A measure of progress: a Merge-based account of some basic properties of Mandarin V1V2 resultative clusters.*

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1 Introduction

The field of syntax has made remarkable theoretical progress over the past 70 years or so, spanning most of Rizzi's career and that of many of his contemporaries. The understanding of the empirical landscape has considerably deepened and broadened. We gained a much better idea of the distributional properties that need to be captured, and dispose of a continuously expanding and increasingly sophisticated diagnostic toolkit to probe abstract properties.

Yet, at the same time, it is not clear how to measure this theoretical process. The field also built up a somewhat bewildering richness in principles and different technical implementations over time. Many basic notions have been challenged in some ways, and there has been a continuous shift in the division of labor between the different components, with syntax shrinking. This raises the question how to measure progress and move forward. Here I pursue the idea that progress can be measured if a set of independently motivated theoretical assumptions chooses the analysis for a set of puzzles, allows independent support for it, and leads to further questions.[1] I will show how the 'theory' chooses the analysis for V1V2 resultative compounds in Mandarin in this sense, once we make an assumption about the initial merge structure. In so far as this enterprise is successful, it suggests a how syntactic theory should move forward.

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[1]Inspired by Kayne (1994: p.132) "To a significant extent, the LCA based theory of syntax proposed here allows us to have the all too infrequent pleasure of seeing the theory choose the analysis."

1.1 Basic puzzles

In 2010, I was invited by Wei-Tien Dylan Tsai to speak at a workshop on verbal complexes in Taiwan. As preparation, I started reading Thompson (1973)'s article on resultative compounds, like (1), in Mandarin.[2]

(1) Ta **la kai-** le men.
     s/he pull open- PRF door
     'S/he pulled the door open'

That was the start of my interest in these constructions, which pose a number of intriguing puzzles. A first set of puzzles concerns the potential *de* or negative potential *bu*, which occur between V1 and V2.

(2) Ta **la** de   **kai** men.   (3) Ta **la** bu   **kai** men.
     she pull DE.POT open door   she pull NEG.POT open door
     'S/he can pull the door open'   'She can't pull the door open.'

This placement is problematic if compounding is presyntactic. But if morphology is within the syntactic component, as I assume, the placement could perhaps fall out from an independently motivated syntactic derivation. The negative potential *bu* is homophonous with the unmarked sentential negation. This suggests the source of the modal interpretation in (3) is a silent modal. Section 2.5 motivates a syntactic account, which is further supported by reconstruction and scope of negation.

A second set of puzzles concerns the alignment of the arguments of V1 and V2 (see Huang, Li & Li (2009) and Li (1990)) amongst others) and bears on the nature of the syntactic representations of arguments and their thematic roles. These can be illustrated with the possible interpretations for (4), (from Li (1990:(1))):[3]

(4) Taotao zhui- lei- le   Youyou le
     Taotao chase- tired- PRF Youyou LE

     a. 'Taotao chased Youyou and as a result Youyou got tired.'   *object resultative*
     b. 'Youyou chased Taotoa and as a result Youyou got tired.'   *'passive' resultative*

Next to the object resultative reading in (4-a), this string also has the reading in (4-b), which I will call a 'passive' resultative for reasons that will become clear in the paper. To me, as a Dutch speaker, the interpretation in (4-b) came as a complete shock. The grammatical subject of the clause, *Taotao*, is interpreted as the theme of *chase$_{V1}$*, and the postverbal object is interpreted *both* as the agent of *chase$_{V1}$*, and the theme of *tire$_{V2}$*! This reading is easily accessible in Mandarin, but completely excluded in Dutch or English. How is this state of affairs possible? In Koopman (2012), I showed that passive-like phenomena in Samoan are possible without any difference in verb form between the active and passive. This turns out to be true for other (unrelated) languages

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[2]I will use PRF, for the bounded aspect/perfective aspect marker *le*, and CRP for the much higher Currently Relevant State marker *le*, which is basically a perfect marker. Bound morpheme boundaries are not systematically indicated in the literature, and will often be omitted. Silent lexical items will be indicated in small capital letters.

[3]A third reading 'Taotao chased Youyou and as a result Taotoa became tired' is possible but not addressed in this paper.

as well.[4] Mandarin as well allows examples like (5), with perfective *-le*, often treated as (lexical) 'middles' or 'unaccusatives', lacking an external argument in the syntax (see Li & Thompson (1994), Sybesma (1999), Cheng & Huang (1994), Tan (1991)).

(5)   Taotao zhui- le.
        Taotao chase- PRF
        'Taotao got chased.'

I will propose that the analysis of examples like (5) can be related to the analysis of (4-b) if such examples involve a silent non-active VOICE. The analysis of the 'passive resultative' (4-b) will provide a welcome new argument in favor of the presence of an implicit external argument in the syntax, as argued in Collins (2005, 2022) and others (see section 2.7). This is incompatible with the widely accepted analysis of Bruening (2013), Legate (2014), Legate (2020) among others, who assume that the external argument is not projected in the syntax, with interpretation shifted to the semantics.

In a nutshell, the general analytical challenge is to take a restricted set of assumptions about the syntactic and morphological component and the architecture of UG (2), and see if a unified syntactic analysis for resultatives can cover both cases in (4), and find independent support. I will formulate a novel hypothesis about the initial merge structure of these resultative V1V2 constructions, and show how the syntactic derivations must unfold from there, accounting for linear order, the placement of perfective *le* and postverbal objects, and the outlined puzzles. Predictions for each derivational step can be put it to the test on the very extensive and deep literature on the topic, force an answer on some old issues, and provide new questions.

1.2   Theoretical assumptions

The assumptions that will guide the analysis me fall within the Merge based Minimalist tradition that includes Antisymmetry,[5] Cartography,[6] and the hypothesis that morphology is entirely part of the syntactic derivations, without any postsyntactic adjustments (Koopman (2005, 2017), Collins & Kayne (2021) among others). A central assumption about the architecture of the model is that the interfaces of syntax with phonology and semantics are (or ought to be) direct. This is the null hypothesis.

Structures are built bottom up, derivationally, via E(xternal) Merge (base generation) and I(nternal) Merge (movement). The Extension condition (Chomsky (1995)) restricts Merge to the root. Given these assumptions, only leftward and upward Merge are permitted, lowering is not allowed.

The atoms that enter into Merge are (single) features. Atoms have lexical properties, specifying meaning, category (label), their immediate right and left environments (i.e. these are distributional snapshots of their local environments), and phonological properties. The latter can range from overt segmental material (syllables or smaller segments), to autosegmental ones (floating

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[4]A search of the Atlas for Pidgins and Creoles Studies https://apics-online.info/parameters/90#2/30.3/10.0 reveals many creoles have "Passive without verbal coding" either as their only passive-like construction (12/76), or as one of their passive constructions 17/76).

[5]Kayne (1994), Kayne (2000, 2005, 2010, 2019),Cinque:2023

[6]See among others, Rizzi (1997, 2004a,b,c), Cinque (1999, 2005, 2006, 2009), **?**, and the many volumes in the Cartography of Syntactic Structures series.

tones, floating consonants, floating nasals, vowels, etc), to **silence**, i.e absence of any phonological expression. As I will show, there are (at least) three silent syntactic atoms hiding in these constructions: a silent causative CAUSE, a silent modal MOD, and a silent (passive.like)VOICE.

Lexical properties drive the syntactic derivation, in the sense that all lexical properties must be locally 'satisfied', i.e. be in a Merge configuration with their selector. (Here, I depart from much of the current literature in not adopting the looser notion of Agree). I-merge is constrained by Relativized Minimality (cf. Rizzi (1990, 2002)), with 'smuggling' (Collins 2005) at least a major way (and perhaps the only way) to get around Minimality violations, by carrying bigger constituents past interveners. Scope and Binding interact with the structures in the usual way.

2   Mandarin Chinese V1V2 (resultative) compounds.

2.1   Background

Given these background assumptions, we can now turn to the syntactic properties of Mandarin V1V2 (resultatives),[7] starting from (1), repeated as (6):

(6)   Ta **la kai-** le men.
       she pull open- PRF door
       'She pulled the door open'

In such resultatives, V1 precedes V2. V1 denotes a pulling event that causes a change of state of an argument of V2 which denotes a resultant state. The 'bounded' aspect marker *le* must follow V2, and precede postverbal objects. In examples like (6), the postverbal object *men* 'door' can only be pronounced once,[8] though it is selected twice, once as the theme of V1, and once as the argument of V2. This is not a prerequisite: as in other languages (Dutch or English for example), the surface object can, but does not need to be selected by V1, as illustrated in (7) from Zhang (2007:57:10b):

(7)   Akiu chi qiong le   ta fuqin.
       Akiu eat poor PRF his father
       'Akiu ate and as a result his father became poor.'

## 2.2   The starting point of the derivation

In late spell-out models with a single computational engine for morphology and syntax, these structures must be the output of the syntactic derivation. Such structures are widely analyzed as having bi-eventive semantics (Lewis (1974), Dowty (1991), Rappaport Hovav & Levin (2001)). Given the underlying hypotheses about direct interfaces, this should also be (part) of their syntactic representation. Causatives relate two event(ualities), with the first evente functioning as an argument (or, in

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[7]These constructions have been heavily studied, see among many others, Thompson (1973), Li (1990), Sybesma (1997), Cheng & Huang (1994), Cheng (1997), Sybesma (1999), Lin (2004), Liu (2004), Williams (2005), and Zhang (2007). who demonstrates that the V1V2 compounds and the phrasal resultatives are 'derivational twins'.

[8]The object may not immediately follow V1 (*ta la (*men) kai-le* 's/he pulled door open') unless V1 is doubled: (*ta la men la kai-le* 'lit.s/he pul the door pull open-PRF). I will not discuss this construction here.

some languages, as a manner modifier, like a from/by phrase), and the second event as the change of state CoS/result predicate. Crucial for this paper are the following:

(8)   a.   There is a silent causative predicate in Mandarin, CAUSE which takes a change of state complement (mostly skipped in the structures below), which in turn takes a Result, with V2 denoting the Result.[9]

   b.   A (miniature) eventive clausal subject, event-vP1, merges as the subject of CAUSE, not as a modifier. Arguments of V1 start out within the event-vP1.

   c.   CAUSE is the head of the compound, V1 is the head of event-vP1 the clausal subject, V2 heads the resultP.[10]

(9)

CAUSEP

event-vP1

<s/he> **pull**(v1) <door$_i$>

CAUSE

<door$_i$>

BECOME

<door$_i$>   **open**$_{V2}$
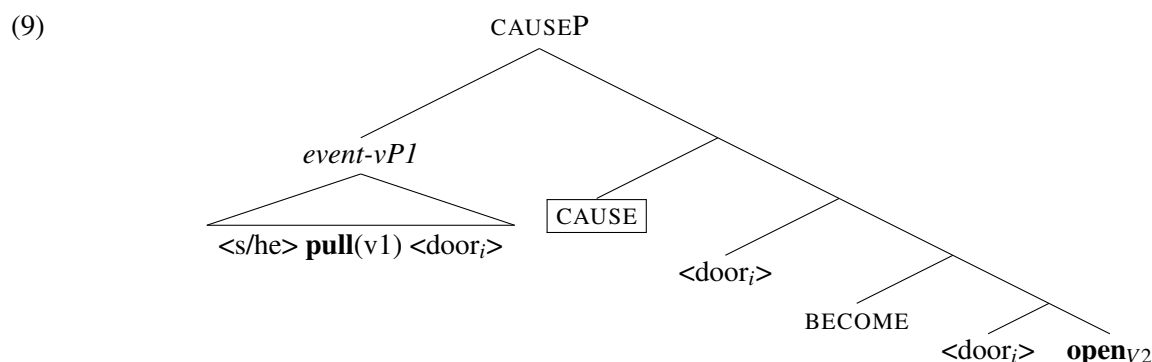
The Mandarin examples can be quite faithfully paraphrased as subject gerunds or from/by gerunds in English. It will be helpful to think of the event-vP1 as a 'miniature' clausal subject, which basically allows simple transitive verbs and some modifiers. Phrasal resultatives, which Zhang (2007) argues are the 'derivational twin' of V1V2 compounds, allow much richer internal structures.

In my proposal V1 V2 do not form a constituent at any level; they are subconstituents of CAUSEP (cf (12)). This proposal differs from existing accounts in that V1V2 is not a lexical (i.e. pre-syntactic) constituent, as in (10),[11] nor an E-merged constituent derived from V1 taking V2 as its complement, and V2 combining with V1 to form a complex head, as in (11), either with their arguments,[12] or without.[13]

At spell out, V1 and V2 happen to be pronounced in that order, because of the presence of silent CAUSE, and the way these structural parts interact with their environment (for example, at what stage perfective *le* enters into the derivation, or where the object will raise to). The paucity of verbal morphology in Mandarin will keep V1, CAUSE, and V2 low in the structure, regardless of the question whether or not V2 undergoes raising to CAUSE or not.
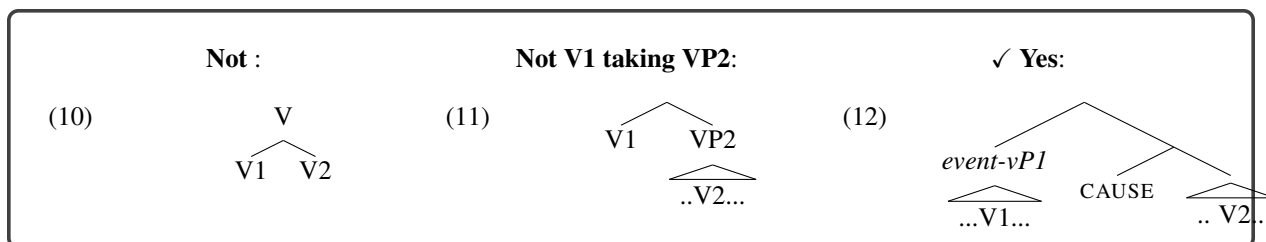
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[9]Cf. Ramchand (2008) among others.

[10]See Li (2009) for a critical overview of the diverse proposals as to what heads these compounds. These include (i) V1 is the head (Cheng & Huang (1994), Li (1990), i.a.); (ii) V2 is the head (Tai 2003, Yong 1997)(iii) There is no head Li (2009); (iv) these are double headed (Gu (1992), following Baker (1989)). The current paper argues CAUSE is the head (I don't know if other have argued this as well).

[11]Cf. the lexicalist approaches of Thompson (1973) and Li (1990), for example.

[12]Cf the syntactic analyses of Hoekstra (1988), or Sybesma (1997), and many others.

[13]See Williams (2005).

Not : (10)   V
                 V1 V2

Not V1 taking VP2: (11)   V1   VP2
                                    ..V2...

✓ Yes: (12)   *event-vP1*   CAUSE
                    ...V1...   .. V2..

The hypothesis in (12) that arguments of V1 start out within event-vP1, in positions local to the predicate, is forced by the theory, and central to the analysis.

The syntactic presence of a silent predicate CAUSE is motivated in section 2.3. Section 2.4 argues objects raise to a (K) position above CAUSE, K_{acc} > CAUSE, and shows how perfective *le* can be incorporated in the syntactic derivation. Independent support for object movement comes from binding. Section 2.5 presents evidence for the subject status (as opposed to modifier status) of the event-vP1, shows how it account for the linear position of the potential *de* and *bu*, and motivates the presence of a silent ability/potential modal. Reconstruction and scope support the derivation. Passive V1V2 resultatives are analyzed in section 2.7. Next to an active eventvP, a passive event-1 containing a silent passive-like VOICE can be E-merged as the clausal subject of CAUSE. This passive event-vP1 can be shown to contain a syntactically represented external argument, PRO, which must be controlled by the surface object. This provides a new argument for the syntactic presence of an implicit external argument. While most known diagnostic tests fail to diagnose its syntactic presence, this is unproblematic, as these tests are actually expected to fail in these particular configurations: the necessary structural conditions cannot be met in these structures in Mandarin. Section 2.8 concludes.

2.3 On the syntactic presence of silent CAUSE

We should be able to support the presence of silent CAUSE in (12), and to show that without this assumption, other hypotheses cannot capture the empirical data.[14]

If V1 is in a phrase that denotes the causal subject, and V2 is the complement of a silent predicate CAUSE, adverbs preceding V1 should be able to independently modify V1 or CAUSE, given the assumption that modification requires sisterhood (i.e. Merge). In addition, a preverbal adverb should not be able to modify just the result V2, because of the presence of an intervening CAUSE. The preverbal adverb cannot be a structural sister to the projection of V2. In addition to being independently modifiable, CAUSE is the main predicate, should be able to serve as a landing site (potentially for V2, though this is actually not necessary), be attracted by higher attractors (like the aspectual suffix -le), and fall in the scope of negation. If the event containing V1 is the subject of a silent CAUSE, it should show subject-like behavior, and be able to raise for example when embedded under a raising predicate (section 2.5). All this is borne out.

Modification of V1, but not of V2   Preverbal adverbs like *henhen (de)* 'severely' can modify V1:

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[14]This section relies on Chen (2019), who further completed and sharpened the empirical arguments in Koopman (2011). For further elaboration, see Chen and Koopman (in prep).

(13) Zhangsan henhen (de) da pao le Lisi.
      [Zhangsan severely (DE) hit] run PRF Lisi.
      'Zhangsan's hitting Lisi hard made Lisi run away.'
      not as: 'Zhangsan's hitting Lisi made Lisi run away hard.'

As the English translation in (13) shows, the manner adverb *henhen (de)* 'severely only modifies event1 denoted by the V1 *da* hit, not V2. This is quite different from (14), where the predicate is a real conjunctive compound *zhe-mo* torture' (lit. bend and grind). Here *henhen (de)* 'severely' has to be understood as modifying the entire verbal compound:

(14) Zhangsan henhen (de) zhe-mo   le Lisi.
      Zhangsan severely (DE) bend-grind PRF Lisi
      Zhangsan severely tortured Lisi.

Modification of CAUSE   Modification of CAUSE by a preverbal adverb is possible:

(15) Zhangsan henkuai (de) da pao le   Lisi.
      Zhangsan quickly (DE) hit run PRF Lisi
      '[Zhangsan's hitting Lisi] quickly made Lisi run away.'

Such examples also show that the initiator (i.e. agent) of the hitting event has moved past the adverb that modifies the CAUSE projection, as in (15), i.e. it forces the following (partial) syntactic bracketing, with the surface subject moved outside of the event-vP1, probably to the definite, topic-like subject position.

(16)   Zhangsan*i* (....) [henkua (DE)*quickly* [CAUSEP [<Zhangsan*i*> da*hit* <Lisi>] CAUSE [.....]]]

Some modifiers that precede V1 like *youdian*, 'considerably' or 'comparatively' can modify causation, or marginally so, the event-vP1, but not the result (Zhiguo Xie, pers. communication).

(17)   ta (chabuduo) za   ping- le nakuai rou.
        3s (almost)   pound flat- PRF that meat
        (i) 'She almost achieved pounding the meat flat.'
        (ii) '[Her pounding somewhat/almost] caused the meat to become flat.'
   (iii) * Her pounding caused the meat to become almost flat.

Since Merge is required for modification, a preverbal adverb can only modify its sister, and therefore can only be structurally local to CAUSEP or marginally to the event-vP1. Adverbs that precede V1 simply cannot modify V2, the change of state predicate or the result. This shows CAUSE must be present in the syntax structure.

2.4   On the surface position of postverbal objects

The direct object in the examples discussed so far is selected twice (or once (7)), but pronounced only once, following V1V2, regardless of the tense/aspect. This can be straightforwardly analyzed as ATB movement of the object to a position above the cause projection, which I take to be case

(=K) related.[15] Further movement of the complement of K around the object yields postverbal objects (boldface indicates pronunciation):

(18)
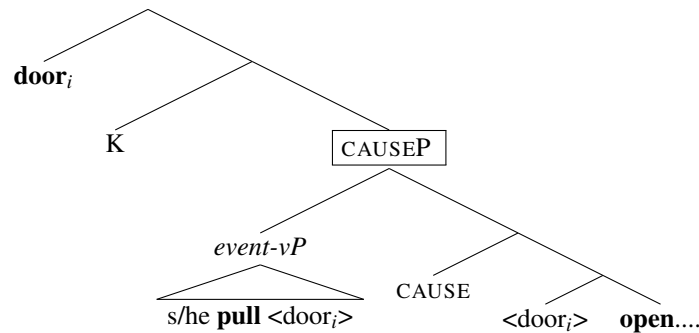
As this representation shows, the surface object (*door*) is interpreted both as the theme of V1 (*pull*) and the theme of V2 (*open*), but only being pronounced once. This also accounts for the fact the surface object can (but does not have to) be selected for by V1 (i.e. (7)). The surface object however in all cases is an argument of V2.

As is well known, objects can bind into a causal subject in language after language. This follows directly if there is a point in the derivation, where the object c-commands the (inanimate) causal subject, as in (18). (19) extends quite generally to psych verbs (see Belletti & Rizzi (1988)).

(19)   a.   [[pictures of each other$_i$] made the boys$_i$ happy.
       b.   the boys$_i$ [[pictures of each other$_i$] cause [<boys> happy]
       c.   *[[each other$_i$'s friends] made the boys happy.

This analysis however is by no means generally accepted: it depends on the understanding of the syntactic structure. If objects are taken to stay in-situ, they do not c-command the causal subject. If causes and animate initiators are taken to be treated in the same way in the syntax, the syntax can not provide a simple way to account for the difference between (19-a), and (19-c). With object movement to a position higher than causal subjects, but below volitional agents (argued for independently as in **?** and others), there is a straightforward syntactic account.[16] It is a by-product of the syntactic derivation that is necessary to capture the properties of resultatives.

Section 2.4.1 discusses how this structure feeds into the placement of perfective *le*, and section 2.5 turns to the potential *de* and negative potential *bu*.

2.4.1   Merging *le*

Perfective *le* combines with the main predicate, i.e. CAUSE, not with V2. The syntactic derivation can incorporate its placement without any need for head movement. *le* merges with KP as its complement. At this point, selection of CAUSE is not local. *le* however can attract CAUSEP to its specifier, satisfying local selection, and deriving the right linear order V1V2-le DP K. This step of

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[15]See also Williams (2005) who argues that this is actually the thematic position of the object.

[16]See Hallman (2004)'s investigation in the scopal interactions of subjects and objects. Of the 3 subject positions and 3 object positions he identifies, there is an object position above the lowest subject position. Note also that there are different postverbal object positions in Mandarin, as well as preverbal object positions (Huang, Li & Li (2009)

the derivation is sketched below, with boldface indicating pronunciation:

(20)   .. *Merge le, I-merge (i.e. pied-pipe)* CAUSE*P to le.*
        [[$_{causeP}$ [$_{event-vP1}$ ..**pull** ..] [CAUSE [<door$_i$> **open**]]] [**le** [**door$_i$**]]]
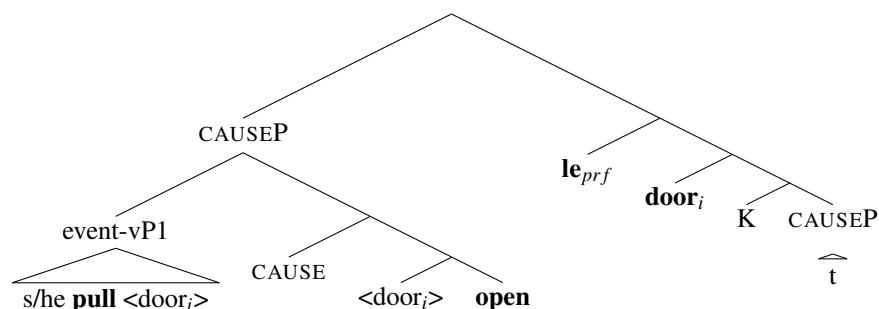
The phrasal movement analysis can easily be extended to the placement of the perfect marker *le*
CRM, which ends up in a right peripheral clausal position. This *le* merges higher in the clause,
attracting a perfect phrase to its Spec.

2.5   The event-vP1 behaves like a syntactic subject

The potential *de* and the negative potential *bu* must follow V1, but precede V2.

(21)   a.   Ta **la** de **kai** men.
            S/he pull POT open door
            'S/he can pull the door open.'

       b.   Ta **la** bu **kai** men.
            S/he pull NEG.POT open door
            'S/he cannot open the door.'

   If there is no presyntactic merge, and lowering is not available, we need to ask how to derive
this linear order from the structure motivated so far.
   Insight into this problem comes from the question where the modal contribution comes from.
There is no reason to assume *bu* is anything but the regular sentential negation *bu*. The modal
interpretation only arises in these specific environments. It is highly likely that there is a silent
modal hiding in this environment, and without looking into the exact modal favors that are available
here, it is clear that ability is one of them. We know that ability modals (*can, be able..*) occur low
in the fseq of the clause in Cinque (1999): (26 out of 38), above completive aspect (possibly *le*)
at 31/38 (which is incompatible with the potential), and (non active) VOICE (at 33/38), as well as
above the object related KP> CAUSE.
   This leads straightforwardly to the hypothesis that Mandarin not only has a silent CAUSE, but
also a low silent modal MOD$_{able}$ that occurs in negative contexts. In positive contexts, *de* could
be a weak form of this modal (possibly behaving as a PPI). Alternatively, *de* licenses the silent
MOD$_{able}$ in positive contexts.
   The relative scope *bu$_{neg}$*> MOD$_{able}$ translates into the relative order of Merge. If the silent
modal (and *de* are raising to subject predicates, the linear placement of *de* or *bu* follows directly
from the raising of the causal subject event-vP. Subjects in Mandarin *always* precedes the sentential
negation *bu*. The placement of *bu* and *de* can therefore quite straightforwardly captured by the fact
that the event-vP is the subject of CAUSE, as shown in (22).

(22) Youyou zhui bu   lei Taotao.
      Youyou chase NEG.POT tire Taotao
      'Youyou is not able to chase Taotao tired.' (i.e. Youyou's chasing Taotao can't make
      Taotao tired)

The low silent modal MOD merges with KP, the structure that includes the postverbal object, and triggers raising to subject of the event-vP1, followed by merge of *bu*, and I merge of event-vP with *bu*.
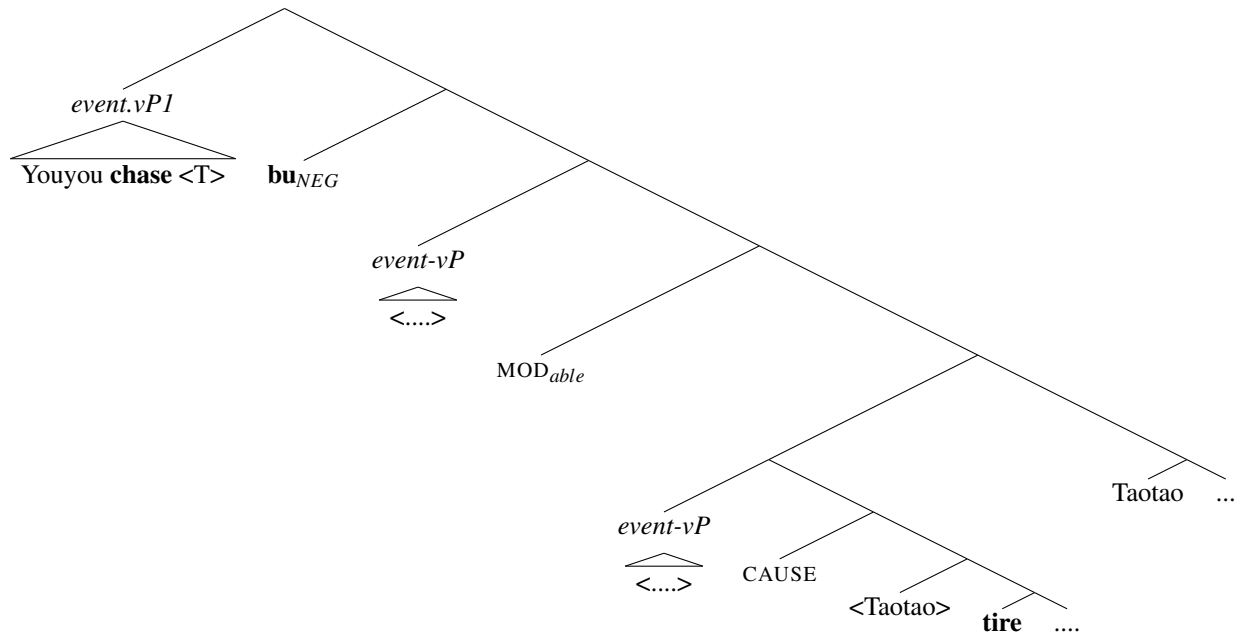
Note that this is as high as the constituent containing V1 will raise. Though further investigation is necessary, this may follow as there is no gerundive morphology, nor tense morphology in Mandarin which could force further upwards movement. The DP agent inside of the event-vP however will undergo further I-merge to the topic-like subject position, ending up in a DP position outside the event-vP, as discussed for (15)).

2.6   Interpretation and Scope

The syntactic derivation sketched in section 2.5 captures not only the linear placement of the potential, but receives further support if we look at the behavior with respect to reconstruction of the modal, and the scope of negation.

2.6.1   Reconstruction of the silent MOD

Consider the syntactic structure in (23):

(23)   [event1] MOD [<event1> CAUSE V2]

A scope bearing element in event1 should be able to reconstruct under the modal. Alexander Williams (2005:651) supports this with the following example :

(24)   sange ren   jiu tui de   dao naliang che.
       three people then push DE.POT invert that   car
       '(A group of) three people could make that car topple by pushing.

This sentence has a reading in which the existence of 3 people is not asserted, i.e. 3 people is interpreted below the modality. This is expected, as the event denoted by V1 is below MOD at some point in the derivation: it starts out as the syntactic subject of CAUSE.

2.6.2   Scope of negation

In the syntactic representation of V1V2 resultatives developed here, there are two separate events: V1 is within the event-vP that is merged as the subject of the main event, CAUSE.

When a past resultative event with the clause final *le* CRS is negated, the negation *mei(you)* must precede V1V2. In analyses where V1 is the main event, negation should negate the event denoted by V1. As Liu (2004)) shows this is not the case however:

(25)   Wo mei   da po   zhe-ge huaping.
       I   NEG.PRF hit break this.CL vase
       'I did not break this vase.' ≈ My hitting the vase did not break the vase
       '*I did not hit the vase and I broke it.' *nor* '*I didn't hit the vase and I didn't break it.'

In such examples, it has to be the case that the vase was hit by me, as a continuation with *but I did not hit the vase* yields a contradiction. The *event-vP1* is therefore *not* negated, just like the gerund in the gerundive paraphrase is not.

Liu proposes to treat V1 as a causal manner adjunct, i.e. basically as a because/from phrase. This is neither necessary in the current proposal, nor consistent with the fact that the event-vP1 raises to the subject of the potential, or a negative potential. Indeed, if negation of an event requires the event to be a sister of Neg, these data will follow from the configuration, as long as event-vP1 cannot contain an independent negation.

Regardless of where the negation merges in the spine, the causal subject can never be a sister to the sentential negation, but negation will negate the event denoted by the main predicate, i.e. CAUSE (or the perfect (CRP) in (25)).[17]

(26)

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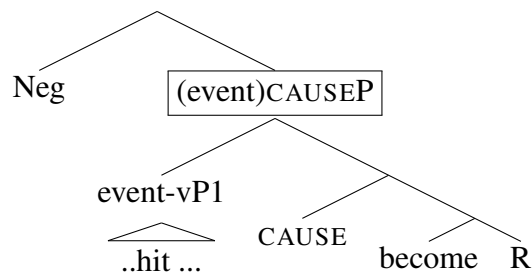
[17]Liu (2004)) states that negation can perhaps very marginally modify the event-vP, by heavily focusing on it. Given the assumptions underlying this paper, this could perhaps involve movement of the event-vP of *hit* to a Focus projection below negation.

2.6.3 Scope of MOD

Similarly, the potential modality (i.e. MOD) does not apply to the event that contains V1, but only to the causative, and shown by Liu (2004)).

(27)   chi- de- bao.
       eat- DE- full
       ≈ 'my eating can get me full, I can get full from eating'
       *my ability to eat (can) make me full

To round up this section, let me point out that any analyses that treat V1V2 as a compound will run into the same problems as we discussed earlier. With conjunctive V compounds, negation must scope over both conjuncts, again as expected if these are structurally coordinated.

(28)   Wo mei zhe-mo ta. (Liu 2004:(309))
       I Neg bend-grind he
       I did not torture him

2.7 On the interpretation of arguments: passive resultatives and PRO

In this section, I turn from active transitive vPs to what I called the passive resultative, which is one of the three readings of (4) repeated below:

(29)   Taotao zhui- lei- le   Youyou le
       Taotao chase- tired- PRF Youyou LE
       'Youyou chased Taotoa and as a result Youyou got tired'   Passive resultative

In passive resultatives, the argument of V2 *tired*, is also interpreted as the agent of V1. Furthermore, the theme of V1 maps to what is generally assumed to be a grammatical subject position, as it supports wh-in-situ (cf. Tan (1991) and others).

   As pointed out in the introduction Mandarin has simple declaratives like (30), where the theme aligns with the grammatical subject. This turns out to be a well known property of Mandarin. Transitive verbs appear to behave as 'unaccusative' verbs, without any visible morphology or change in form, as long as such examples are telic (cf. Tan (1991)).

(30)   Yifu   xi-   le.
       clothes wash- PRF
       'The clothes got washed. *lit* 'The clothes washed.

How can languages allow the agent of a transitive verb to remain unexpressed, and the theme to appear in the syntactic subject position? Language after language shows such effects in the presence of a non-active VOICE. If we assume that this situation can only arise in UG when a non-active VOICE combines with a transitive verb, it follows that the effects we observe in Mandarin must be analyzed as the reflex of a *silent* non-active VOICE. VOICE is the third silent lexical item that we encounter in Mandarin.[18] Under this view, besides active event-vPs seen so far, passive-

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[18]For other languages with silent non-active VOICE, see Hale (1970), for Australian languages with ergative case marking systems, Koopman (2012) for Samoan, and the references in footnote 5.

like resultatives would emerge when an event-vP with a silent non-active VOICE merges as the subject of CAUSE.

(31)   (30) contains a silent non-active VOICE, and so does the subject event-vP1 in (29).

This brings us to the next problem: what exactly does Voice do? There are currently two different views on this topic. The first view assumes Voice is involved in either introducing the external argument as its specifier or not projecting a specifier in the case of non active Voice (cf. Legate (2014, 2020), Bruening (2013), and many others). In the latter case, the interpretation of the implicit external argument is handled in the semantics. This analysis is a direct descendent of the GB era analysis for passives, with a transfer of the element that introduces the external argument from little v to Voice. If non active Voice introduces no external argument in the syntax, the syntactic derivation proceeds automatically as T will attract the closest DP argument, i.e. the highest DP in the 'big' VP.

(32)

$$VOICE_{non.act} \quad \text{wash} \quad \text{clothes}$$
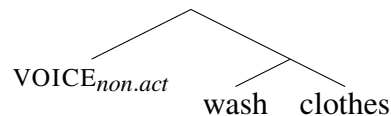
Though this analysis gets around the demotion of the external argument, and removes a potential Minimality violation, there are several weak spots in the analysis. External arguments of predicates are not represented in a uniform way: sometimes they are introduced by Voice and present in the syntax, sometimes they are not, even though they are clearly interpreted. A different formal tool must be employed to account for the interpretation of the implicit arguments that are absent in the syntax . Further tools are required for the treatment of the external argument as a by-phrases requires further tools.

A second view, proposed by Collins (2005, 2022), incorporates features of earlier analyses of passives. It takes transitive verbs to always be represented in the same way. (Passive) Voice merges with a fully transitive structure as in (33), with Voice attracting a big VP constituent to its Spec, playing a role in the way arguments can be realized, not in how thematic roles are assigned. Non-active Voice attracts a verbal projection, the 'big' VP, smuggling the argument that contains it closer to T over the external argument, effectively demoting the subject. This allows for a principled understanding of why there is no Minimality violation.

If Voice is a phase head, akin to the silent C of infinitival complements, the silent external argument can be PRO, occurring in the type of configuration where PRO is generally found. The burden of the interpretation now shifts to accounting for the reference to PRO (and the understanding the different types of PRO). According to this view, the Mandarin structures in (30) would have the syntactic representation in (33).
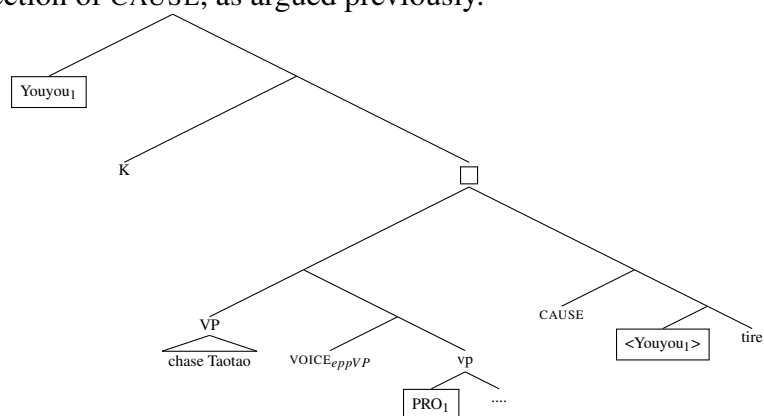
(33)

$$\text{VP} \quad VOICE_{non.act} \quad \text{vp}$$
$$\text{wash clothes} \quad \text{PRO} \quad v \quad t_{VP}$$
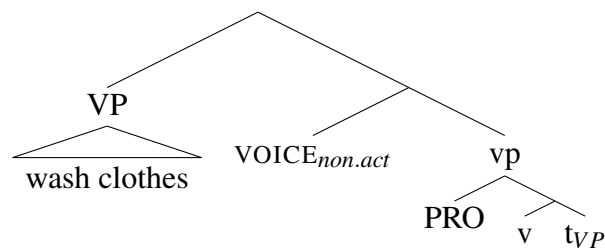
Section 2.7.1 presents a new empirical argument in favor of the latter analysis based on passive resultatives.

2.7.1 Is there an silent external argument in the syntax or not?

Consider the following step in the derivation of passive resultatives. The subject argument of CAUSE is a silent non-active VOICE, and the argument of *tire* has I-merged to the object position higher than the projection of CAUSE, as argued previously.

```
              Youyou₁
             /      \
            K         □
                    /    \
                  /        \       CAUSE
               VP           vp    /     \
          chase Taotao  VOICE_eppVP  <Youyou₁>  tire
                         PRO₁  ....
```

This representation immediately accounts for the observed reading, while keeping the projection of arguments in the syntax uniform. The object Youyou locally c-commands PRO and 'controls' the reference of PRO[19]. Taotao does not c-command PRO at this point in the derivation, which makes the surface object the closest c-commander. Youyou is therefore interpreted both as the external argument of *chase* and as the argument of *tire*. There is no need for any additional mechanisms to account for the reading of the silent external argument in this case. In the next step of the derivation, which will not be shown here, the CAUSE projection raises around the object and *le*, yielding the linear order *V1V2 le Youyou*. This movement removes a potential minimality problem caused by the object, allowing the internal argument of *chase* eventually to map to the subject position.

Confirmation for the high position of the object and the central role of the implicit external argument comes from Binding (see section 2.4), as the following examples of passive resultatives show (examples from Zhuo Chen (personal communication):[20]

(34)   *Context: Zhangsan's handwriting is hard to read.*

    a. (ta)ziji₁ de biji   kan lei le Zhangsan₁.
        3SG.self DE handwriting read tire PRF Zhangsan
        'Zhangsan read self's handwriting and as a result Zhangsan got tired.'
        ≈ 'Zhangsan got tired from reading his own handwriting.'
        not: * Zhangsan$_i$ got tired from PRO$_i$ reading someone else's own handwriting.

    b. [Z₁ [$_{causeP}$ [[self₁ DE handwriting] read VOICE$_{eppVP}$ PRO₁] [CAUSE <Z₁> tire]]]

(35)   *Context: The players' passes were way off so they had to chase the ball to catch the pass*

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[19]Note that this could perhaps this could be a case of ATB movement as well, potentially explaining why only this reading is available

[20]A reviewer points out that these data should be controlled for logophoric uses of the reflexive or reciprocals. These readings appear to beunavailable in the these configurations.

a. bici$_1$ de chuanqiu zhui lei le qiuyuan-men$_1$.
e.o. DE pass chase tire LE play-PL
'The players chased e.o.'s passes and as a result they got tired.'
b. [players-PL$_1$ [$_{causeP}$ [[e.o DE pass] chase VOICE PRO$_1$] [CAUSE <players$_1$> tire]]

The syntactic presence of the implicit external argument in the non-active Voice plays a central role in accounting for these particular interpretations. It also suggests why other readings are excluded. An existential interpretation (*Taotao being chased by someone tired Youyou*), for example, does not appear to be available in this particular configuration, i.e. speakers report the intuition that control is obligatory in the case of passive V1V2 resultatives. This strongly suggests the timing of binding must be fixed at this particular cycle. Thus, raising of the causal event-vP1 subject does not appear to create new binding possibilities for PRO. Super-Equi ((i.e. *Mary$_i$ knew that [PRO perjuring himself$_k$/herself$_i$] disturbed John$_k$* does not seem to occur in these V1V2 contexts, which instead seem to parallel cases of extraposition where only local control is possible (*Mary$_i$ knew that it disturbed John$_k$ to perjure himself$_k$/*herself$_i$* (cf. Landau (2001) for discussion).

In sum, the presence of the external argument in the syntax, though silent, manifests itself through possible and impossible interpretations that depend on the specific syntactic configuration that is independently motivated. There is a PRO in these constructions, albeit a very deeply embedded one in the very low region of the clause.

2.7.2 Why standard tests fail to diagnose the syntactic presence of the external argument

The fact that this PRO occurs in a very low position in the syntactic derivation (i.e. within the clausal event-vP1, subject of CAUSE), provides a structural explanation of why some of the standard diagnostics for the syntactic presence of this PRO fail in this particular context: they are in fact expected to fail.

As is well known, a postverbal object cannot be modified by a volitional modifier:

(36) Youyou (*guyi) zhui le Taotao
Youyou (deliberately) chase PRF Taotao
under the reading Taotao was deliberate in having Youyou chase him

This holds as well for passive resultatives: neither the surface direct object, nor the implicit agent PRO can be so modified:

(37) Taotao (*guyi) zhui lei le Youyou
Taotao (deliberately) chase tire PRF Youyou
under the reading 'Youyou's deliberately chasing Taotao tired Youyou'

This is fully expected. For modification to be possible though, a volitional modifiers must Merge with the structure where volitional arguments are interpreted, which, as I assumed, is above the surface position of the postverbal object, and above change of state CAUSE. Since PRO is stuck below the surface object that controls its reference and the big VP of the passive vp1-event, the modifier test is expected to fail for structural reasons: this PRO is simply too deeply embedded to support a volitional modifier.

This same explanation extends to other cases. The understood agent (i.e. PRO) cannot control into a purposive (38-a), it cannot support an emphatic agent oriented floated *ziji (by himself/alone)*

as in (38-c), regardless of whether it is controlled by the postverbal object. It can get an inner reflexive (i.e. automatically, by itself) reading (38-b) (from Liao (2005), who cites Wei-Tien Dylan Tsai).

(38) a. *fan chi-wan   lai   taohao mama.
          rice eat-finish LAI please mother
          intended 'The meal was eaten up by someone to please one's mother.'
      b. *Deng ziji da   kai le   Youyou.
          Light   self turn open PRF Youyou
          *Youyou himself turned on the lights. *Youyou turning on the light happened by itself.
      c. Deng ziji da-kai le.
          Light self turn   open PRF
          'The light turned on by itself/automatically.' '*someone (by himself/alone) turned on the light'

While an existential reading for PRO is possible in purposives, it is excluded in passive resultatives. Since purposives are merged higher in the clause, the PRO is too deeply embedded to c-command the purposive, hence control is excluded. Overt agents precede direct objects and causal subjects: if emphatic agent oriented *ziji* must occur in that region (see Tsai (2019) for the cartography of self-hood)), the PRO in passive resultatives will fail to support subject oriented anaphors (as in (38-c), and (38-b)). Note that the automatically, *by itself*, reading of inner reflexives are possible ((38-c)), recalling certain low occurrences of Romance *si/se*, as in the French example (*la porte s'est ouverte*, the door SE-is opened.

It is important to stress that failure of some diagnostics by itself can never lead to the conclusion the implicit argument is absent. Indeed, it could very well be that the necessary structural conditions under which such readings are expected are simply not met, as is the case for the passive resultatives cases discussed here.

Thus, the analysis in this paper is entirely consistent with the presence of a syntactically present PRO in passive resultatives. It is also quite strongly supported, as (i) it allows a unified treatment of arguments, with the interpretative properties of PRO following from independently motivated configurations without any further stipulations, (ii) the movement of big VPs is expected to be available given decomposition and accounts for the Minimality problem; (iii),the failure of diagnostic tests to support the presence of the implicit argument can be accounted for by very general principles and an independently established fine-grained cartography.

2.8   Conclusion

This paper, guided by a set of restrictive theoretical assumptions, sketched a unified Merge-based syntactic analysis for a subset of challenging V1V2 resultatives in Mandarin.

The analysis captures the linear orders, incorporates the verbal morphology in the main derivations, and shows silent lexical items must be present in the syntax, including (CAUSE, $MOD_{able,potential}$), (non-active) $VOICE_{eppVP}$, and PRO, the external argument in passive-like constructions. Silent arguments leave their signature on their environment. The analysis is shown to make the right predictions for reconstruction, scope and binding.

The central properties of the account can be listed below: (i) a causal miniature 'event-vP' containing not just the verb, but also the arguments of the verb, merges is shas the subject of a silent syntactic predicate CAUSE, which takes the change of state predicate and result (V2) as its complement; (ii) The event-vP1 can be either active or passive, yielding object resultatives or passive resultatives; (iii) (Limited) raising to subject of the eventvP in potential constructions supports the subjecthood of event-vP, and opens up an account for the placement of the potential between V1 and V2; (iv) Arguments start out internal to event-vPs, but are forced to move outside the CAUSEP. Objects move to K_{acc}, and subjects to the clausal topic-like subject position; (v) The fact that objects move accounts for the different interpretations of arguments in resultatives; While an object must be selected by V2, it can (and does not need to) be selected by V1. (vii) By virtue of the syntactic position of objects in Spec, K > CAUSEP, surface objects bind anaphors contained in the causal active or passive event-vP. (viii) Passive resultatives contain a silent external argument, PRO. Surface objects obligatorily control the external argument PRO in the passive event-vP. This yields the interpretation that the superficial object must determine the reference of the external argument of V1; (ix) The failure of certain diagnostic tests to support the syntactic existence of PRO in passive resultatives is expected, since the necessary structural conditions that must hold for the tests to work are not met.

As the analysis is chosen by the theory, the next step is really to use it as a starting point to address the many further questions that arise. How does the analysis extend to other types of resultatives in Mandarin (subject resultatives, verb doubling, phrasal resultatives)? What is the difference between in miniature causal vP1 subjects and phrasal resultatives or English gerundives, and what does it show about the architecture of the model? How does the analysis extend to English resultatives, or to the general typology of resultatives? The difference between Mandarin and English seems to be related to differences in morphology. Mandarin has very little verbal morphology, and as the paper shows, the suffix *le* is clearly an affix that combines with a larger phrase than the substantially richer English verbal morphology does. This is perhaps why V1V2 resultatives are possible in Mandarin, but not in English, where V1V2 resultatives may be excluded because of its verb specific morphology, including the morphology on the spine, above CAUSE. In English, either the clausal event-vP and CAUSE(+R) each carry independent verbal morphology '[Youyou's chas**ing**] tir**ed** me', or the subject event-vP ends up merging with the tense morphology in the spine 'Youyou chas**ed** me away', and the result is restricted to P or A. As a consequence, V1 behaves like the main verb in English, show it starts out as the miniature event vP1. There is no space in the current paper to pursue these questions, but this much is clear: the adopted theoretical hypotheses yield powerful results, and open up the field for new research questions and insights.

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