A measure of progress: some basic properties of Mandarin resultative clusters.

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1 Introduction

Over the course of the past 70 years or so, the field of syntax has seen remarkable theoretical progress[1] resulting in an ever expanding and more sophisticated diagnostic toolkit at the disposal of linguists, deepening the understanding of the empirical landscape, and the general understanding of the distributional properties that need to be captured.[2]

The origin for this paper goes back to 2010 when I was invited as a keynote speaker for a workshop on verbal complexes in Taiwan. In preparation, I read up on verbal complexes in Mandarin, and became intrigued by some properties of verbal resultative compounds (V1V2 resultatives), as in (1). Given my assumption that morphology is entirely within the syntactic component, I wondered what a syntactic analysis for such resultatives would look like, and how it extends to other puzzling cases.[3]

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

Two puzzles for these constructions stood out. The first puzzle is that the potential *de* or negative potential *bu* occur between V1 and V2. This raises the question whether this linear order could be the output of an independently motivated syntactic derivation, without any need to "fix" this order.

(2) Ta *la* de *kai-* men
     s/he pull DE open door
     'S/he can pull the door open'

(3) Ta *la* bu *kai-* men
     s/he pull NOT open door
     'S/he can pull the door open'

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[3] Abbreviations follow conventions used for Mandarin PRF, for the bounded aspect/perfective aspect marker *le*, and CRP for the Currently Relevant State marker (a Perfect). Dashes to indicate bound morphemes are not systematically indicated in the literature, and they are not in the current work either. I will refer to silent lexical items with capital letters, and use small caps in glosses.

The second puzzle concerns the alignment of the arguments the two verbs (see amongst many others Li (1990), and Huang, Li & Li (2009)) and bears on the nature of the syntactic representation of arguments and their thematic roles.

(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

Next to the object resultative reading in (4-a), this string also has the reading in (4-b). (For a third reading, see (8)). At least for me as a speaker of Dutch (or English), this is a completely surprising and puzzling interpretation. The grammatical subject of the clause, *Taotao*, is interpreted as the theme of V1 *chase*, and the postverbal object is interpreted *both* as the agent of V1 and the experiencer of *tired*. For Mandarin speakers this seems to be an easily accessible reading. This looks related to passive-like phenomena, without any morphological signature, which I had encountered before in Koopman (2012a). The challenge is again to determine whether a unified syntactic analysis can be extended to cases like (4-b). The literature generally relates such cases to the frequently occurring examples like (5), with perfective -le, and analyzes such examples as 'middles' or 'unaccusatives', without an external argument (see Li & Thompson (1994), Sybesma (1999), Cheng & Huang (1994), Tan (1991)).

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

These examples bear on the more general question how exactly such passive-like constructions should be analyzed, and relate to the old and ongoing debate if an implicit external argument is present in the syntax, as in Collins (2005) and others, or not (cf. Bruening (2013), Legate (2014), Legate (2020), and many others). Guided by a very specific set of assumptions about the syntactic component and the architecture of UG, I had an idea for a unified syntactic analysis, and was able to put it to the test on the very extensive and deep literature on the topic. I gave some talks, wrote a lengthy draft, and shelved it. So, here I come back to it in a condensed form.

If I think back to the very beginning of my own career in the late 70ies, I would have been puzzled by these data, but this investigation would have gone nowhere. But now, guided by a set of restricted hypotheses about the syntactic component and the architecture of the grammar, it looks to me that a unified syntactic analysis is within reach. A powerful restrictive theory and a more developed toolkit that meets with success is one way to measure progress. A second point is that the feasibility of a unified syntactic analysis provides further plausibility for a particular set of guiding assumptions that underlies it. Much of the literature over the past decades, often forced by the apparent impossibility of the syntax-at-the-time to account for the properties has looked for principles, mechanisms, a different division of labor between the components to account for the empirical landscape. However, problematic cases for syntactic approaches can also cease to be problematic, and may be syntactic after all. This simply requires a constant reevaluation of the abundance of different tools that have been developed to account for such cases.

Guiding assumptions My guiding assumptions fall within the Minimalist tradition that includes Antisymmetry[4] and the work in the cartographic enterprise.[5] A central assumption is that the interfaces of syntax with phonology and semantics are (or ought to be) direct. This is simply the null hypothesis. Thus the basic merge structure of V1V2 resultatives should encode the structure that the semantics interprets, and the output of an independently motivated syntactic derivation should yield the linear orders, and provide an account for the interpretative and formal properties of the structure. Structures are built bottom up, derivationally via with E(xternal) Merge (base generation) and I(nternal) Merge (movement). The Extension condition (Chomsky (1995)) restricts Merge to the root. Only leftward and upward movement permitted.

The atoms that enter into Merge are (single) features (heads, L(exical)I(tems). Atoms have lexical properties, which are basically distributional snapshots of their local environments, and phonological representations which can range from overt segmental material, to autosegmental ones (floating tones, floating consonants, vowels, etc), to **silence**, i.e absence of any phonological expression. There will be (at least) three silent lexical items that play a role 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 continue to 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.

1.1 Mandarin Chinese V1V2 (resultative) compounds.

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

(6) Ta *la kai-* le men
s/he pull open- PRF door
'S/he 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 the canonical position for objects. In examples like (6), the postverbal object *men* 'door' can only be pronounced once,[7] 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 he father
'Akiu ate and as a result his father became poor.'

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[4]Kayne (1994), Kayne (2000, 2005, 2010, 2019).

[5]See among others, Rizzi (1997, 2004c,a,b), Cinque (1999, 2005, 2006, 2009, 2010), and the many volumes in the Cartography of Syntactic Structures series.

[6]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) Williams (2005), and Zhang (2007) who demonstrates that the V1V2 compounds and the phrasal resultatives are 'derivational twins'.

[7]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.

In this paper, I will only consider cases where the postverbal argument is selected for by both V2, and V1, in particular (8-a), and what I will call the 'passive'-like resultative in (8-b). Subject resultatives, as in (8-c), will not be discussed any further.

(8)   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
      c. Taotao chased Youyou and as a result Taotoa became tired   Subject resultative

1.2   The starting point of the derivation for object resultatives

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 must also be part of their syntactic representation. Causatives relate two event(ualities), with an eventive phrase functioning as a causal subject (or in some languages as a manner modifier akin to a from/by phrase), and the second event as the change of state/result. In addition, I will assume that these resultative compounds are headed in the syntax by a silent predicate CAUSE. What is crucial for this paper is the assumption that an eventive causal subject merges as a phrase with its arguments as the causal subject.

(9)   a. silent CAUSE combines with a change of state predicate (which I will largely ignore) leading to the result state denoted by V2 (see Ramchand (2008) amongst many others).
      b. v1 **and its arguments** are merged within an event denoting phrase, i.e (*eventvP*), as the **subject** of CAUSE.
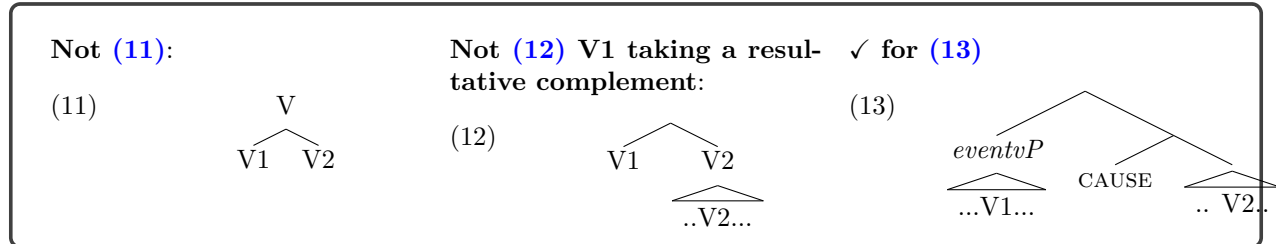
The event denoting phrase should be thought of as a 'miniature' clausal subject. The close paraphrase would be a subject -ing gerund in English, or a from -ing gerund. The exact label of this phrase is not important for this paper. What is important though is the hypothesis that arguments of V1 start out within eventvP, in positions local to the predicate, in accordance with locality of selection. This is basically an updated version of part of the theta-criterion, with each argument projected in designated VP shells (if only in a rudimentary form, i.e. as NPs, as in Sportiche split DP hypothesis), Sportiche (2005) with functional elements merged outside).

   As a result of various steps of I-Merge which force arguments into higher positions, only the boldfaced items in the projection of CAUSE will ultimately be pronounced. Deleted copies (i.e. traces) will be notated as $< >$ or 't':

(10)
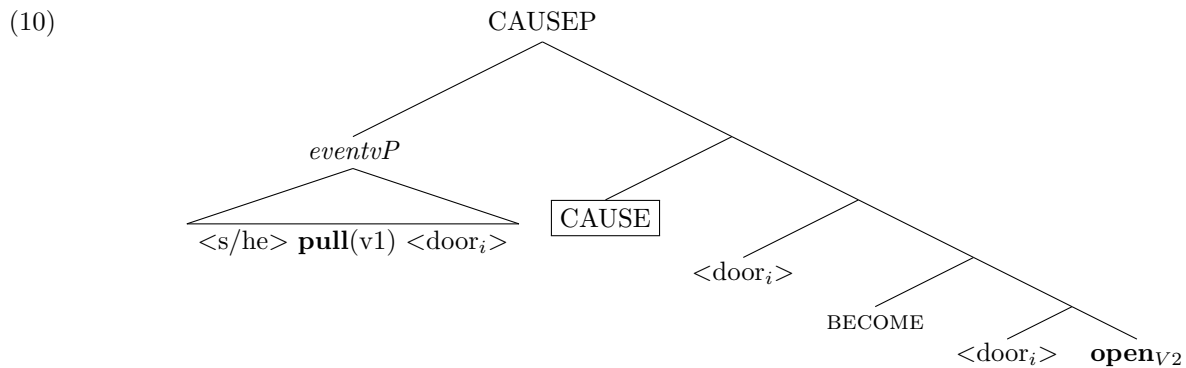
This basic proposal differs from existing accounts in that V1 V2 is not a constituent at any level,

not lexically (i.e. pre-syntactic), as in (11),[8] nor E-merged, as in (12), with their arguments,[9] or without.[10] 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 which 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 further raising to CAUSE.

Not (11):

(11)

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        V
       / \
      V1   V2
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Not (12) V1 taking a resultative complement:

(12)

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        /\
      V1    V2
           /\
         ..V2...
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✓ for (13)

(13)

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            /\
          /    \
    eventvP     /\
    /\      CAUSE  /\
  ...V1...         .. V2..
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Given this basic merge structure, we now turn to motivating the individual pieces of the structure. Section 1.3 motivates the presence of silent predicate CAUSE. Section 1.4 turns to objects, and argues that objects raise higher than CAUSE. This is independently supported by evidence based on binding. Section 1.5 presents evidence for the subject nature of the eventvP. This will lead to a further understanding of part of the clausal merge hierarchy, and an exploration of reconstruction and modification given the particular structure. Section 1.6 turns to passive resultatives, and asks what types of eventvP can be merged as the subject of CAUSE. It will argue that next to active eventvPs, the eventvP can also contain be a passive-like eventvP with a silent passive-like Voice and a syntactically represented silent external argument, PRO, which must be controlled by the surface object. The fact that the possible reference of PRO is completely determined by the syntactic configurations strongly suggest that an implicit external argument must be present in the syntax. This raises the problem that certain other diagnostic tests fail to diagnose its syntactic presence. I will argue the tests are actually expected to fail, as some structural conditions that must hold for the tests to work are not met. Section 1.7 concludes.

1.3 On the presence of silent CAUSE

We should be able to support the presence of silent CAUSE in (13), and to show that without this assumption, other hypotheses cannot capture the empirical data.[11] If V1 is in a phrase that denotes the causal event, 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, and the adverb cannot be a structural sister to the projection of V2. In addition to being independently modifiable, CAUSE should also be able to serve as a landing site (potentially for V2), and be attracted by higher attractors (like the aspectual suffix -le). Last, but not least, 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 1.5). It should also be able to support processes that affect transitive verbs (i.e. little vP), as we will see when discussing passive resultatives in

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[8]See in particular the lexicalist approaches of Thompson (1973) and Li (1990), and others.

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

[10]See Williams (2005).

[11]This subsection relies on Chen (2019), who further completed and sharpened the empirical arguments in Koopman (2011), and expanded the arguments to test predictions about quantifier scope, cf Chen and Koopman (in prep) for further elaboration.

section 1.6.

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

(14) a. 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 in some severe way'

As the English translation in (14-a) shows, the manner adverb *henhen (de)* severely only modifies event1 denoted by the V1 *da* hit, not V2. This is quite different from (15), 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:

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

Modification of CAUSE Cause can be independently modified, as the following examples show.

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

(17) Zhangsan jinchang da ku Lisi.
      Zhangsan. often   hit cry Lisi.
      '[Zhangsans hitting Lisi often] makes Lisi cry (lit. Zhangsan often hits Lisi cries.)

Such examples also show that the initiator (i.e. agent) of the hitting event has moved past the adverb that modifies the CAUSE projection, i.e. it necessitates the following (partial) syntactic bracketing, with the surface subject moved outside of what I have called the eventvP. [12]

(18) Zhangsan$_i$ [henkuai$_{quickly}$ (DE) [$_{CAUSEP}$ [<Zhangsan$_i$> da$_{hit}$ <Lisi>] CAUSE ..ETC...]]

Some modifiers that precede V1 like *youdian*, 'considerably' or 'comparatively' can modify causation, or marginally so, the eventvP, but not the result (Zhiguo Xie, pers. communication). Since a preverbal adverb can only be structurally local to the eventvP or the causeP, adverbs that precede V1 simply cannot modify the change of state predicate without also modifying CAUSE.

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

In addition to being independently modifiable, CAUSE should also be able to attract V2, and be able to be selected itself, as is the case for the bounded suffix -le (section 1.4.1).

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[12]This implies that the eventvP is not an island at the relevant level of the derivation.

1.4 On object resultatives, and the surface position of objects

The direct object in the examples discussed so far is selected twice, but pronounced only once, following the aspectual particle *le*. This can come about by ATB movement of the object to a position above the cause projection, which I take to be case (=K) related.[13] Further movement of the complement of K around the object will yield postverbal objects:

(20)
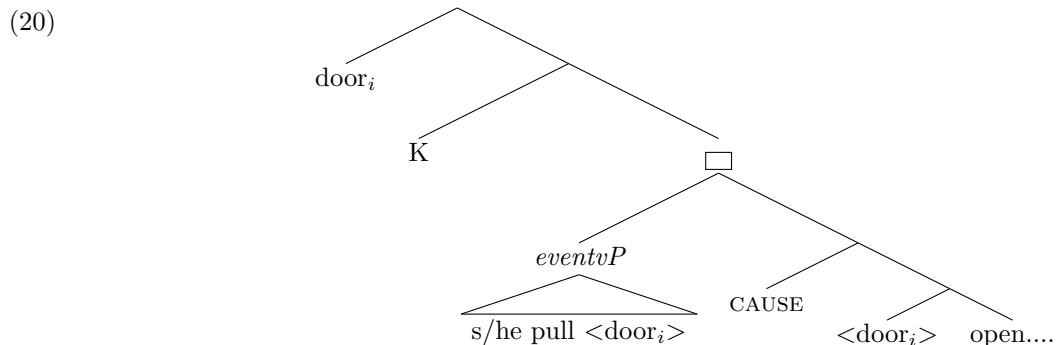
As this representation shows, the surface object (*door*) is interpreted both as the theme of V1 (*pull*) and the theme of V2 (*open*), but only being pronounced once because of ATB movement. It also allows an understanding why object resultatives require the surface object to be selected by V2, but not necessarily by V1 (i.e. (7)).

There is good empirical evidence that crosslinguistically objects raise to a position higher than causal subjects. First, a surface object can be the antecedent of an anaphor inside an underlying causal subject. This shows that there may be a point in the derivation, where the object c-commands the (inanimate) causal subject, as in (20). (21) extends quite generally to psych verbs (see Belletti & Rizzi (1988)).

(21) 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 is by no means generally adopted. In fact, it is often argued that such cases cannot be subject to syntactic constraints, because of the lack of a c-commanding antecedent for (21-a), and because animate causers do not allow such binding (21-c). However, such arguments are only as convincing as the understanding of syntactic structures allows. Certainly, without VP shells, decomposition of volitional arguments and causers, and object movement higher than causal subjects, there is no independent path possible towards a syntactic account. I take it however, that such an account is likely to be available in current decompositional approaches. A second argument is based on the understanding of scopal interactions of subjects and objects, as carefully laid out in Hallman (2004). Hallman shows that of the 3 subject positions and 3 object positions he identifies, there is an object position higher than the lowest position for the subject. I take this position to be higher than the causal subject, but below the region where volitional agents are introduced (see Koopman (2012b)).

If this is correct, direct objects occur above CAUSE, not just in Mandarin and English, but most likely universally. Further support from binding from the object position in Mandarin will be discussed in section 1.6, where we discuss passive resultatives and binding into inanimate causes.

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

1.4.1 Merging *le*

The suffixal aspectual marker *le* always follows the main predicate, i.e. in this particular instance silent CAUSE. Since right adjunction is not allowed, *le* takes CauseP or the projection with the object as its complement. In addition, *le* selects for the main predicate. This forces leftward movement of a phrase that contains CAUSE to locally satisfy its selectional properties of *le*. This part of the derivation is sketched below, with boldface indicating pronunciation:

(22) a. *Merge K, and I-merge DP(O)*:
door_i [K_{acc} [$_{CAUSEP}$ [$_{vP1}$ ..**pull** ..] [CAUSE [$<\text{door}_i>$ **open**]]]]]

   b. *Merge le, I-merge (i.e. pied-pipe) CAUSEP to le*.
[[$_{CAUSEP}$ [$_{eventvP1}$ ..**pull** ..] [CAUSE [$<\text{door}_i>$ **open**]]] [**le** [$\textbf{door}_i$]]]
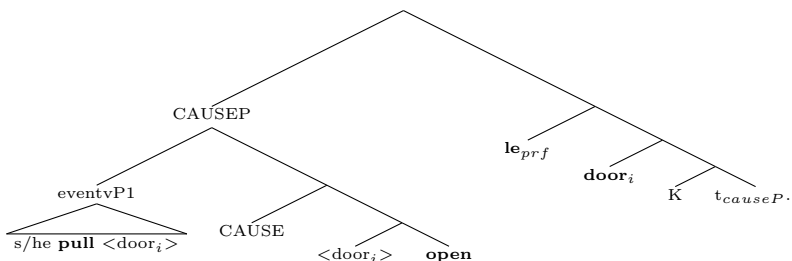
We next turn to how this structure feeds into the placement of the potential *de* and the negative potential *bu*.

1.5 On ways in which the eventvP behaves like a syntactic subject

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

(23) 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 allowed, we need to ask how our proposal can yield this linear order from the structure motivated so far. Insight into this problem comes from the question where the modal contribution can come from. There is no reason to assume *bu* is anything else than the regular sentential negation *bu*. The modal interpretation only arises in these specific environments. Thus, it is highly likely that there is a hidden modal in this environment. From Cinque's functional hierarchy, Cinque (1999), we know that ability modals (*can, be able..*) occur low in the fseq of the clause (26 out of 38), above completive aspect (possibly *le*) at 31/38, and (non active) Voice (at 33/38). This leads quite directly to the hypothesis that Mandarin not only has a silent CAUS, but also a silent modal MOD_{able} that occurs low in the structure where we would expect to find it. The relative scope $bu_{neg}> MOD_{'able'}$ further translates into the hierarchy of Merge. If the silent modal is a raising predicate, the linear placement of *de* or *bu* follows directly from raising of the causal subject eventvP. Subjects in Mandarin always precedes the sentential negation *bu*, and *de* follows phrases. The placement of *bu* and *de* therefore follows from the fact that the eventvP as the subject of CAUSE, undergoes raising, as shown in (24).

(24) 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 cannot make Taotao tired)
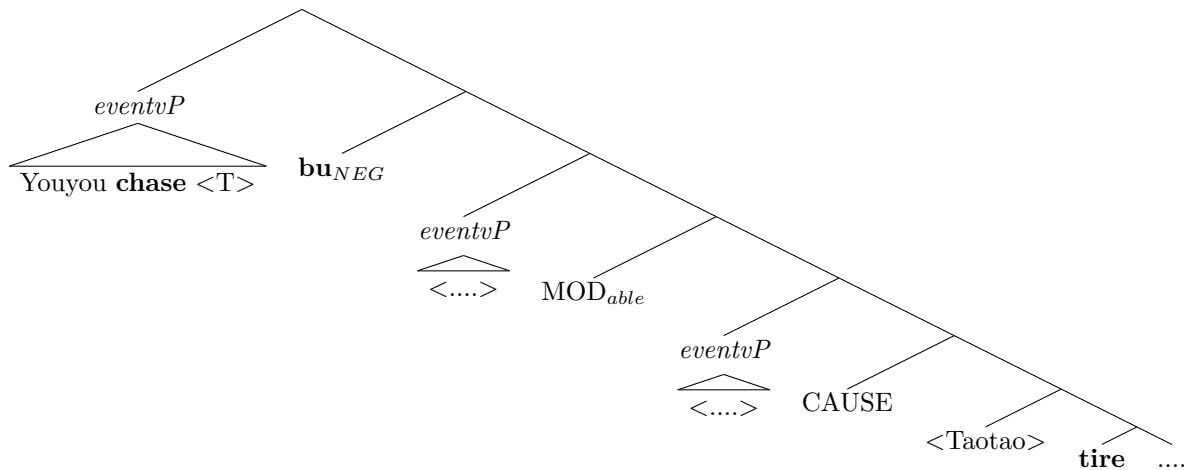
Note that this is as high as the constituent containing V1 will raise any further. This follows, as there is no gerundive morphology, nor tense morphology in Mandarin which could force further upwards movement. The DP agent inside of the eventvP however will undergo further movement, ending up in a DP position outside the eventvP (cf. (16)).[14]

1.5.1 Interpretation and Scope

The syntactic derivation sketched in the previous section directly captures the linear placement of the potential. It receives further support from predictions it makes with respect to scope of the modal, and the interpretation of negation.

Scope of the MOD   Given the following syntactic structure:

(25)   [event1] MOD [<event1> CAUSE V2].

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

(26)   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 supports that the fact that the event denoted by V1 is below MOD at some point in the derivation: it starts out as the syntactic subject of CAUSE..

Negating the event requires Merge   In the syntactic representation of V1V2 resultatives developed here, there are two separate events: V1 is within the eventvP that is merged as the subject of Cause, with the causative representing the main event. When a past resultative event with the

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[14]The *eventvP* therefore can not be an island at the relevant point in the derivation.

clause final *le*CRS is negated, the negation *mei(you)* must precede V1V2. In analyses where V1 is the main event, we expect negation of the perfective to negate the event denoted by V1. As Liu (2004)) shows this is not the case however:

(27)   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 eventvP1 is therefore *not* negated, just like the gerundive paraphrase is not. While Liu proposes to treat V1 behaves as a causal adjunct, i.e. basically as a because/from phrase, this analysis is not necessary in the current proposal. Indeed, if negation of an event requires the event to be a sister of Neg, basically a case of modification, these data will follow from the configuration. Regardless of where the negation merges, the causal subject will not be a sister to the sentential negation, but negate the event denoted by the main predicate, i.e. CAUSE (or the perfect (CRP) in (27)).

(28)
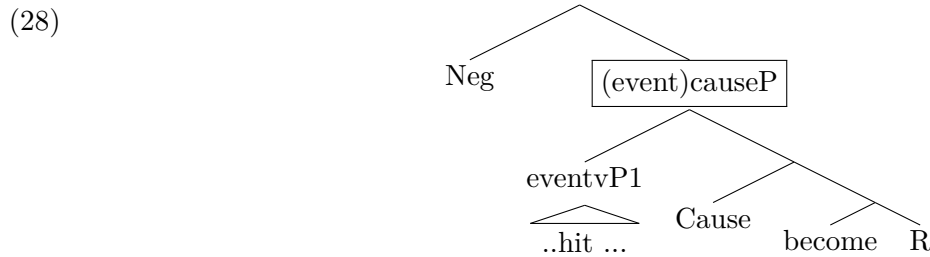
At the lowest level in the derivation, the causal subject (the eventvP) cannot be a sister of the negation in (27), as the perfect CRP combines with *mei(you)*, must clearly be on the spine, and this regardless of any further subject raising the eventvP could undergo.[15]

MOD cannot apply to eventvP1   Similarly, the potential modality (i.e. MOD) does not apply to the event that contains V1, but only to the causative (cf Liu (2004)).

(29)   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

1.6   On the interpretation of arguments: passive resultatives and PRO

In this section, we turn from active transitive vPs to the passive(-like) resultative, which is one of the three readings of (8) repeated below:

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

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

In such passive-like resultatives, the agent of V1 is also interpreted as the argument of V2 *tired*. 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 (31), 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)).

(31)   Yifu   xi-   le
        clothes wash- PRF
        lit: The clothes washed. The clothes got washed.

How can a language 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 effect of a *silent* non-active VOICE. VOICE then is the third silent lexical item that we encounter in Mandarin.[16] Under this view, besides active eventvPs seen so far, passive-like resultatives would emerge when a eventvP with a silent non-active VOICE merges as the subject of CAUSE.

(32)   A silent non active VOICE is present in examples (31) and within the subject evenvP1 in (30).

This brings us to the next problem: what exactly does Voice do? There are currently roughly two different and incompatible views on this topic. The first view assumes Voice is involved in either introducing the external argument as its specifier or not, 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 by existential closure[17]. 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. Though this analysis gets around the demotion of the external argument, there are potential problems. 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 interpreted. A different formal tool must be employed to account for the interpretation of the implicit arguments in the syntax, and the treatment of the external argument in the by-phrases requires further tools. Under this view, the representation for Mandarin (31) would be (33):

(33)

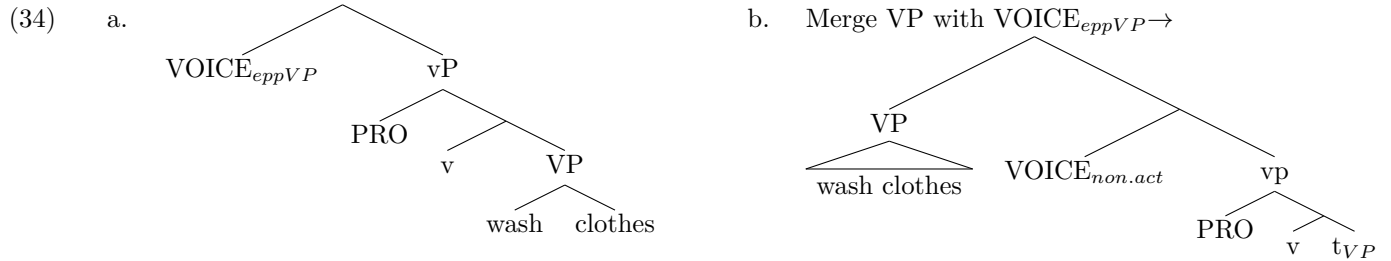$$\text{VOICE}_{non.act} \quad \text{wash} \quad \text{clothes}$$

A second view, proposed by Collins (2005) is a departure of the classical GB style type analyses. It takes transitive verbs to always be represented in the same way. (Passive) Voice merges with a

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[16]For other languages with silent non-active VOICE, see Hale (1970) for Australian languages with ergative case marking systems, and Koopman (2012a) for Samoan.

[17]This tool was developed in lexicalists approaches as an alternative to the treatment of silent syntactic categories like PRO, as well as to account for the implicit argument in passives.

fully transitive structure as in (34-a), with Voice playing a role in the way arguments are realized, not in how they are assigned. Non-active Voice attracts a verbal projection, the ' big' VP, bringing the argument that contains it closer to T, i.e. it smuggles it over the external argument, effectively 'demoting' the subject. This allows 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 is PRO, occurring in the type of configuration where configuration generally found. The burden of the interpretation now shifts to accounting for the reference to PRO. According to this view, the Mandarin structures in (31) would have the syntactic representation in (34).

(34)   a.

VOICE$_{eppVP}$ vP

PRO

v   VP

wash   clothes

b.   Merge VP with VOICE$_{eppVP}$→

VP

wash clothes   VOICE$_{non.act}$ vp

PRO

v   t$_{VP}$

The problem is whether there are any empirical arguments in favor of this analysis, besides theoretical considerations of parsimony. Is there an obligatorily silent implicit argument in the syntactic structure in Mandarin, and if so why do standard diagnostics seem to fail (they do, as we discuss below). Section 1.6.1 shows that the interpretation of the implicit argument depends entirely on the local syntactic configuration. This strongly suggests that the implicit argument should in fact be syntactically represented, contrary to the general literature, with Control (or movement) underlying the attested and unattested interpretations. Section 1.6.2 addresses the question how the arguments for the presence of an implicit argument can be reconciled with the failure of standard criteria to diagnose this silent category. As I will suggest, these criteria are actually *expected* to fail given the structure I argued for. In a nutshell, PRO will have to c-command the relevant phrase in order to show its presence. This can fail, if PRO can be shown to be low, and the relevant phrase is simply too high.

1.6.1   Presence of an implicit argument or not?

Let us turn to the point in the derivation where the subject argument of CAUSE is a silent non-active VOICE phrase, and the argument of *tire* has I-merged to the object position higher than the projection of CAUSE, as argued previously.

Youyou$_1$

K

VP
chase Taotao
VOICE$_{eppVP}$ vp
PRO$_1$ ....

CAUSE
<Youyou$_1$>   tire
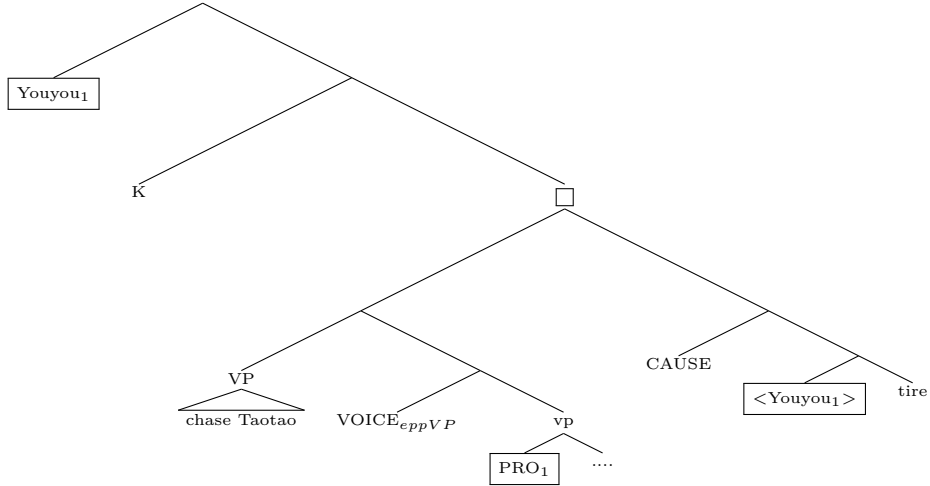
This representation allows an immediate account for the observed reading, while keeping the projection of arguments in the syntax uniform. Youyou locally c-commands PRO and 'controls' the reference of PRO.[18] Taotao does not c-command PRO at this point. Youyou is therefore interpreted both as the external argument of *chase* and as the argument of *tire*. There is no need for any additional mechanisms to account for the reading of the implicit 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 in fact 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 argument comes from Binding (see section 1.4), as the following examples from Zhuo Chen (personal communication) show:

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

a.   (ta)ziji$_1$ de biji   kan lei le   Zhangsan$_1$
      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

b.   [Z$_1$ [$_{CAUSEP}$ [[self$_1$ DE handwriting] read VOICE$_{eppVP}$ PRO$_1$] [CAUSE <Z$_1$> tire]]]

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

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.' 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 not only a central role in accounting for these particular interpretations. It also suggests (a way to further explore) 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. control is obligatory in the case of object V1V2 resultatives. In addition, raising of the causal subject should not be able to create new binding possibilities for PRO as it will remain stuck under the surface subject, i.e. the theme of *chase*. This seems to be correct. Cases like Super-Equi ((i.e.

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[18]This analysis would also be compatible with an ATB movement analysis.

Mary$_i$ knew that [PRO perjuring himself$_k$/herself$_i$] disturbed John$_k$ do not (and should not) occur in these 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. There is a PRO in these constructions, albeit a very deeply embedded one in the low region of the clause.

1.6.2 On failure of standard tests for the 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 subject of CAUSE) may in fact provide a structural explanation of why some of the standard diagnostics for the syntactic presence of PRO fail in this context: they are in fact expected to fail.

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

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

An implicit agent PRO cannot do so either. This is expected, as in the current analysis, there is an implicit PRO in both (37) and (38).

(38)   Taotao (*guyi)   zhui lei le
        Taotao (deliberately) chase tire PRF.
        * *under the reading* 'Someone's deliberately chasing Taotao tired Taotao'

For modification to be possible though, a volitional modifiers must Merge local to a a structure where volitional argument are interpreted. Volition is surely a property of a region in the clause that is higher than the surface object or arguments of CAUSE. This can be concluded from the fact that in *Mary pushed Bill intentionally* intentionally can never modify the object. Therefore, since objects cannot support volitional modifiers, and since PRO is stuck below the surface object that controls its reference, the modifier test is expected to fail for structural reasons: this PRO is simply too deeply embedded to support a volitional modifier.

This explanation extends to other cases in the same way. The understood agent (i.e. PRO) cannot control in a purposive (39-a), it cannot support an emphatic agent oriented floated *ziji (by himself/alone)* as in (39-b), regardless of whether it is controlled by the postverbal object. It can get an inner reflexive (automatically, by itself) reading (Liao (2005), citing Wei-Tien Dylan Tsai).

(39)   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
            Light self turn open PRF
            The light turned on by itself/automatically *someone (by himself/alone) turned on the light
     c.   *Deng ziji da   kai le   Youyou
            Light self turn on PRF Youyou
            *Youyou himself turned on the lights *Youyou turning on the light happened by itself.

An existential reading is possible in (39-a), as the object *food* is not controlling PRO in this case. But since this is a passive resultative, and purposives are merged higher in the clause, PRO is simply too deeply embedded to c-command and hence control into the purposive. Overt agents occur in a position preceding direct objects and Causal subjects: if emphatic agent oriented *ziji* must occur in that region as well, the PRO in question will fail to support subject oriented anaphors (as in (39-b), and (39-c)). Inner reflexives are possible, recalling certain low occurrences of *si/se* (la porte s'est ouverte (the door SE-is opened, 'the door opened') and a quite fine cartography.

It is important to stress the fact 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. Thus, the analysis in this paper is entirely consistent with the presence of a syntactically present PRO. 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 (iii), the failure of diagnostic tests to support the presence of the implicit argument can be accounted for by very general principles like locality of selection that determine part of the fine grained cartography.

1.7   Conclusion

This paper, guided by a set of strong theoretical hypotheses, sketched a unified syntactic analysis for a subset of V1V2 object resultatives in Mandarin that present multiple challenges. Central to the account are the following ideas (i) the causal 'eventvP' containing not just the verb, but also the arguments of the verb, is merged as the subject of a silent syntactic predicate CAUSE, which takes the change of state predicate and result as its complement. (ii) that this eventvP can be either active or passive. (iii) while arguments start out internal to eventvP, they are forced to move outside the CAUSEP for case reasons, I assume. This accounts for the different interpretations of arguments through ATB movement. In addition, because of their high position, objects can bind anaphors contained in the causal eventvP. There are several silent lexical item Mandarin (CAUSE, $MOD_{able,potential}$) as well as (more controversially) (non-active) $VOICE_{eppVP}$ attracting a verbal shell. These are all very low in the clausal structure. Their presence in the syntax is independently supported by different distributional arguments: silent elements leave their signature on their environment. Since eventvP is merged as a causal subject, it should behave like a subject by being able to raise. This yields the linear order where the eventvP raises past the potential *de* and negative potential *bu* yielding their linear position between V1 and V2. A passive resultative eventvP can be merged as the subject of CAUSE. I argued that the syntactic structure contains a silent passive-like VOICE and a syntactically represented silent external argument, PRO, which must be controlled by the surface object. This analysis accounts for the interpretative properties of PRO from independently motivated configurations without any further stipulations, as well as the passive properties of the construction. While certain diagnostic tests fail to diagnose the syntactic presence of PRO, I argued that the necessary structural conditions that must hold for the tests to work simply cannot be met: these tests are therefore in fact expected to fail. In conclusion, a parsimonious and unified syntactic account can be constructed for the data discussed here, given a proper understanding of the syntactic derivations and the interfaces.[19]

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[19]There is no space here to address the further language internal and crosslinguistic typology, which will have to be based on the initial merge structures argued for here. While V1V2 resultatives are possible in Mandarin, because of the paucity of verbal morphology, they are excluded in English, as a consequence of the needs of verbal morphology higher than CAUSE. Either the clausal eventvP and the CAUSE R each carry independent verbal morphology, or the subject eventvP ends up having to combine with the tense morphology on the spine, with R restricted to P or A.

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