# Multi-categorial multiple right dislocation in Chinese
## A cross-framework study

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A common syntactic pattern in the colloquial register of many languages:

(1)   a.   He$_i$'s really smart, John$_i$ (is).    (Kayne 1994)

    b.   *Der$_i$ war viel zu schön, [der Tag]$_i$.*    [German]
        it was much too wonderful the day    (Altmann 1981)

    c.   *Il$_i$ a mangé la soupe, Jean$_i$.*    [French]
        he has eaten the soup Jean    (Lambrecht 1981)

    d.   *Lo$_i$ porto domani, [il dolce]$_i$.*    [Italian]
        it bring.1SG tomorrow the dessert

        'I'll bring it tomorrow, the dessert.'    (Benincà 1988)

Pretheoretical umbrella term: Right Dislocation (RD)

General consensus: for discourse-related purposes

A subtype of RD that has received little attention—that involving multiple RD-ed units (MRD).

(2)  a.  He$_i$ gave them$_j$ to his sister, Peter$_i$, [the keys]$_j$.                    (Averintseva-Klisch 2009)

    b.  *Il$_i$ la$_j$ lui$_k$ a donnée, à Jean$_k$, [son père]$_i$, [sa moto]$_j$.*                    [French]
       he  it  to.him  has given   to Jean   his dad    his motorbike

       'He gave it to him, to Jean, his dad, his motorbike.'                    (Calve 1985)

    c.  *Maria gli$_i$ lo$_j$ ha portato,* [*il dolce*]$_j$, *a Gianni$_i$.*                    [Italian]
       Maria to.him it  has brought  the dessert  to Gianni

       'Maria brought it to him, the dessert, to Gianni.'                    (Sun 2022)

In familiar European languages, MRD is a straightforward extension of SRD (single RD).

An even more special and less discussed pattern: **multi-categorical multiple RD (MMRD)**. It occurs naturally in some Chinese dialects, especially in casual and relaxed speech.

(3)  [*Ni   shangyihuir  mai-di   ne*]$_i$   *gao-de   nɒ    **lie,***          [Dongying Mandarin]
       you  last.time      buy-REL  NMLZ  put-at   where  SFP

     *wo  wen,  ne  nai$_i$.*
     I    ask   the  milk

'Where you put that which you bought last time, I asked, the milk.'
≈ 'I was asking where you had put the milk you bought last time.'
(in answer to the question 'What did you ask just now?')

📍 Dongying Mandarin: a subvariety of Northern Mandarin Chinese

More examples of MMRD:

(4) a. *Chao  caihuar    chi **ae**, wo ji  ni,  jin shangwu.*      [Dongying Mandarin]
stir-fry cauliflower eat SFP I   for you this noon
'Stir-fry cauliflower, I for you, this noon.'
≈ 'I will stir-fry cauliflower for you for lunch today.'

    b. *Zaezae-zhou **ae**, dei,  mae yunqi lai, haoshi-zhou.*
save-DUR    SFP must DISP luck  LAI carefully-DUR
'Save up, must, (good) luck, carefully.'
≈ 'We must carefully save up our good luck.'

Basic characteristics of MMRD in Chinese:

- RD-ed units highly versatile in syntactic category/constituency
- mostly no coreferential term (aka correlate) in main clause
- typically very incomplete main clause

Intuitively, MMRD happens when speakers are not bothering organizing language but just outputting whatever comes to mind first. It is a kind of "disorganized" speech systematically allowed by Chinese syntax but a **minor sentence type** from a typological perspective.

💡 Potential licensing factors: isolating, radical pro drop, regional feature(?)
(The larger region Dongying is located in: Shandong—well-known for inversion-laden speech)

In this study, I will

- review previous approaches to RD in three frameworks (Minimalism, LFG, Dynamic Syntax)
- conclude that MMRD is a challenge for all of them
- propose a new analysis integrating useful ideas from previous studies

MMRD shows free word order:

(5)  a.  *Chao  caihuar   chi **ae**, wo ji  ni,  jin  shangwu.*          [Dongying Mandarin]
         stir-fry cauliflower eat SFP I    for you  this  noon
         'Stir-fry cauliflower, I for you, this noon.' (= 4a)

    b.  *Chao   caihuar    chi **ae**, jin  shangwu, wo ji   ni.*
         stir-fry cauliflower eat SFP this  noon      I   for  you
         'Stir-fry cauliflower, this noon, I for you.'

No preference—depends on which RD-ed unit comes to mind first.

Another example:

(6)   a.   *Zaezae-zhou **ae**, dei,   mae yunqi lai, haoshi-zhou.*      [Dongying Mandarin]
           save-DUR      SFP must DISP luck   LAI carefully-DUR
           'Save up, must, (good) luck, carefully.'(= 4b)

      b.   *Zaezae-zhou **ae**, dei,   haoshi-zhou,  mae yunqi lai.*
           save-DUR      SFP must carefully-DUR DISP luck   LAI
           'Save up, must, carefully, (good) luck.'

      c.   *Zaezae-zhou **ae**, mae yunqi lai, dei,   haoshi-zhou.*
           save-DUR      SFP DISP luck   LAI must carefully-DUR
           'Save up, (good) luck, must, carefully.'

      d.   … All permutations work!

MMRD is not tied to any particular illocutionary force (i.e., sentence type in the narrow sense).

(7)  [*Shangyihuir mai-di   ne*]$_i$  *gao-de np*   **lie,**                                    (interrogative)
     last.time   buy-REL NMLZ put-at where SFP

     *ni,   ne  nai$_i$?*
     you  the  milk

     'Where (you$_j$) put that which (you) bought last time, you$_j$, the milk?'
     ≈ 'Where did you put the milk you bought last time?' 🤔

More examples:

(8) a. *Chao   caihuar    chi **bae**, ngen ji   ngae, jin  shangwu!*                     (imperative)
     stir-fry cauliflower eat SFP  you  for me    this noon
     'Stir-fry cauliflower, you for me, this noon!'
     ≈ 'Stir-fry cauliflower for me for lunch today, please!' 🙂

   b. *Zaezae-zhou **ninhae**, renge  dai,  mae yunqi lai, yizuer!*                (exclamatory)
     save-DUR      SFP        others will DISP luck  LAI altogether
     'Save up, she/he will, (good) luck, altogether!'
     ≈ 'She/he is going to save up all her/his good luck! (surprised and amused tone)' 😂

Some further examples... this type of sentence is pretty common!

(9) a. *Gae-bu-liao **liae**, shɒ      ye,  zhe  yi   mer.*                [Dongying Mandarin]
     do-not-RES  SFP  anything also this one period
     'Can no longer do, anything, this period of time.'
     ≈ 'One can't do anything anymore these days (due to COVID-19).'

   b. *Bu niaehur **ae**, zhe sie   diaefen, yi   dar ye.*
      not sticky   SFP this CL.PL starch    one bit also
      'Not sticky, this starch, even a bit.'
      ≈ 'This bag of starch isn't sticky at all (i.e., is of poor quality).'

   c. *Mu      jiae-hang ni  **mae**, bu shi, shang yi   huir she, yinwei?*
      not.have see-RES   you SFP    not COP last  one  time at  because
      'Did not get to see you, isn't it, last time, because!'
      ≈ 'Isn't it because (I) didn't get to see you last time! (So here I am again.)'

# Overview

RD usually analyzed in one of two ways:

1. in a single clause, "RD-ed" unit stranded upon leftward movement of the rest of the clause ⬅ the monoclausal approach

2. coordination of two clauses plus ellipsis in the second clause, upon leftward movement of the "RD-ed" unit ⬅ the biclausal approach

Both have been applied to Chinese (S)RD—Sun (2022) applies them to inversion-like RD and argument RD, respectively.

Two types of SRD in Chinese:

(10)  a.  *Shang  feiji  **le,**  wo  kuai.*                    [Standard Mandarin]
          get.on  plane  SFP  I    soon
          'Get on the plane, I (will) soon.'
          ≈ 'I'll get on the plane soon.' (inversion-like SRD)    ⬅ highly common in Chinese

    b.  *Mali  mai* [e]$_i$  ***le   ba,** baozhi$_i$.*
          Mary  buy  PRO  SFP  SFP  newspaper
          'Probably Mary bought (it), the newspaper.' (argument SRD)         (Sun 2022)

Argument SRD is like the common European pattern, modulo the null pronoun.

More examples of inversion-like SRD:

(11) a. *Ni na tian zenmeyang **a**, kan Manlian juede?*      [Standard Mandarin]
     you that day how     SFP watch Man.United feel
     'How did you that day, feel watching Manchester United?'
     ≈ 'How did you feel that day watching Manchester United?'      (Packard 1986)

   b. *Wo yi-miaozhong shui-zhao, deng yixia keyi.*
     I one-second sleep-TEL, wait a.bit can
     'I fall asleep in one second, in a bit can.'
     ≈ 'I can fall asleep within one second in a bit.' 😴      (overheard on TV)

Sun's (2022) analysis:

(12)  a.  **Inversion-like SRD: focus fronting**
        [$_{FocP}$ [$_{vP}$ t$_i$ *shang feiji le* ]$_j$ [$_{Foc'}$ Foc [$_{IP}$ *wo$_i$* [$_{I'}$ I [$_{AspP}$ *kuai* [$_{Asp'}$ Asp t$_j$ ]]]]]]
        'Get on the plane, I (will) soon.'

      b.  **Argument SRD: coordination-plus-ellipsis** (à la Ott & de Vries 2016)
        [$_{:P}$ [$_{CP_1}$ *mali mai* pro$_i$ *le ba* ] [$_{:'}$ [$_{CP_2}$ *baozhi$_i$* [$_{IP_2}$ ~~*mali mai* t$_i$ *le*~~ ]]]]
        'Probably Mary bought (it), the newspaper.'

A special "colon coordinator" in (12b): Koster's (2000) specifying coordination

(12a) more flexible: does not require the RD-ed (i.e., stranded) string to be a constituent
Limitation: one-round-per-clause (hence inapplicable to MRD)

Ott & de Vries's (2016) schema:

(13)   $[_{CP_1}\ldots\text{correlate}_i\ldots]$ (:) $[_{CP_2}\, d\text{XP}_i\, [\ldots t_i \ldots]]$

Two types of (S)RD:

- Colon coordination (in syntax): backgrounding (BRD)   ⬅ topic-like
- Direct juxtaposition (in discourse): afterthought (ARD)   ⬅ focus-like

O&V's focus is on European languages, so their two types do not include focus fronting.

(14)   *Ich  habe  heute*  [*einen  Star*]$_i$  *getroffen:*  [*den        John  Travolta*]$_i$*!*        [German]
          I     have   today   a.ACC   star    met              the.ACC  John  Travolta
          'I met a star today: John Travolta!' (ARD)                              (Ott & de Vries 2016)

(The ":" here is a punctuation mark, not the colon coordinator.)

Ott & de Vries's (2016) derivations:

(15)  a.  [$_{:P}$ [$_{CP_1}$ he$_i$'s really smart] [$_{.'}$ : [$_{CP_2}$ John$_i$ [ t$_i$ ~~is really smart~~]]]]     (BRD)

b.  [$_{CP_1}$ ich habe heute einen Star getroffen]     (ARD)
[$_{CP_2}$ [den John Travolta].ACC$_i$ [~~habe ich t$_i$ getroffen~~]]

In general, the coordination-plus-ellipsis approach cannot handle inversion-like RD in Chinese, because Ott & de Vries's *d*XP is by definition a phrasal constituent.

As for MRD: usually mentioned in passing (and only the European pattern)

1. Sun (2022): also a multi-conjunct account, but in a different direction
   [ $CP_1$ : [ $CP_2$ : $CP_3$ ]]

2. Yip (2025): a special case of BRD, with multiple conjuncts
   [[ $CP_1$ : $CP_2$ ] : $CP_3$ ]

❶ seems more plausible: $CP_1$ c-commands all other CPs, serving as the "antecedent" triggering repetition-based ellipsis. But both are designed for BRD, inapplicable to the inversion-like RD. That is, they are meant for (16a) but not (16b).

(16) a. 'Maria brought it$_i$ to him$_j$, the dessert$_i$, to Gianni$_j$.' (A′-movement in $CP_2/CP_3$ + ellipsis)

    b. 'Save up, must, DISP luck LAI, carefully.' ('must': head; 'DISP luck LAI': nonconstituent)

Discourse-driven A′-movement can only target constituents of certain phrasal categories!

Can we combine focus fronting and multi-coordination?

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- having to manipulate $n + 1$ CPs when there are $n$ RD-ed units
- ellipsis only at PF, syntax/LF still dealing with full-fledged CPs

# Minimalism: A solution?

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Besides, still restricted to the familiar European pattern:

- ellipsis in $CP_{i \geq 2}$ still relies on A$'$-movement of RD-ed units
- so only possible for certain phrasal constituents (i.e., Ott & de Vries's $d$XP)

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Better: coordinating just enough structure, ellipsis without A′-movement
(Such resource-awareness **is** seen in previous studies, though not in minimalist ones…)

Kalbertodt (2019): the only LFG-based work dedicated to RD to my knowledge

- Empirical focus on German, so only about the **coreferential** pattern in European languages
- Not directly useful for our task at hand (MMRD)

But it shows us how RD can be handled by LFG.

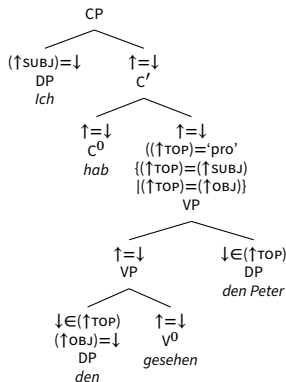Two types of RD: true RD (=BRD) vs. afterthought (=ARD)

(17)  a. *Ich hab ihn$_i$ gesehen, [den Peter]$_i$.* (BRD)                  [German]
          I    have him seen         the Peter

      b. *Ich hab ihn$_i$ gesehen. [Den Peter]$_i$.* (ARD)
          I    have him seen         the Peter                              (Kalbertodt 2019)

Same string, different intonation: BRD deaccented, ARD nuclear accent
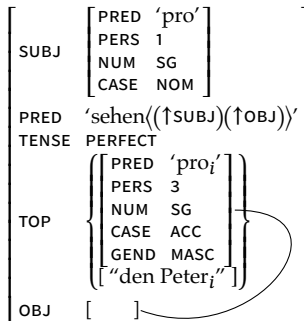
(18) *Ich hab ihn_i gesehen, den Peter_i.* 'I have seen him, Peter.' (BRD)

a. c-structure
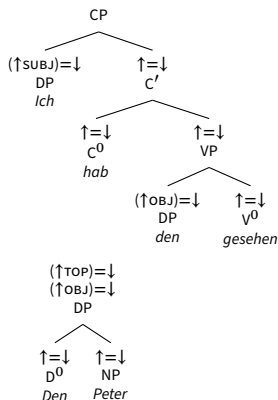
b. f-structure



Kalbertodt's analysis:

- c-structure: VP-adjunct
- part of main clause
- f-structure: topic function
- correlate *den* also topic

*But RD is a root phenomenon…*
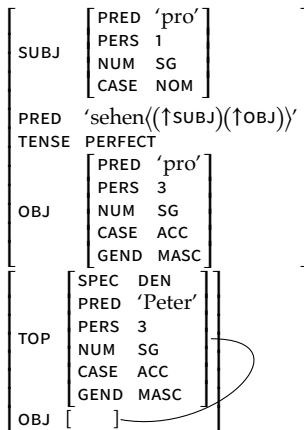*(e.g., Cann et al. 2005)*

(19) *Ich hab ihn$_i$ gesehen. Den Peter$_i$.* 'I have seen him. Peter.' (ARD)

a. c-structure   b. f-structure



Kalbertodt's analysis:

- separate c-structure (DP)
- called an "orphan"
- not part of main clause
- f-structure: object & topic

*This analysis is "lite" in display. There is unshown elided structure. (economy constraint in LFG)*

In sum, what Kalbertodt (2019) proposes is

- a monoclausal structure for BRD
- a biclausal structure for ARD  ⬅ similar in spirit to Ott & de Vries's analysis

Useful ideas:

- adjunction for structure-building
- "lite" biclausal syntax

Limitation: designed for the familiar pattern in European languages

- coreferentiality-based
- only phrasal constituent RD-ed units

… hence cannot be applied to inversion-like RD in Chinese, let alone MMRD.

Different from Minimalism/LFG, Dynamic Syntax (DS) directly reflects **time-linear parsing**.

Cann et al. (2005):

- Knowing a language is knowing how to parse it.
- Production = parsing, except that the speaker has in mind what they want to say.

DS is still considered a model of linguistic competence—it is just more connected to a general theory of performance.

DS has a built-in **resource-awareness**, which is well reflected in its treatment of RD.

I review three DS-based analyses:

- 2 for BRD (Cann et al. 2005, Wu 2005)
- 1 for ARD (Chatzikyriakidis 2016)

All still designed for familiar European patterns, so inapplicable to MMRD.
(Wu 2005 studies Chinese but only considers the familiar European BRD pattern)

Nevertheless, we can draw further inspiration from these DS studies.

Cann et al. (2005): only consider pronoun doubling (the most familiar BRD pattern)
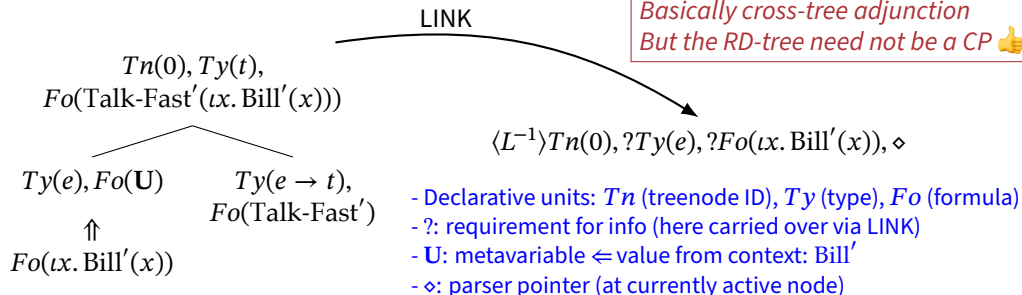
(20)    He$_i$ talks too fast, [the new secretary]$_i$.

Analysis:

- RD-ed unit = background topic (recapitulation effect)
- modeled by a pair of trees (of semantic types $t$ and $e$)
- the two trees connected by a LINK arrow

(21) He$_i$ talks too fast, [the new secretary]$_i$. (Cann et al. 2005)

LINK

*Basically cross-tree adjunction*
*But the RD-tree need not be a CP* 👍

$Tn(0), Ty(t),$
$Fo(\text{Talk-Fast}'(\iota x.\text{Bill}'(x)))$

$\langle L^{-1} \rangle Tn(0), ?Ty(e), ?Fo(\iota x.\text{Bill}'(x)), \diamond$

$Ty(e), Fo(\mathbf{U})$      $Ty(e \rightarrow t),$
                             $Fo(\text{Talk-Fast}')$

⇑

$Fo(\iota x.\text{Bill}'(x))$

- Declarative units: $Tn$ (treenode ID), $Ty$ (type), $Fo$ (formula)
- ?: requirement for info (here carried over via LINK)
- $\mathbf{U}$: metavariable ⇐ value from context: $\text{Bill}'$
- ⋄: parser pointer (at currently active node)

**Main tree:** main clause (address 0, type $t$)
**LINKed tree:** RD-ed unit (address 'reversely linked to $Tn(0)$', required info $\text{Bill}'_{\langle e \rangle}$)
These ?-requirements can only be fulfilled by a term that refers to Bill.

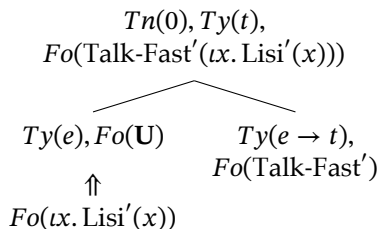Wu (2005): applies Cann et al.'s analysis to Chinese BRD (with a null pronoun)

(22) a. [e]$_i$ *jianghua hao kuai ya, Lisi$_i$.*            [Standard Mandarin]
     PRO talk     so   fast SFP Lisi
     '(He) talks so fast, Lisi.'

b.
$$Tn(0), Ty(t),$$
$$Fo(\text{Talk-Fast}'(\iota x.\,\text{Lisi}'(x)))$$

$$Ty(e), Fo(\mathbf{U}) \qquad Ty(e \rightarrow t),$$
$$\qquad\qquad\qquad Fo(\text{Talk-Fast}')$$
$$\Uparrow$$
$$Fo(\iota x.\,\text{Lisi}'(x))$$

$$\langle L^{-1}\rangle Tn(0), Ty(e), Fo(\iota x.\,\text{Lisi}'(x))$$

*Wu directly displays the completed parse*
*(with ?-requirements fulfilled)*

Chatzikyriakidis (2016): takes both BRD and ARD into account

- BRD: same analysis as in Cann et al. (2005) and Wu (2005)  👉 I skip this
- ARD: analyzed as **clarification answers to implicit questions**

(23) *Ton$_i$*   *htipise o*   *Giorgos,,* [*ton*   *Giani*]$_i$.                       [Greek]
     him.ACC hit    the George   the.ACC John.ACC
     'George hit him,, John.' (ARD)

(Chatzikyriakidis uses ",," to indicate a "period intonation" associated with afterthoughts.)
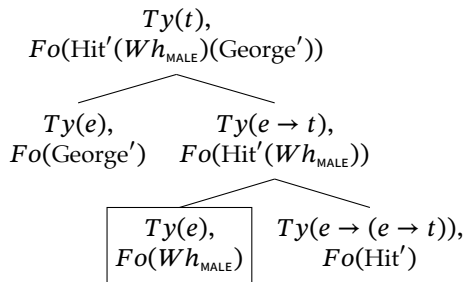
Interpretive effect: 'George hit him. You want to ask who George hit? George hit John.'
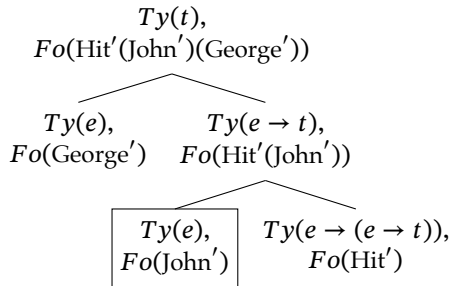Implemented via two trees: main tree + implicit question tree (in context)
(i) Parse main clause. (ii) Parse afterthought. (iii) Make implicit question. (iv) Substitution.

(24)  a. Implicit question
      'Who$_{\text{MALE}}$ did George hit?'

$$Ty(t),$$
$$Fo(\text{Hit}'(Wh_{\text{MALE}})(\text{George}'))$$

- $Ty(e)$, $Fo(\text{George}')$
- $Ty(e \to t)$, $Fo(\text{Hit}'(Wh_{\text{MALE}}))$

- $Ty(e)$, $Fo(Wh_{\text{MALE}})$
- $Ty(e \to (e \to t))$, $Fo(\text{Hit}')$

b. Substitution 'George hit John.'

$$Ty(t),$$
$$Fo(\text{Hit}'(\text{John}')(\text{George}'))$$

- $Ty(e)$, $Fo(\text{George}')$
- $Ty(e \to t)$, $Fo(\text{Hit}'(\text{John}'))$

- $Ty(e)$, $Fo(\text{John}')$
- $Ty(e \to (e \to t))$, $Fo(\text{Hit}')$

(adapted from Chatzikyriakidis 2016)

✅ *Clearly brings out the clarification function of ARD*
✅ *RD-ed unit treated as is (here DP), without superfluous structure (CP)*
✅ *Can be extended to MRD (with multiple implicit Qs)*

Multiple ARD in Chatzikyriakidis's (2016) analysis:

(25) *Ton$_i$*      *ida,,*      [ *ton*      *Giorgo*]$_{i,,}$      *xtes.*                    [Greek]
     him.ACC saw.1SG    the.ACC George.ACC yesterday

     'I saw him,, George,, yesterday.' (two metavariables: 'who', 'when')

Interpretive effect: 'I saw him. You want to ask who I saw? I saw George. You also want to ask when I saw George? I saw George yesterday.'

Limitations:

- Only works for constituent RD (since each DS tree must have a well-defined type)
- Relies on a relatively complete main clause (left-to-right parsing feeds on lexical content)

Thus, the DS analysis (despite its truly lite design) cannot be applied to Chinese MMRD either.

Having reviewed how RD is analyzed in three theoretical frameworks, I conclude that MMRD is a challenge for all of them. Nevertheless, previous studies contain some useful ideas.

Table: Useful ideas from previous studies

| Idea | Framework | Advantage | Problem |
|------|-----------|-----------|---------|
| Focus fronting | Minimalism | can derive inversion-like, nonconstituent RD | limited to SRD |
| Coord.+ellipsis | Minimalism | can derive MRD | limited to constituent RD, resource-demanding |
| Lite multi-tree syn. | DS (LFG) | resource-aware, MRD | limited to constituent RD, needs complete main clause |

Next, I try to combine these previous ideas in **a new minimalist analysis**.
(I choose Minimalism as the framework to keep using focus fronting.)

# Overview

Proposal:

- Inheriting basic minimalist settings so that focus fronting can normally proceed
- Using **multi-workspace** derivation to implement lite multi-tree syntax in Minimalism

The reason why the original coordination-plus-ellipsis approach (Ott & de Vries 2016) is resource-demanding is because it manipulates full-fledged CPs. There is no such requirement in multi-workspace derivation. The content of a side workspace may well be a $v$P, DP, etc.

Workspace-level theorizing is increasingly prominent in current Minimalism. The notion of workspace (WS) has also been incorporated into the latest definition of Merge:

(26)    Merge(P, Q, WS) = WS′ = ({P, Q}, …)                            (Chomsky et al. 2023)

Multi-workspace derivation has long been used in practice (though not often explicitly said).
- Zwart (2011): "layered derivation" for complex non-complements (e.g., subjects)
- Fowlie (2013): "multiple multiple spellout" for tree satellites (i.e., specifiers and adjuncts)

(27)    [The man] kicked the ball.                                      (Zwart 2011)

The subject is merged onto the tree spine as a whole (in Spec-TP), so it must be pre-derived in a separate layer/workspace.

An MMRD example:

(28) *Zaezae-zhou **ae**, dei, mae yunqi lai, haoshi-zhou.*        [Dongying Mandarin]
    save-DUR      SFP must DISP luck LAI carefully-DUR            (= 4b)
    'Save up, must, (good) luck, carefully.' $\approx$ 'We must carefully save up our good luck.'

We can derive this sentence using **three workspaces** with just enough structure.

(29) a.  $WS_1$ (main + $RD_1$): [$_{ForceP}$ [$_{FocP}$ [$_{vP}$ *zaezae-zhou* pro$_o$ ]$_k$ [$_{Foc'}$ Foc t$_j$ ]]$_i$ [$_{Force}$ *ae* ] [$_{GroundP}$ [$_{IP}$ pro$_s$ [$_{I'}$ [$_I$ *dei* ] t$_k$ ]$_j$ [$_{Ground'}$ Ground t$_i$ ]]]]        (à la Sun 2022)

    b.  $WS_2$ ($RD_2$): [$_{vP}$ pro$_s$ [$_{v'}$ [$_v$ *mae* ] [$_{ApplP}$ *yunqi$_o$* [$_{Appl'}$ [$_{Appl}$ *lai* ] [$_{VP}$ ~~*zaezae-zhou*~~ t$_o$ ]]]]]

    c.  $WS_3$ ($RD_3$): [$_{vP}$ [$_{AdvP}$ *haoshi-zhou* ] [$_{vP}$ pro$_s$ [$_{v'}$ v [$_{VP}$ ~~*zaezae-zhou*~~ pro$_o$ ]]]]

I analyze the disposal [*mae* DP$_i$ *lai* V t$_i$ ] 'lit. hold DP come V it' as a $v$P-ApplP-VP structure for now.

Next, we coordinate the three workspaces, but

- not by discourse juxtaposition since the workspaces should be joined before the interfaces
  - recall that we are positing just enough structure rather than full CPs
- nor by a CoP (or :P) in phrasal syntax since it encodes more asymmetry than desirable
  - we do not want $[ WS_1 : [ WS_2 : [ WS_3 : ... ]]]$ (à la Sun 2022)
  - because in MMRD only the main clause is fixed in position, while the RD-ed units can be freely reordered (i.e., no evidence for structural asymmetry)
  - so we want something like $[ WS_1 > \{ WS_2, WS_3, ... \} ]$ instead
    (where ">" means 'structurally above / more prominent than')

$$[\, WS_1 > \{\, WS_2, WS_3, \ldots\, \}\, ]$$

Set Merge cannot yield this structure (in a binary-branching setting) but (multi-dimensional) **Pair Merge** can (cf. Song 2024).

- Let $WS_1$ pair-merge with $WS_{i \geq 2}$ separately, each on a different plane.
  (see Chomsky 2004 et seq. and especially Chomsky 2019)

- Get $\{\langle WS_1, WS_2 \rangle, \langle WS_1, WS_3 \rangle, \langle WS_1, \ldots \rangle\}$. **1**

- Order-theoretically, this is equivalent to $\langle WS_1, \{WS_2, WS_3, \ldots\}\rangle$. **2**

- Both **1** and **2** describe the same partial order, as in the following Hasse diagram:
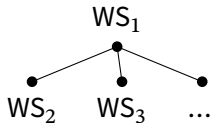


*This is not a normal scenario but occurs when speakers are too "lazy" to assemble several ideas into a single syntactic object, hence the "disorganized" nature of MMRD.*

Corresponding to this "loose coordination" in syntax, we can let the workspaces' contents be only **loosely conjoined** in semantics too:

- not by the boolean $\wedge$ since not all workspaces have type-$t$ values in our lite setting
- a generic disjoined union (aka coproduct) operation $\oplus$ is more suitable
  $[\![WS_1]\!] \oplus [\![WS_2]\!] \oplus [\![WS_3]\!] \oplus [\![...]\!]$

(30)   *Zaezae-zhou **ae**, dei,   mae yunqi lai, haoshi-zhou.*          [Dongying Mandarin]
       save-DUR      SFP must DISP luck   LAI carefully-DUR                    (= 4b)

'Save up, must, (good) luck, carefully.' $\approx$ 'We must carefully save up our good luck.'

Interpretive effect (more pedantically):
'[$_{WS_1}$ Save up (sth.), we must]; [$_{WS_2}$ saving luck]; [$_{WS_3}$ carefully saving (sth.)].'

We can take a step further and give the cross-workspace information integration a formal protocol—using a process calculus such as the **session calculus** (Yoshida & Gheri 2020). Process calculi are used in computer science to model concurrent processes and distributed systems (see, e.g., Sangiorgi & Walker 2001, Wadler 2014). Some established process calculi:

- CCS (Calculus of Communicating Systems)
- CSP (Communicating Sequential Processes)
- $\pi$-calculus
- session calculus

Process calculi are to concurrency what the $\lambda$-calculus is to functions (Milner 1990).

Next, I use a simplified version of the **synchronous multiparty session calculus** in Yoshida & Gheri (2020) to demonstrate how cross-workspace information integration can be protocolized.

In session-based modeling of concurrency, a communication **session** between **participants** p, q, … consists of a structured sequence of message-passing interactions as **processes** $P$, $Q$, … .

(31)    p ⊲ $P$ = !c⟨$m$⟩.?d($x$).**0**
        (The process $P$ of participant p: send a message $m$ via channel c, receive any message via channel d and assign it to variable $x$, and terminate.)

(See paper version for more detail.)

Note the slight notational similarity to Dynamic Syntax.

We can view the cross-workspace information integration in an MMRD sentence as a session:

- Each workspace is a participant.
- Each Pair Merge step establishes a communication channel.
- The integrated information is ultimately fed to the C-I system (also viewed as a participant).

In our running example: '$[_{WS_1}$ Save up, must], $[_{WS_2}$ (good) luck], $[_{WS_3}$ carefully].'

(32)   a.   $WS_2 \lhd P_{WS_2} = !a\langle [\![WS_2]\!] \rangle.\mathbf{0}$ (WS$_2$ sends its content as a message via channel a and terminates.)

   b.   $WS_3 \lhd P_{WS_3} = !b\langle [\![WS_3]\!] \rangle.\mathbf{0}$ (WS$_3$ sends its content as a message via channel b and terminates.)

   c.   $WS_1 \lhd P_{WS_1} = ?a(x).?b(y).!s\langle [\![WS_1]\!] \oplus x \oplus y \rangle.\mathbf{0}$
   (WS$_1$ receives two messages via channels a and b and assigns them to $x$ and $y$, loosely conjoins the received messages with its own content, sends the coproduct via channel s, and terminates.)

   d.   $CI \lhd P_{CI} = ?s(z).\mathbf{0}$ (CI receives a message via channel s, assigns it to $z$, and terminates.)

My analysis of Chinese MMRD is as follows:

(33) *Zaezae-zhou **ae**, dei, mae yunqi lai, haoshi-zhou.*        [Dongying Mandarin]
     save-DUR     SFP must DISP luck LAI carefully-DUR           (= 4b)
     '[$_{WS_1}$ Save up, must], [$_{WS_2}$ (good) luck], [$_{WS_3}$ carefully].'

**Syntax:** Derived in three workspaces with just enough structure, loosely joined by Pair Merge.
**PF:** Main clause fixed in position, RD-ed units flexible in ordering.
**LF:** Three parallel (i.e., concurrent) thoughts, loosely conjoined in interpretation.
**Session:** A protocolization of cross-workspace information integration.

Overall result: A principled combination of ideas from previous studies

Table: New uses of ideas from previous studies

| Idea | Framework | Advantage | New use |
|------|-----------|-----------|---------|
| Focus fronting | Minimalism | can derive inversion-like, nonconstituent RD | for main clause & 1st RD-ed unit (flexibly chosen) |
| Coord.+ellipsis | Minimalism | can derive MRD | for $n$th ($n \geq 2$) RD-ed unit, WS-level Pair Merge, in-situ ellipsis w/o A′-movement |
| Lite multi-tree syn. | DS (LFG) | resource-aware, MRD | lite multi-WS syntax (with just enough structure in each WS) |

# Thank you!

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