume that the position from which ATB-extraction takes place is Spec-vP in both conjuncts.

structures (but cf. Vicente 2016 on some possible exceptions). One possible reason for this could be that it is a Last Resort option to circumvent the Coordinate Structure Constraint (CSC, Ross 1967) that militates against extraction from a single conjunct. If we take a representational view of the CSC as in (51) (see Mayr & Schmitt 2013:41, Weisser 2015:197f., but cf. Kato 2005), then no extraction can take place from a single conjunct at any point of the derivation. Crucially, by moving in parallel we avoid both of the configurations banned by (51):

(51)   *Coordinate Structure Constraint* (Weisser 2015:197):
        In a structure $[_{\&P}$ A $[_{\&'}$ B $]]$, movement (out) of either A or B is prohibited:
        $*[\ \alpha \dots [_{\&P} [_A\ t_\alpha\ ]\ \&\ [_B\ \beta\ ]]]$
        $*[\ \beta \dots [_{\&P} [_A\ \alpha\ ]\ \&\ [_B\ t_\beta\ ]]]$

Furthermore, this general approach can help to make sense of an interesting restriction on ATB movement reported by Kasai (2004) and Citko (2005, 2011). In multiple wh-fronting languages such as Polish, it is not possible to combine ATB extraction and multiple wh-fronting:

(52)   a.   *Kogo$_1$ kogo$_2$ $[_{TP}$ Jan lubi t$_1$] a $[_{TP}$ Maria kocha t$_2$] ?
             who.ACC who.ACC   Jan likes   and   Maria loves
             'Who does Jan like and Maria love?'

        b.   *Kogo$_1$ komu$_2$ $[_{TP}$ Jan lubi t$_1$] a $[_{TP}$ Maria się   przygląda t$_2$] ?
             who.ACC who.DAT   Jan likes   and   Maria REFL looks.at
             'Who does Jan like and Maria look at?'   (Citko 2005:492)

As Citko argues, this follows under a multidominance approach. Under a movement-based approach, these examples serve to show us that parallel extraction (somehow resulting in a single filler) is the only way to leave a coordination structure since multiple ATB wh-fronting entails two separate extraction operations that each violation the CSC as defined in (51). Revealingly, multiple wh-fronting is possible only if each filler corresponds to two gaps:

(53)   Co$_1$ komu$_2$ $[_{TP}$ Jan kupił   t$_1$ t$_2$] a $[_{TP}$ Piotr wysłał t$_1$ t$_2$] ?
        who.ACC who.DAT   Jan bought   and   Peter sent
        'What did Jan buy for whom and Peter send to whom?'   (Citko 2011:57)

As a result, even in languages with the option of multiple wh-fronting, extraction from a coordinate structure must involve parallel movement. How exactly this parallel movement results in a single filler is discussed in the following section.

3.2.3   Feature set intersection

In the previous section, we established our assumption that ATB movement proceeds in parallel to an external workspace, however, how does ATB extraction result in a single filler if two elements are moved simultaneously? We suggest that parallel movement to an external workspace results in set intersection of the feature sets of the moving elements. Recall that parallel sideward movement is viewed as a Last Resort solution to circumvent the CSC and is therefore not the norm. We assume that the external workspace has a restriction that it can hold a single moving

item. As a result of this restriction, something must happen if two items move in parallel. It seems we have two options: (i) intersection of feature sets, (ii) unification of feature sets. The latter option would run into the same problems shown for Citko's DM approach in section 3.1.4, since the wh-phrase would bear both case values in a unification approach. Thus, we assume that if more than a single item is moved (via the external workspace), intersection of the feature sets of these items must take place. In a simple example of ATB movement in (54), both wh-phrases (with matching feature sets) are intersected in the external workspace, resulting in a single wh-phrase bearing the same features as the two moved items. This single element then re-enters the structure at the the landing site for ATB movement.

(54)
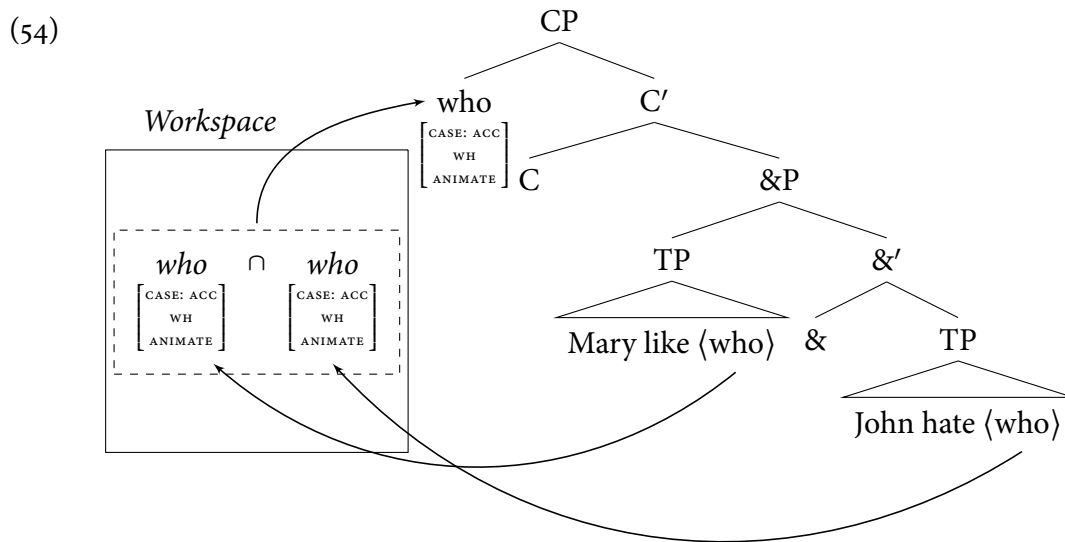
In this way, we can derive the asymmetric relation between fillers and gaps that is a hallmark of ATB dependencies. Furthermore, if the feature sets of the items do not intersect for a particular feature, for example animacy features with *who* ([+anim]) and *what* ([−anim]), then the value of that feature will be empty and thus result in a crash (given *Full Interpretation*; Chomsky 1995). Example (54) is a somewhat trivial case, in which both of the intersected items have exactly the same features. However, as we show in the next section, this intersection operation has interesting, welcome consequences when cases do not match, but are syncretic.

3.3 Deriving case mismatches under ATB with syncretic forms

This section will illustrate how 'repair by syncretism' follows naturally in an intersection approach to ATB movement on the basis of the examples from Polish. To begin with, we decompose standard case features in Polish into the smaller binary subfeatures [±subj(ect)], [±gov(erned)], and [±obl(ique)] (Jakobson 1962; Bierwisch 1967; Wiese 1999; Alexiadou & Müller 2008) in (55).[12]

(55)   *Polish case decomposition and wh-phrases*

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[12]Note that the features we use are arbitrary. However, for convenience, we adopt the conventional labels ±*subject*, ±*governed* and ±*oblique* without attributing these any semantic relevance. They could easily be replaced by $\pm\alpha, \pm\beta, \pm\gamma$.

Case	Decomposition	wh$_{anim}$	wh$_{inan}$
NOM	[+subj −gov −obl]	*kto*	***co***
ACC	[−subj +gov −obl]	***kogo***	*co*
GEN	[+subj +gov +obl]	***kogo***	*czego*
DAT	[−subj −gov −obl]	*komu*	*czemu*
INS	[+subj −gov +obl]	***kim***	***czym***
LOC	[−subj −gov +obl]	***kim***	***czym***

Syncretism can then be captured by assuming that syncretic forms are underspecified and realize a feature that is present in both contexts.[13] In other words, syncretic forms must have at least one feature in common (the one that the syncretic form realizes), i.e. their contexts' feature sets must overlap. For example, one can see in (55) that animate wh-phrases in the genitive and the accusative share the feature [+gov]. Thus, the exponent *kogo* can be underspecified for only [+gov, +anim] and will therefore be inserted in both accusative and genitive animate contexts. We assume the following Vocabulary Items for Polish wh-phrases:

(56)   *VIs for Polish wh-phrases*
                        <u>Animate series</u>
   DAT   /komu/ ↔ [−subj −gov −obl +anim]
   NOM   /kto/ ↔ [+subj −gov −obl +anim]
   INS,LOC   /kim/ ↔ [−gov +obl +anim]
   ACC,GEN   /kogo/ ↔ [+gov +anim]
                        <u>Inanimate series</u>
   DAT   /czemu/ ↔ [−subj −gov −obl −anim]
   GEN   /czego/ ↔ [+subj +gov +obl −anim]
   INS,LOC   /czym/ ↔ [−gov +obl −anim]
   NOM,ACC   /co/ ↔ [−obl −anim]

Although ATB is independently assumed to involve intersection in order to derive the one-to-many relation we observe between fillers and gaps, we also see that this will derive the case matching data, in particular, repair by syncretism in the following way: If we try to ATB-move two wh-phrases with mismatching cases, those with an overlapping feature will result in a successful intersection and – provided that there is a suitably underspecified VI – will be realized by that VI. We will show this in detail in the following sections.

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[13]An alternative approach is to use postsyntactic rules (e.g. impoverishment rules) to derive syncretism (see Himmelreich 2017), however, we find this approach somewhat more *ad hoc* and are unsure of how it is compatible with 'repair' effects of syncretism.

3.3.1 ATB with matching cases (no syncretism)

An example of an ATB dependency with matching cases is given in (57) where both verbs assign accusative case to an animate wh-phrase.

(57) Co   Janek widział ___ACC a   Maria lubiła ___ACC ?
      what.ACC John saw   and Mary liked
      'What did John see and Mary like?'

As we saw in previous sections, both wh-phrases move in parallel via the external workspace. Given the assumption this workspace can only hold one item, both items undergo feature intersection. Since in this case both items have exactly the same case features the newly formed item is identical to each of the two moving items, that is, it bears a fully specified accusative case. This new item is then merged from the external workspace into SpecCP.

(58)
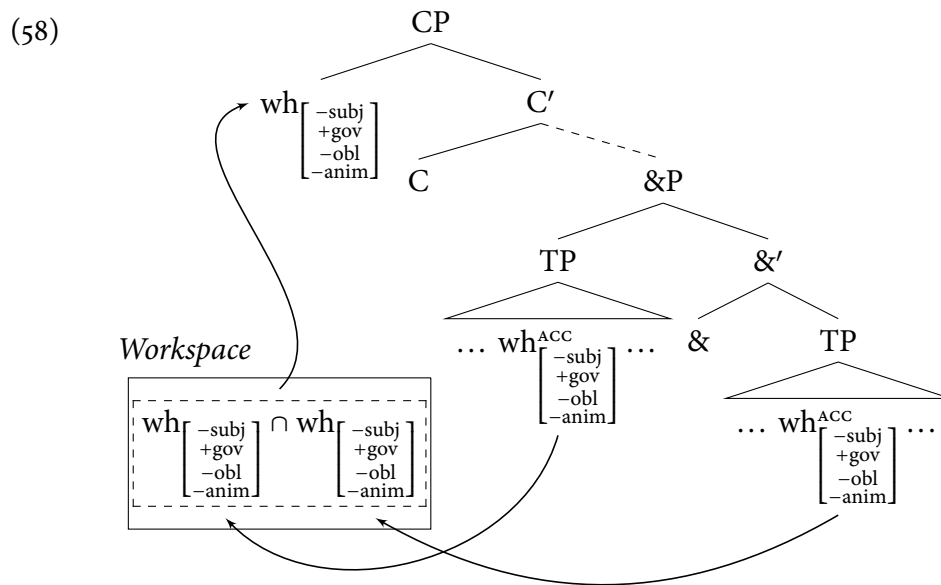
At Spell-Out, only one of the four wh-vocabulary items from the inanimate series (59), namely *co*, is specified for a subset of the wh-phrase's morphosyntactic features and therefore available for insertion. All other VIs are specified for at least one feature-value that is not part of the terminal. Hence, the accusative marker *co* is inserted as expected in accordance with the Subset Principle.

(59) *Vocabulary insertion*:
      /czemu/ ↔ [−subj −gov −obl −anim] ⊄ {−subj +gov −obl −anim}
      /czego/ ↔ [+subj +gov +obl −anim] ⊄ {−subj +gov −obl −anim}
      /czym/↔ [−gov +obl −anim] ⊄ {−subj +gov −obl −anim}
      /co/ ↔ [−obl −anim] ⊆ {−subj +gov −obl −anim}

3.3.2 ATB with mismatching cases (no syncretism)

Now consider an example like (60) where one verb assigns genitive and the other accusative. Because the wh-phrases for both cases are not syncretic, the resulting sentences are ungrammatical.

(60) a. *Czego   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
          what.GEN Jan hates   and Maria likes

      b. *Co   Jan nienawidzi ——GEN a   Maria lubi ——ACC?
          what.ACC Jan hates   and Maria likes
          'What does Jan hate and Maria like?'   (Citko 2005:487)

Again, as this is ATB movement, both wh-phrases move in parallel into the external workspace where they are intersected. In contrast to the above example with matching cases, there is a case mismatch between the moving items. The resulting single wh-phrase is thus specified for only those features which are present on both movees. These are features that accusative and genitive have in common plus the animacy (and wh) feature which are the same on both items. Since both cases differ in their value for [±subj] and [±obl] but have the same [+gov] value the newly formed wh-phrase only bears the latter together with the [−anim] feature (61).

(61)
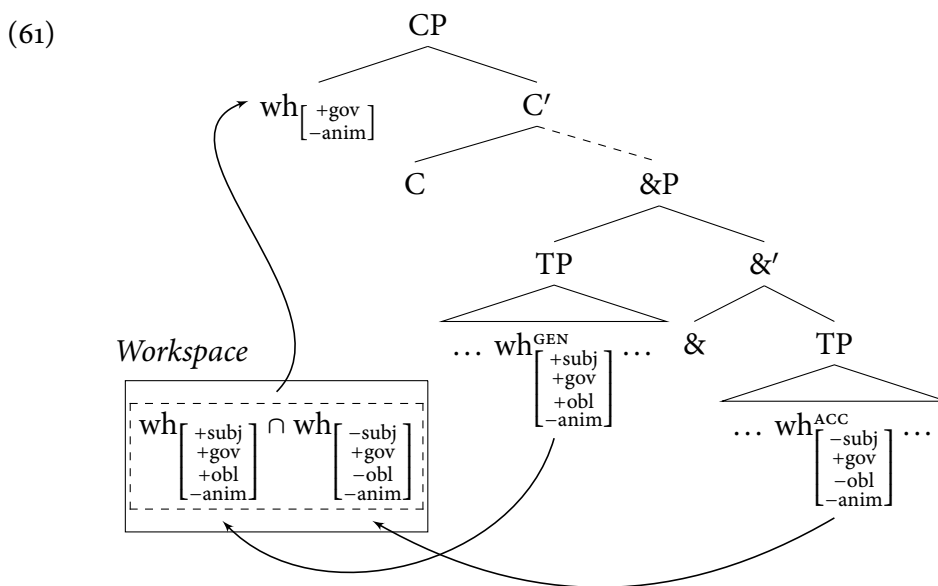
When vocabulary insertion takes place, none of the vocabulary items of the inanimate series fulfils the Subset Principle. All of them are specified for features like [±subj] or [±obl] which are not present on the terminal. Hence, none of them can be inserted. For reasons of recoverability, however, a wh-phrase cannot remain unrealized at PF and the failure of vocabulary insertion results in a crash of the derivation which explains why (60) is ungrammatical.

(62)   *Vocabulary insertion*:
        /czemu/ ↔ [−subj −gov −obl −anim] ⊄ {+gov −anim}
        /czego/ ↔ [+subj +gov +obl −anim] ⊄ {+gov −anim}
        /czym/↔ [−gov +obl −anim] ⊄ {+gov −anim}
   /co/ ↔ [−obl −anim] ⊄ {+gov −anim}

3.3.3 ATB with mismatching cases (empty intersection)

In addition, there is another way in which a case mismatch can lead to a crash and, thus, ungrammaticality. Consider a case mismatch like (63) where one verb *nienawidzić* 'hate' assigns

genitive and the other verb *ufać* 'trust' assigns dative.

(63) a. *Kogo   Jan nienawidzi ___GEN a   Maria ufa   ___DAT?
         who.ACC/GEN Jan hates   and Maria trusts
         'Who does Jan hate and Maria trust?'

     b. *Komu   Jan nienawidzi ___GEN a   Maria ufa   ___DAT?
         who.DAT Jan hates   and Maria trusts
         'Who does Jan hate and Maria trust?'   (Joanna Zaleska, p.c.)

As in the examples discussed above, both wh-phrases move to the external workspace in parallel and a new single wh-phrase is created by intersecting both of them. However, since genitive and dative have different values for all three case features, the new item that is merged in SpecCP only bears an animacy feature but remains unspecified for case (64).

(64)
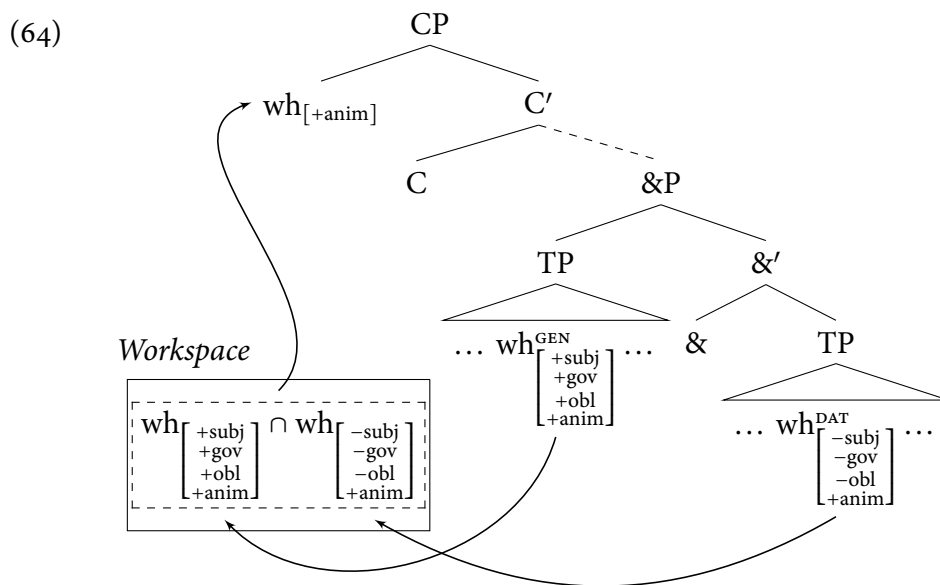
In other words, the newly formed wh-phrase is unvalued for case. Since there is no other case-assigner in the structure who at this point has not already assigned its case the item remains case-less until spell-out. A DP that does not have case, however, is in conflict with the Case Filter (or whatever ensures that DPs have case, e.g. *Full Interpretation*; Chomsky 1995). The derivation therefore crashes at the interface to PF.

3.3.4 ATB with mismatching cases (with syncretism)

The interesting case now concerns ATB movement with mismatching cases that happen to be realized by the same (syncretic) form. Consider the, by now familar, case in (65).

(65) Kogo   Janek lubi ___ACC a   Jerzy nienawidzi ___GEN ?
      who.ACC/GEN John likes   and George hates
      'Who does John like and George hate?'   (Borsley 1983:170)

As usual, ATB movement proceeds via parallel movement to an external workspace where both wh-phrases are intersected to create a new single wh-phrase. Again, like in (61), accusative and

genitive only have one feature-value in common which is [+gov], while they differ in the values for the other two case features [±subj] and [±obl]. The new wh-phrase is thus specified for [+gov] and, in contrast to (61), importantly also for [+anim] instead of [−anim].

(66)
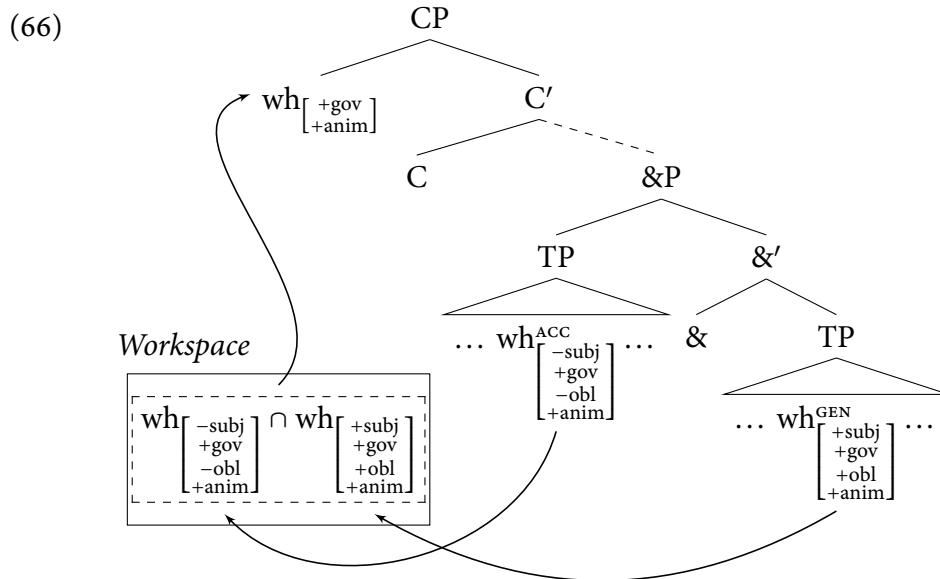
In contrast to the inanimate series, the animate series of Polish wh-vocabulary items contains a VI that is syncretic for accusative and genitive. *Kogo* is underspecified for [±subj] and [±obl] in exactly the same way that the wh-terminal in SpecCP is. It therefore fulfils the Subset Principle and can be inserted. Since ATB and syncretism employ the same underlying mechanism, i.e. intersection of feature sets, a syncretic vocabulary item can repair a case mismatch in an ATB dependency.

(67)   *Vocabulary insertion*:

/komu/ ↔ [−subj −gov −obl +anim] ⊄ {+gov +anim}

/kto/ ↔ [+subj −gov −obl +anim] ⊄ {+gov +anim}

/kim/ ↔ [−gov +obl +anim] ⊄ {+gov +anim}

/kogo/ ↔ [+gov +anim] ⊆ {+gov +anim}

One may wonder if it is possible for feature set intersection via ATB-movement to create an underspecified item that could be realized by a completely different exponent. An example of this would ATB-movement of a dative and accusative DP resulting in an entirely different case such as instrumental, for example. However, this scenario seems unlikely. To appreciate this, consider the following abstract example that captures the spirit of the present approach. If we have the paradigm in (68), then the distribution of A can be captured by underspecification for the feature [+f] only. The forms B and C, on the other hand, will require full specifications (68b,c).

(68)

	+g	−g
+f	A	A
−f	B	C

(69)   a.   [+f] ↔ A

b.   [−f, +g] ↔ B

c.   [−f, −g] ↔ C

As we saw, intersection of items bearing the mismatching features [+f, +g] and [+f, −g] will result in morphological realization by (69a). However, what if there was another, completely non-syncretic exponent that just happened to be underspecified for the features realized by the features shared by the intersected items. Abstractly, such a scenario could look as follows. If there is no syncretism in the paradigm in (70), then the exponents A–D will have to be fully specified for the features f and g. However, if we intersected the feature sets corresponding to the forms B [$+f$, −g] and D [$−f$, −g], for example, the result would be their shared feature [−g]. If we have a Vocabulary Item such as (70e), the result of intersection could be realized as the exponent E.

(70)

	+g	−g
+f	A	B
−f	C	D

(71)   a.   [+f, +g] ↔ A
       b.   [+f, −g] ↔ B
       c.   [−f, +g] ↔ C
       d.   [−f, −g] ↔ D
       e.   [−g] ↔ E

However, would this situation plausibly ever arise? This would be an instance in which there is a distinct, underspecified VI for a form that only occurs in ATB contexts. While such an entry could in principle exist, there is no cue from the morphological paradigm to posit such a form. Assuming that underspecification is chiefly a strategy to account for syncretism in the paradigm of a learner's language, the entry in (71e) is superfluous and thereby unlearnable. Instead, underspecification must exist independently and be motivated by syncretism in the paradigm in question. Once such a syncretism, and the associated underspecification, exists in the grammar, then the intersection operation employed in ATB-contexts can 'piggy-back' on this syncretism to save ATB-movement of non-identically case-marked constituents. If syncretism/underspecification is not independently available in the grammar, then mismatches under ATB-movement will result in a failure of Vocabulary Insertion, as shown in section 3.3.2.

3.4   Intersecting complex elements

In the intersection analysis developed here, there still remains the question of how we can account for items with complex internal structure that undergo ATB-movement. For example, it is possible to have ATB-extraction of complex elements such as *which book* in (72).

(72)   Which book₁ did [Mary read t₁] and [John throw away t₂] ?

This would seem to pose a challenge for a naïve theory of set-intersection since we would intersect of 'nested sets'. To see this, let us assume that the wh-object *which book* corresponds to a set in (73) containing the sets corresponding to *which* and *book* (i.e. Merge is set formation; see e.g. **?**Collins 2017; Chomsky 2013).

(73)   *which book* = {{D, ACC, ϕ}$_{which}$, {D, ACC, ϕ}$_{book}$}

Furthermore, if each of these elements bears case feature values such as α, β and γ, then we want to intersect the elements of the sets corresponding to *which* and *book*, respectively (74).

(74) $\{\{\text{D}, \beta, \alpha, \phi\}_{which}, \{\text{D}, \beta, \alpha, \phi\}_{book}\} \cap \{\{\text{D}, \alpha, \gamma, \phi\}_{which}, \{\text{D}, \alpha, \gamma, \phi\}_{book}\}$
$= \{\{\text{D}, \alpha, \phi\}_{which}, \{\text{D}, \alpha, \phi\}_{book}\}$

The issue here is that intersection must apply recursively to elements contained within a sets. While this may seem like an obstacle at first, it can be overcome by exploiting that the fact that set notation is equivalent to a hierarchical tree structure. In fact, applying arithmetic operations to elements with complex internal structure is often implemented by breaking the task down into sub-tasks that apply to an ordered, hierarchical structure. This is pointed out by **?**:146f., who draws an explicit parallel to syntax. He argues that the complex equation in (75), in which the inner bracket must be computed first, can be understood in terms of the tree structure in (75).

(75) $(5 \times 6) + 8$

We can take a similar approach to intersection of nested sets. Recall that the intuitive view of intersection we took involves taking two trees and building a new tree whose nodes correspond to the shared features of the relative nodes in the input trees. We can therefore treat nested set structures corresponding to complex syntactic structures as application of recursive intersection to a tree structure. Consider first an abstract example with natural numbers. Imagine that we want to intersect the two internally-complex sets in (76).

(76) $\{\{\{6,5,2\}, \{8\}\}, \{\{5, 7\}, \{8, 4, 3\}\}\} \cap \{\{\{4, 5\} \{8, 3\}\}, \{\{3, 5\} \{4, 7, 8\}\}\}$

If we break down these sets into the corresponding tree structure in (77), then we treat intersection a top-down tree traversing algorithm similar to the *zipper* function in computer science (Huet 1997).

(77)
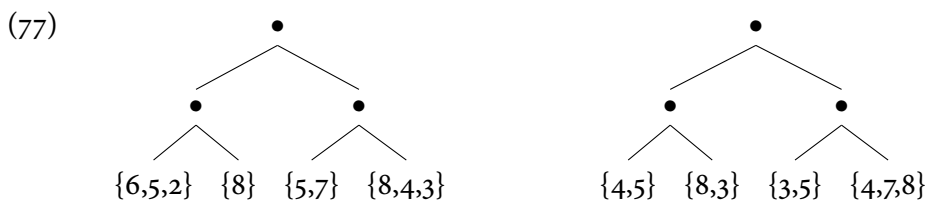
When ATB-movement creates a new tree from two existing trees $\mathcal{T}_1$ and $\mathcal{T}_2$, one starts at the root node of $\mathcal{T}_1$ and then follows the a path (down left or right sisters) until a terminal node is found. The same number of steps applies to find the corresponding in $\mathcal{T}_2$. In the new tree ($\mathcal{T}_3$), the specification of this node is the intersection of the relevant nodes in $\mathcal{T}_1$ and $\mathcal{T}_2$.[14] Failure to find a matching node will result in abortion of the algorithm and therefore a crash. This means

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[14]Note that intersection could, in principle, apply at non-terminal nodes. We do not assume this for the syntactic trees in question, given the assumptions of Bare Phrase Structure (e.g. Chomsky 1995; **?**). Furthermore, standard approaches to Distributed Morphology assume that Vocabulary Insertion only applies to terminal nodes, i.e. the ones undergoing intersection in the present analysis.

that if the trees do not match trivially, intersection will be impossible. Recursive application of this algorithm will generate the tree in (78).
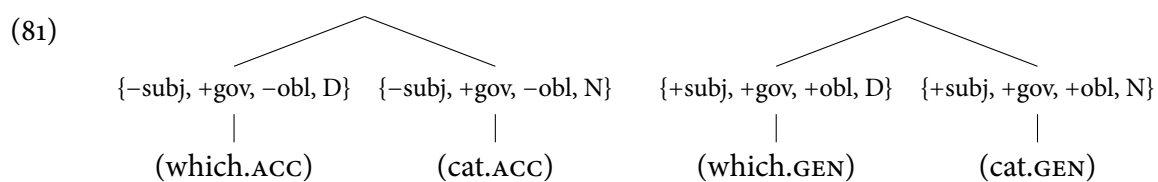
(78)

{6,5,2} ∩ {4,5}   {8} ∩ {8,3}   {5,7} ∩ {3,5}   {8,4,3} ∩ {4,7,8}
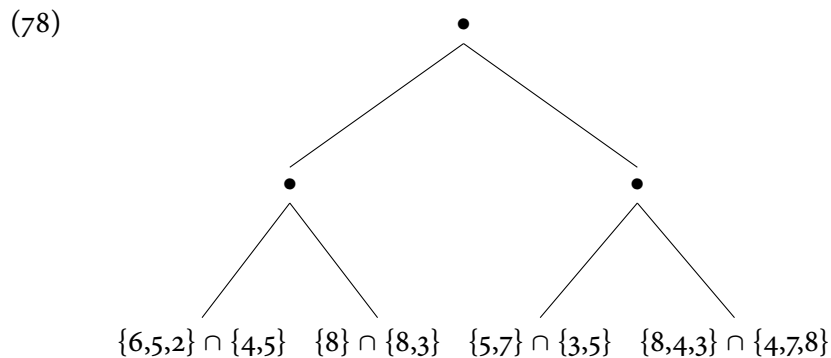
After intersection, we have the tree in (79) corresponding to the set {{{5}, {8}}, {{5}, {4,8}}}.

(79)

{5}   {8}   {5}   {4,8}
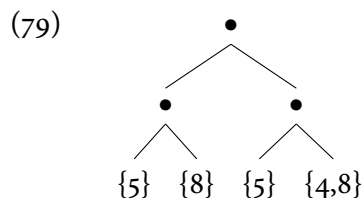
This approach will then also work for intersection of DPs with complex internal structure. In the Polish example in (80), a complex DP can undergo ATB-movement if both the determiners and NPs are syncretic in accusative and genitive (80).

(80) Któr-ego   kot-a   Janek lubi ___ACC a Jerzy nienawidzi ___GEN ?
      which-ACC/GEN cat-ACC/GEN Janek likes   and Jerzy hates
      'Which does Janek like and Jerzy hate?'

Let us assume that the two trees that are intersected involve a DP bearing accusative and genitive case respectively:

(81)

{−subj, +gov, −obl, D}   {−subj, +gov, −obl, N}   {+subj, +gov, +obl, D}   {+subj, +gov, +obl, N}
          | | | |
     (which.ACC)   (cat.ACC)   (which.GEN)   (cat.GEN)

When these trees undergo parallel movement to the external workspace, a new tree is created by intersecting the relevant terminal nodes. This results in the derived tree in (82).

(82)

{+gov, D}   {+gov, N}
    | |
 (which)   (cat)
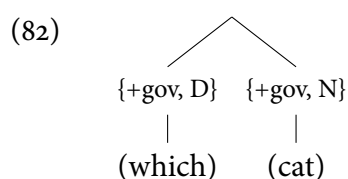
Given suitably underspecified Vocabulary Items such as those in (83) for the determiner, the

terminal corresponding to a non-empty feature set can only be realized by an underspecified, i.e. syncretic, exponent such as the one in (83b).

(83)   a. /którą/   ↔ [−subj, +gov, −obl, +fem]
        b. /którego/ ↔ [+gov, −fem]

The discussion in this section therefore demonstrates that the possibility of trees being internally complex is not a challenge to the intersection approach if we assume that intersection applies recursively to the relevant nodes of the trees themselves.

3.5   Right Node Raising

Finally, we will show how this analysis can be extended to case matching in the Russian Right Node Raising constructions discussed in section 2. Recall that Russian imposes the same case matching condition on RNR as we find for leftward ATB extraction (84), and crucially this restriction can also be circumvented by syncretism (85) (Asarina 2011:174).[15]

(84)   *On ne ostavil ＿＿$_{ACC}$, tak kak emu nadoela ＿＿$_{NOM}$, *tarelk-a/-u*   s   chürnoj
        he not kept   as   him sick.of   plate-NOM/-ACC with black
        kaëmkoj.
        border
        'He didn't keep, as he was sick of, the plate with the black border.'

(85)   On ne ostavil ＿＿$_{ACC}$, tak kak emu nadoela ＿＿$_{NOM}$, *bljudc-e*   s   chürnoj
        he not kept   as   him sick.of   saucer-ACC/NOM with black
        kaëmkoj.
        border
        'He didn't keep, as he was sick of, the saucer with the black border.'

Before we proceed to the analysis of these constructions, a few remarks on the analysis of RNR are required. Right Node Raising is a notoriously heterogeneous phenomenon and it is unclear what its correct treatment is (cf. Bošković 2004; Abels 2004; Bachrach & Katzir 2009; Barros & Vicente 2011*a*; Larson 2012; Chaves 2014). Due its similarity to ATB extraction in terms of the asymmetry between fillers and gaps, similar proposals have been made for RNR: (i) ATB movement (e.g. Postal 1974; Sabbagh 2007), (ii) phonological ellipsis (e.g. Wilder 1997; Hartmann 2000) and (iii) multidominance (e.g. McCawley 1982; Gračanin-Yüksek 2013; Bachrach & Katzir 2009, 2017). The emerging consesus is that RNR is better viewed as a cover term for a group of superficially similar phenomena that correspond to a (proper) subset of the aforementioned analytical op-

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[15]Similar examples have also been discussed in the literature. For example, Zaenen & Karttunen (1984) discuss the Finnish example in (i) where the possessive suffix *-nsa* is syncretic for both genitive/nominative and singular/plural and thereby permits a mismatch (see Toivonen 2000 on some of the intricacies of the possessive suffix).

(i)   He lukivat hänen uusi-mm-an   ＿＿$_{GEN.SG}$ ja me hänen parha-at   ＿＿$_{NOM.PL}$
        they read   his   new-SPRL-GEN.SG   and we his   best-NOM.PL
        kirja-nsa
        book-GEN.SG/NOM.PL
        'They read his newest book and we read his newest books.'

tions (Barros & Vicente 2011a; Chaves 2014). Chaves (2014) assumes that RNR can involve ATB extraction and, while Barros & Vicente (2011a,b) do not argue in favour of an ATB analysis of RNR, they do not rule it out in principle (Barros & Vicente 2011a:46,fn.11). Furthermore, Sabbagh (2007) presents compelling arguments for a movement approach, for example the fact that a universal quantifier right-node-raised from a relative clause can out-scope an existential quantifier outside of that clause (86) (Sabbagh 2007:367).

(86)   John knows [someone [who speaks ___]] and Mary knows [someone
       [who wants to learn ___]] *every Germanic language*   (∃>∀, ∀ > ∃)

One common objection to the movement approach to RNR is that it is not subject to the same constraints as other rightward processes such *Heavy NP Shift* (HNPS) (e.g. Bachrach & Katzir 2009:286). For example, HNPS is subject to the *Right Roof Constraint* (i.e. clause-boundedness; cf. Ross 1967) (87a), whereas RNR is not (87b).

(87)   a.   *John claimed [$_{CP}$ that Sam loves ___] yesterday *the new headmaster*.
       b.   John claims [$_{CP}$ that Sam loves ___] and Mary claims [$_{CP}$ that Sam hates ___]
            the new headmaster

However, the fact that RNR differs from other rightward process is not problematic, in fact there is evidence that RNR is distinct from HNPS since the two processes interact as in (88) (Wilder 1997, also see Kluck & de Vries 2013 for similar Dutch examples).

(88)   [John bought ___] and [Mary put ___ in the fridge (___)] *two bottles of champagne*.
                                                                              (Wilder 1997:84)

In order not to violate the *Right Edge Restriction* requiring RNR gaps to be rightmost in the conjunct (Wilder 1997, 1999), the gap in the second conjunct must be to the right of the PP *in the fridge*, i.e. created by HNPS. Furthermore, Bachrach & Katzir (2009:289) present interesting evidence that RNR also interacts with wh-extraction. In (89), normally ungrammatical extraction out of a Complex NP Island is facilitated by first right-node-raising the DP *an article about which animal* and then sub-extracting *which animal*.

(89)   Which animal$_1$ did John say that Mary knew [a man [who wrote ___]] and [a woman
       [who published ___]] *an article about t$_1$* ?

Whereas this island-violating extraction would not normally be possible, Bachrach & Katzir (2009) show that wh-movement can be fed by RNR. Although it is possible to enrich multidominance analyses with extra machinery to capture this observation (as Bachrach & Katzir 2009 do, also cf. de Vries 2013), by far the simplest explanation is that RNR is (at least in some cases) a syntactic operation and can therefore interact with other syntactic processes (see Clapp 2008). In general, we agree that an 'eclectic' approach to RNR is necessary and that one of these options should be rightward ATB movement (Chaves 2014). Furthermore, we saw that multidominance and ellipsis accounts struggle to adequately capture the fact that syncretism aleviates case match-

ing violations. This leads us to the conclusion that a movement-based analysis of RNR must be invoked for examples in which syncretism repairs case matching violations.

In the theory developed here, the repair effect of syncretism in (85) can easily be accounted for under the premise that Right Node Raising involves actual movement to the right. For concreteness sake, we assume that RNR is rightward adjunction to the closest node dominating both extraction sites (Sabbagh 2007:387).[16] As for Polish above, we assume that case features in Russian are decomposed into smaller binary features. For concreteness, we adopt the decomposition in (90) proposed by Müller (2004).

(90)   *Russian case decomposition* (Müller 2004:364):

Case	Decomposition
NOM	[+subj −gov −obl]
ACC	[−subj +gov −obl]
GEN	[−subj +gov +obl]
DAT	[+subj +gov +obl]
INS	[+subj −gov +obl]
LOC	[−subj −gov +obl]

In keeping with standard approaches to syncretism, and the one adopted above for Polish, Vocabulary Items can be underspecified for some of these case features in order to capture the relevant patterns of syncretism we find in the language. In Russian, while feminine nouns such as *tarelk-* 'plate' take different case markers in accusative (91a) and nominative (91b), the neuter noun *bljudc-* 'saucer' is marked by the same suffix in both cases.[17]

(91)   a.   On ne ostavil tarelk-*u*   / bljudc-*e*.
            he not kept   plate-ACC saucer-ACC
            'He didn't keep the plate/saucer.'

       b.   Emu nadoel-a/-o   tarelk-*a*   / bljudc-*e*.
            him sick.of-FEM/-NEUT plate-NOM   saucer-NOM
            'He's sick of the plate/saucer.'   (Asarina 2011:174)

In order to capture the fact that /-e/ is inserted on neuters (specified as [−fem,−masc]) in both nominative and accusative environments, it is underspecified for case, realizing only the feature shared by the decompositions for nominative and accusative in (90), namely [−obl] (92a). The exponents, which are specified as [+fem,−masc], have a full case specification for nominative (92b) and accusative (92c), and can therefore also be used with the relevant case.

(92)   *VIs for relevant Russian case markers*

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[16] Note that the RNR example here involves movement out of an adverbial clause. We assume that the adverbial clause is adjoined to *v*P and the RNR-ed constituent adjoints above this node, as shown in the trees below.

[17] In reality, the situation for Russian is a little more complicated. Although there are three genders, these are distributed across four inflection classes that determine which case markers they combine with (see Müller 2004, Asarina 2011 and also Baerman et al. 2005:204).

    a.   /-e/ ↔ [−obl −fem −masc]

    b.   /-a/ ↔ [+subj −gov −obl +fem −masc]

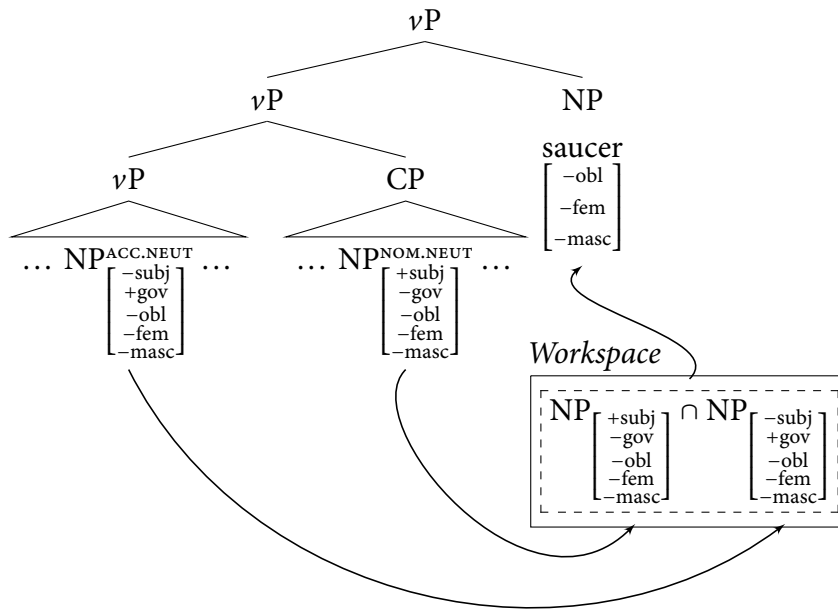   c.   /-u/ ↔ [−subj +gov −obl +fem −masc]

The derivation then proceeds analogously to the analysis of Polish ATB movement in the preceding section. First, the two nouns move from their respective base positions to an external workspace. Next, their feature sets are intersected to form a single set that is subsequently merged in clause-final position. For example (84) with *tarelk-a/-u* 'plate', the result of intersection is an NP bearing the features [−obl +fem −masc] (93).[18]

(93)
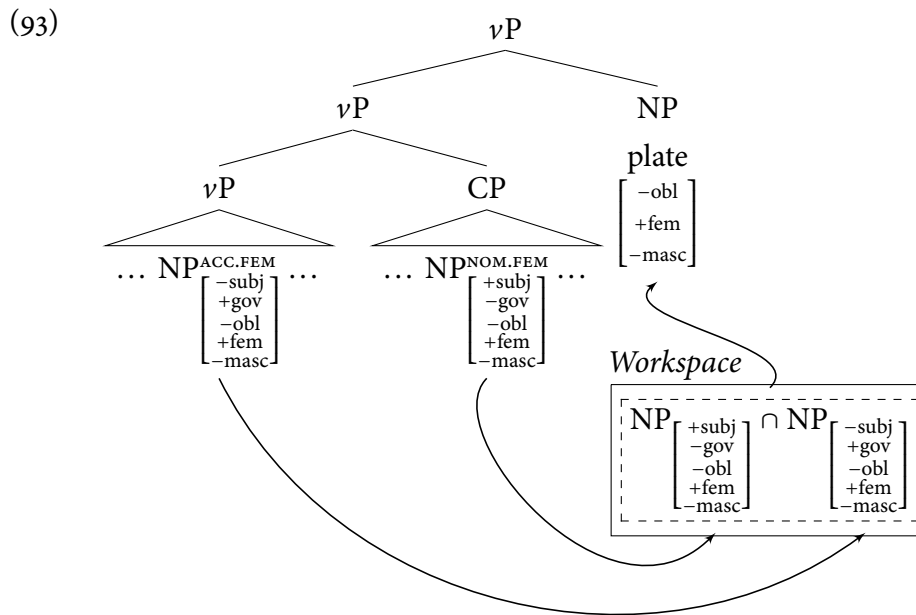
However, there is no VI in (92) that can be inserted into it in accordance with the Subset Principle. Both /-a/ and /-u/ have the right gender specification but their case features do not form a subset of the case features of the target node. Only the case features of /-e/ do so, however, /-e/ bears conflicting gender features, i.e. it is specified for [−fem] while the target is specified for [+fem]. According to our assumptions, this leads to a crash in the derivation.

    In contrast, the case matching requirement can be circumvented if the moved noun has neuter gender like *bljudc-e* 'saucer', where nominative and accusative are realized by the same syncretic marker. In this case, the newly formed item bears the features [−obl −fem −masc] (94).

(94)

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[18] Following Bošković (2008) and Despić (2013), we assume that Russian, as an articless language, does not project a DP layer.

vP

vP — NP

vP — CP — saucer $\begin{bmatrix} -\text{obl} \\ -\text{fem} \\ -\text{masc} \end{bmatrix}$

… NP$^{\text{ACC.NEUT}}$ $\begin{bmatrix} -\text{subj} \\ +\text{gov} \\ -\text{obl} \\ -\text{fem} \\ -\text{masc} \end{bmatrix}$ … … NP$^{\text{NOM.NEUT}}$ $\begin{bmatrix} +\text{subj} \\ -\text{gov} \\ -\text{obl} \\ -\text{fem} \\ -\text{masc} \end{bmatrix}$ …

Workspace

NP $\begin{bmatrix} +\text{subj} \\ -\text{gov} \\ -\text{obl} \\ -\text{fem} \\ -\text{masc} \end{bmatrix}$ $\cap$ NP $\begin{bmatrix} -\text{subj} \\ +\text{gov} \\ -\text{obl} \\ -\text{fem} \\ -\text{masc} \end{bmatrix}$

The Vocabulary items /-a/ and /-u/ are both not suitable for insertion because they do not fulfill the Subset Principle (due to having additional case features) and have conflicting gender features ([+fem] vs. [−fem]). However, the underspecified VI /-e/ can be inserted as it realizes the neuter gender features and, due to its syncretism in nominative and accusative, is specified only for the case feature that both nominative and accusative have in common ([−obl]). As a result, intersecting two neuter NPs with mismatching cases results in an item that is compatible with the case marker /-e/.

4 Conclusion

In this paper, we have shown how one can derive the fact that case matching requirements in ATB constructions can be circumvented by syncretism. On the face of it, these data seem to be incompatible with a postsyntactic view of morphology since morphological form seems to play a role in the licensing of ATB movement. Whereas existing approaches are forced to simply state 'repair by syncretism' as a fact, or their proposal turns out to be inconsistent, we have shown that an intersection-based approach to ATB can derive the syncretism facts in an elegant way. In this approach, intersection is the operation independently required to derive the one-to-many 'sharing' characteristic of ATB, since it is otherwise puzzling why movement of two items results in a single filler. Once intersection is established as the core mechanism for deriving ATB, the syncretism facts follow naturally (given an underspecification approach to syncretism), rather than having to be stated additionally. In particular, we have shown how the present approach can derive the classic facts of syncretism repair with case matching violations in Polish. Of course, any extension to other languages with similar effects, such as German or Russian, may entail a different case decomposition (as the patterns of syncretism will most likely differ), however the basic mechanism will remain the same.

Furthermore, we have argued that only a movement-based account with intersection can adequately derive the ameliorating effect of syncretism. The most (if not only) worked-out ap-

proach in multidominance theories, Citko (2005), is beset with a number of technical problems that become apparent once one tries to implement the proposal in a more explicit way. We have argued that this is particularly relevant to the debate about the correct analysis of Right Node Raising.

In sum, this paper shows that a movement approach to ATB movement, which has fallen out of favour in recent times, is superior to a multidominance approach when it comes to deriving 'repair by syncretism'. Of course, it is always possible to enrich other theories with further operations (e.g. intersection of feature sets) to derive the syncretism fact, but we have seen that this comes for free in the present approach, where intersection is independently assumed to be the central mechanism for deriving ATB constructions.

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