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MANDARIN SECONDARY PREDICATES[*]

Ryosuke Shibagaki

ABSTRACT

In the first part, I provide some data of secondary predicates in English and Mandarin on consequence-depictives (SUBJ-oriented) and resultatives (OBJ-oriented), which adopt an intransitive verb/adjective for their secondary predicate. In the second half, I present an account of the linking issue on "resultative" compound predicates in Mandarin Chinese, building on the LFG/LMT work of Her (2007), who assumed that the argument structures of each predicate merge to give a composite structure, which determines whether a resultative sentence is semantically causative or not, and from which the arguments link to grammatical functions. I argue here that the facts require a more articulated semantics, for unlike Her's analysis, the determination of causativity and the linking of the arguments of the two predicates is fully an issue of semantics; specifically, I argue that there are two types of secondary predicates in terms of their semantics, namely those with internally- and externally-caused changes of state (see Levin and Rappaport Hovav: 1995, McKoon and Macfarland: 2000), which are respectively "indirect-causative" and "direct-causative"; causativity should be categorised into three types, non-causative, indirect-causative, and direct causative. I further argue that the argument undergoing internally-caused change always links to Actor and that the one undergoing externally-caused change (a truly "affected" argument) always links to Undergoer.

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1. INTRODUCTION

As an introduction, I will lay out two types of "secondary predicate", firstly with English examples and later with Mandarin ones. In the examples, secondary predicates are italicised and the arguments modified by the secondary predicates are underlined.

(1)   [Two Types of Secondary Predicates in English]
    a. [Consequence Depictive **OR** Goal/Path sentence] (SUBJ-ori.)
       The wise men followed the star *out of Bethlehem*.

(Wechsler, 1997)

    b. [Resultative] (OBJ-oriented)
       John pounded the metal *flat*.

(1a) was introduced as a "subject oriented resultative" by Wechsler (1997). There is an on-going debate as to whether this is a true resultative or mere Goal/Path sentence. As the debate is not the main point of this paper, I only briefly lay out the debate in the note.[1] If (1a)

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[1] Since Wechsler (1997) and Verspoor (1997) introduced sentences like (1a) as subject-oriented transitive resultatives, some linguists including Rappaport Hovav and Levin (2001) and Goldberg and Jackendoff (2004) agreed with Wechsler and Verspoor and admitted that the restriction on the internal argument, (Levin and Rappaport Hovav 1995, Kageyama 1996), that only internal arguments can be semantically modified by the resultative secondary predicate, was wrong. On the other hand, others like Kageyama (2003), Rothestein (2004), and Mateu (2005) disagreed with Wechsler and Verspoor, and insisted on retaining the restriction on the internal argument. Their counterargument against Wechsler and Verspoor is that genuine resultatives do not allow the phrase all the way right before the resultative predicate, since the resultative predicate denotes an ending point but not a whole process.

(a)   The wise men followed the star out of Bethlehem. (Wechsler, 1997)
(b)   The wise men followed the star all the way out of Bethlehem.
(c)   John shot Mary to death.
(d)   *John shot Mary all the way to death.

Kageyama (2003) argues that (c) is the canonical resultative construction, which disallows *all the way* to precede the secondary predicate *to death*, as shown in (d). On the

was a kind of resultative, then it would be a consequence depictive construction; there are two events in (1a), and the secondary event takes place only after the first event occurs. Thus there is a causative relationship between the primary and secondary events. However, there is no external causer; the causer is internal (the Actor performs an action possibly without volition and the resultant state occurs to the Actor itself). In fact, the primary event in (1a) could easily cause not only the state of staying out of Bethlehem but also many other different types of secondary events. In this respect the extent of causation in (1a) is relatively weak, and I use the term "indirect causation" to describe it. For these reasons, I name the type of sentence as in (1a) as a consequence depictive, which may or may not exist in English, but is productive at least in Mandarin as well as some other languages including Thai. The linking pattern in this type is always subject-oriented.

(1b) is the canonical resultative construction, where the linking is always object-oriented unless the main verb is intransitive. In this type, the secondary event is clearly brought about by the primary one, which I call "direct causation" in section 4.

Mandarin Chinese can also exhibit the two types of secondary predicates shown in (1), using intransitives or adjectives.[2] Examples are

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other hand, (a) allows *all the way* to precede the "secondary predicate" *out of Bethlehem*, as shown in (b). This suggests that (a) is a mere goal/path sentence, like *John went to school*, which allows the insertion of all the way as *John went <u>all the way</u> to school*. However, I think that if the main verb shot in (c) is replaced with punched, the grammaticality of the sentence rises distinctively, compared to (d).

    (e)   ?John punched Mary all the way to death.

I am not going to debate this issue in this paper. I believe that there is no true transitive subject oriented resultative in any language.

[2] As for the variety of so-called secondary predicates, it is well known that there are some other variants such as spurious resultative and subject- and object-oriented depictives. I will only briefly introduce these data here, as I will not analyse these constructions in this paper. In addition, it is doubtful whether Chinese has true depictives, for the grammaticality of (ii) and (iii) are only marginal. In some other languages including English, spurious and depictive secondary predicates are adjectival, while as can be seen below, they are adverbial in Chinese; *–de* stands for an adverbial marker.

(i) [Spurious Resultative] (OBJ-oriented)

    ?Ta *song-song-de* zha   le   tiao bian zi
    she loosely   braid   PFV pigtail
    "She put her hair into a pigtail loosely."

given in (2), where the causation and linking of each type will be briefly explained. They will be theoretically analysed later.

(2) [Two Types of Secondary Predicates in Mandarin]
    a. [Consequence Depictive] (SUBJ-oriented)
       <u>John</u> chi-*ni*   le   mantou
       John eat-bore PFV bun
       "John ate the bun and became bored with doing so."
    b. [Resultative] (OBJ-oriented)
       John da-*po*   le   <u>bo-li</u>
       John hit-broken PFV   glasses
       "John hit the glass broken."

    (2a) exemplifies the consequence depictive. (2a) consists of two events; the primary one can be interpreted as *John ate the bun*, and the secondary one *John became bored*. The secondary event takes place only after the primary event occurs; if you ask "Why is John bored with eating buns?", then the answer has to be "Because he ate them (a lot of them)". So there is a causative relation between the primary and secondary events; the secondary event is brought about by the first one. However, *John* of (2a) does not need to carry volition to become bored of eating buns. Moreover, the event of eating could cause various types of caused events such as being happy, unhappy, full, sick and so on, unlike the case of the typical resultative construction as in (2b). Therefore, this type should be called "consequence-depictive", since two descriptive events take place one after another under the weak causative relationship. I call this subject *John* as the internal causer because the entity itself, which performs an action without volition, ends up in a resultant situation denoted by the secondary predicate. This construction is always subject-oriented and productive in Mandarin Chinese.

(ii) [Depictives] (SUBJ-oriented)
    ??/*John *pa-pa-de* pao le
       John shyly   run PFV
       "John shyly ran."
(iii). [Depictive] (OBJ-oriented)
    ??/*John *re-hu-hu-de* chi le   mantou
       John hotly   eat PFV bun
       "John ate the bun hot."

(2b) represents the case of the canonical resultative, which is object-oriented. The secondary event is clearly brought about by the primary event; the possible caused events are semantically restricted compared with the case of the consequence depictive: in (2b) the resultant state has to be something closely associated with the meaning of hitting. The subject *John* plays the role of external causer.

2. THE LINKING AND CAUSATION IN MANDARIN SECONDARY PREDICATES

In terms of linking and causation, Mandarin secondary predicates can be categorised into three types, consequence depictives, resultatives and inverse-linking resultatives, which were previous analysed in the category of "resultatives" by, most notably, Li (1995, 1999) and Her (2007). Linking stands for whether the secondary predicate modifies the subject (SUBJ-oriented) or the object (OBJ-oriented). Causative means "the bringing about of one state of affairs directly by another state of affairs, usually an event or action" (Van Valin & LaPolla, 1997). The linking pattern is explained in section 2.1, and causation in 2.2, following the accounts of Li (1995) and Her (2007).

2.1 Linking Patterns

Examples of the three constructions with a true secondary predicate are given below.

(3) <consequence depictive>
     <u>John</u>   chi-*ni*   le   mantou
     John   eat-bored PFV   bun
     "John ate the bun and became bored with doing so."

(4) <(canonical) resultative>
     John   niu-gan   le   <u>maojin</u>
     John   wring-dry PFV   towel
     "John wrung the towel, which caused the towel to become dry."

(5) <inverse-linking resultative>
    Zhe zhong yao   chi-si   le   <u>John</u>
    this kind   medicine eat-die PFV John
    "The eating of this kind of medicine (by John) caused John to   die."

   (3) represents the consequence depictive type, where the secondary predicate *ni* 'bored' modifies the subject *John* (SUBJ-oriented). On the other hand in (4) the secondary predicate *gan* 'dry' modifies the object *maojin* 'towel' (OBJ-oriented). In both (3) and (4), those are the only possible interpretations; in any context, it is impossible to have the OBJ-oriented reading for (3) or SUBJ-oriented reading for (4). [3] Interestingly, (5) is grammatical, where, among the two arguments *John* and *zhe zhong yao* 'this kind of medicine', *John* is the proto-subject entity EATER, yet which maps to the object, and *zhe zhong yao* 'this kind of medicine' is the proto-object entity EATEE which maps to the subject. [4] This situation appears to go against the thematic hierarchy, that a hierarchically more prominent theta role should correspond to a structurally more prominent argument position. Thus, (5) shows an inverse-linking phenomenon. As for the linking of (5), it is the surface object that is modified by the secondary predicate *si* 'dead' (OBJ-oriented). Moreover, the interpretation shown in (6) is unacceptable.

(6) #<u>Zhangyu</u> chi-*si* le   John
     octopus   eat-die PFV John
     Int. "John ate the octopus and it (the octopus) died."

   (6) is grammatical only with the OBJ-oriented reading as in (5); it cannot be interpreted as SUBJ-oriented, although it is possible to create a context that *a living octopus was eaten by John and it died (in John's mouth)*. These are the basic data on the linking patterns of Mandarin secondary predicates. The theoretical explanations for the linking pattern will be offered in section 5 and 6.

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[3] In some dialects of Mandarin Chinese, it is possible to use *ni* 'bored' in the inverse linking type. I will mention this issue later in this paper.

[4] The proto-properties of subjecthood and objecthood will be discussed in section 4.3 by introducing some arguments from Dowty (1991) and Van Valin and LaPolla (1997).

2.2 Causative vs. Non-causative

Many linguists including Huang (1988) stated that examples like (3) are "non-causative", while those like (4) and (5) are "causative".[5] The distinction between "causative/non-causative" can clearly be observed with BA (affected object) and BEI (passive) tests, because in Mandarin such constructions carry a causative interpretation and are compatible only with causative sentences. Below, (7), (8) and (9) correspond to (3), (4) and (5), respectively, where (7a, b) are ungrammatical, which means (3) is non-causative, while (8a, b) and (9a, b) are both grammatical, which means (4) and (5) are both causative.

(7) a. *John   ba   mantou chi-ni   le
       John BA   bun   eat-boerd PFV
       "John ate the bun, which caused John to become bored with doing so."
    b. *Mantou bei   John   chi-ni   le
       bun   BEI John   eat-bored PFV
       "The bun was eaten by John, which caused John to become bored with doing so."

(8) a. John   ba   maojin niu-gan   le
       John BA towel   wring-dry PFV
       "John wrung the towel dry."
    b. Maojin bei   John   niu-gan   le
       towel   BEI John   wring-dry PFV
       "The towel has been wrung dry by John."

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[5] Though I use the conventional term "non-causative", I will later show that the consequence-depictive sentence (3) is not non-causative but "indirect-causative", which is incompatible with BA and BEI constructions like "non-causative"; BA and BEI tests are the ones which detect whether a sentence is direct-causative or not.

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(9) a. Zhe zhong yao   ba   John chi-si   le
     this kind   medicine BA   John eat-dead   PFV
     "The eating of this kind of medicine caused John to die."
   b. John bei   zhe zhong yao   chi-si   le[6]
     John BEI   this kind   medicine   eat-dead   PFV
     "John was caused to die by the eating of this kind of
     medicine."

3. PREVIOUS ANALYSES

3.1 Review of Li (1995) and Her (2007)

Li (1995) focused upon the argument-function linking of the Mandarin "resultative construction", which was later extended by Her (2007) within the framework of Lexical Mapping Theory (LMT). In their analyses, the three constructions (3), (4), and (5) are the outcomes, generated by merging argument structures of V_1 (main verb) and V_2 (secondary predicate); V_1 carries two argument roles since it is the transitive, while V_2 carries a single argument role since it is an intransitive verb. The composition of argument structures is illustrated in (10).

(10) $V_1 <x, y> + V_2<z>$ $\rightarrow$ a. V_1-$V_2 <x, y\text{-}z>$
                                         b. V_1-$V_2 <x\text{-}z, y>$

Thus, the single role of V_2 merges with either of the two roles of V_1, which produces two outcomes as in (10a) and (10b). However, as already shown in (5), there are also the inverse linking resultatives, which theoretically doubles the outcomes of (10). Examples are given in (11) to (14), which correspond to (3) to (6), respectively.

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[6] I am not sure whether BA is the genuine passive trigger or not; in (9b) the thematically more prominent Actor links to SUBJ, and the less prominent Undergoer links to OBJ. This phenomenon contradicts the proposal on the passive construction by Jackendoff (1992). In Mandarin, the BA construction may only be a device that changes the positions of SUBJ and OBJ of an active sentence. In any case, (5)/(9) is at least causative.

(11) <consequence depictive>
John   chi-ni   le   mantou
John   eat-bored   PFV   bun
"John ate the bun and John became bored with doing so."

```
        <x-z        y>
         ↓          ↓
         S          O
        John     octopus
```
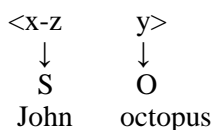
(12) <resultative>
John   niu-gan   le   maojin
John   wring-dry   PFV   towel
"John wrung the towel, which made the towel dry."

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        <x          y-z>
         ↓           ↓
         S           O
        John        towel
```
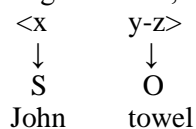
(13) <inverse-linking resultative>
Zhe   zhong yao   chi-si   le   John
this   kind   medicine   eat-die   PFV   John
"The eating of this kind of medicine (by John) caused John to become dead."

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        <x-z              y>
         S  ←        →    O
        drug             John
```
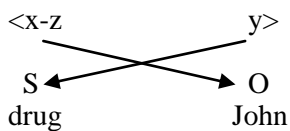
(14) <non-existent>
#Zhangyu   chi-si   le   John
 octopus   eat-die   PFV   John
 Int. "John ate the octopus and it died. (SUBJ-ori. reading)"

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        <x                y-z>
         S  ←        →    O
        octopus          John
```
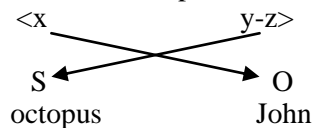
In order to explain the linking and causation of the four examples above, Li (1995) introduced three principles, which are laid out in (15), (16), and (17).

(15) Causative hierarchy:
   Causative roles, or c-roles, are assigned directly to syntactic positions according to the causative hierarchy, i.e., the more prominent Cause to the more prominent subject, and less prominent Affectee to the less prominent object.   (Li, 1995)

(16) Causative role (C-role) Assignment Conditions:[7]
  a. The argument in the subject position receives the c-role Cause from a resultative compound if it receives a theta role only from V_1.
  b. The argument in the object position receives Affectee from a resultative compound if it receives a theta role at least from V_2.
                  (Li, 1995)

(17) Well-formedness Condition on Mapping Argument Structure to Syntax:
   Theta roles can be assigned contrary to the thematic hierarchy if the arguments receiving them are assigned c-roles in ways compatible with the causative hierarchy.   (Li, 1995)

These principles well explain the grammaticality and causativity of the examples (3) to (6). For example, according to the principle shown in (16), (3)/(11) is non-causative; two theta-roles are assigned on SUBJ. (4)/(12) is causative; one theta-role is assigned on SUBJ. In (5)/(13), the subject *zhe zhong yao* 'this kind of drug' receives a theta role only from V_1, and thus c-roles are assigned to the arguments which are prior to thematic roles; the subject successfully receives c-role Cause; according to the principle shown in (17), in spite of the violation of thematic hierarchy, the inverse linking is grammatical. However, in (6)/(14) the subject receives theta roles from both V_1 and V_2; there are no c-roles assigned to the arguments. Thus, the inverse linking violates thematic

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[7] As Her (2007) also stated, Li (1995) seemed to take it for granted that Cause and Affectee are the only two roles, and thus the hierarchy is simply Cause > Affectee, although he did not give a explicit list of c-roles.

hierarchy and no c-roles are involved. The ungrammaticality of (6)/(14) can also be explained well.

This explanation, however, contains some problems. Her (2007) indicated some of them[8]; first, Li's (1995) c-role assignment conditions are specific to the resultative compounding and do not follow from the use of independently-motivated principles within the derivational framework adopted; second, given that causativity is one of the most important properties distinguishing the proto-subject from the proto-object (Dowty, 1991) and thus affects argument-function linking, it should be integrated into the argument structures of resultative compounds.

Extending Li's (1995) proposal, Her (2007) adopted the notion of "suppression" and a revised version of Causativity Assignment. Suppression in LFG refers to an argument role which receives no mapping but semantically exists (cf. Bresnan, 2001). As already mentioned, in a transitive resultative construction, the single role from V_2 needs to be combined with either of the roles of V_1; either subject or object has two theta roles. However, those two roles, one from V_1 and the other from V_2, cannot be syntactically activated to map onto a grammatical function, because that operation would violate the strict one-to-one linking principle. Therefore, one of the two roles has to be suppressed. This in turn implies that the composition of roles, shown in (10), needs to be amended to account for the suppressed arguments. Suppression is indicated by a single cross-out.

(18) $V_1 <x, y> + V_2<z> \rightarrow$ a. V_1-$V_2 <x, y\text{-}\cancel{z}>$
  b. V_1-$V_2 <x, \cancel{y}\text{-}z>$
  c. V_1-$V_2 <x\text{-}\cancel{z}, y>$
  d. V_1-$V_2 <\cancel{x}\text{-}z, y>$

By having suppression with one of the two arguments in (10a) and (10b), there potentially appear four types of argument structures for Mandarin resultatives. (18d) is the a-structure of (5)/(13), where x is suppressed. The remaining (unsuppressed) 'y' and 'z' are both patient/theme roles and thus hierarchically equivalent in terms of theta

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[8] Her's (2007) original claim contained another argument on theta-criterion. However, since it is well known that the definition of theta-criterion has been softened to some extent, the argument does not seem to be effective any more. Thus this argument is not introduced here.

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role. However, in fact there exists only one mapping pattern; y must be mapped to subject and z to object; 'y-OBJ and z-SUBJ' is ungrammatical. In order to explain this situation, Her (2007) provided four potential a-structures further articulated by introducing a Causativity Assignment principle, which is based on a universal default hypothesis (Li, 1999) that causative roles are assigned when a resultative construction is formed, and leads to the three types of resultative construction in (3), (4) and (5).

(19)   Causativity Assignment in Resultative Compounding:
        An unsuppressed role from V_2 receives [af] *iff* an unsuppressed
        role from V_1 exists to receive [caus].   (Her, 2007)

   (19) means that within a causative resultative compound, the most natural place for [af] (affectee) must be associated with 'z', the only role required from V_2. Hence, the principle (19) gives the prominence to 'y' when 'x' is suppressed. The a-structures in (18) are now revised with the proposal (19).

(20) V_1 <x, y> + V_2<z> → (i) V_1-V_2 <x, y-z̶>
                                  (ii) V_1-V_2 <x[caus], y̶-z[af]>
                                  (iii) V_1-V_2 <x-z̶, y>
                                  (iv) V_1-V_2 <x̶-z[af], y[caus]>

   In (21) to (23), examples (3), (4) and (5) are re-analysed with the a-structures given in (19).

(21)   John   chi-ni   le   mantou
        John   eat-bored   PFV   bun
        "John ate the bun and he became bored with doing so."
                <x-z̶   y>   <non-causative>
                  ↓   ↓
                  S   O
                John   bun

(22) John   niu-gan   le   maojin
      John   wring-dry   PFV   towel
      "John wrung the towel, which made the towel dry."
      a. $<$x   y-z̶$>$ $<$non-causative$>$
             ↓   ↓
             S   O
           John   towel

      b. $<$x[caus]   y̶-z[af]$>$ $<$causative$>$
             ↓   ↓
             S   O
           John   towel

(23) Zhe zhong yao   chi-si le John
      this kind   medicine eat-die PFV John
      "The eating of this kind of medicine caused John to die."
           $<$x̶-z[af]   y[caus]$>$ $<$causative$>$

             S   O
          drug   John

As can be seen in (21) to (23), these four types represent all possible readings; this theory well explains that the reading of (6)/(14), which is inverse-linking & SUBJ-oriented, does not exist. However, against the fact that (22) is causative, this theory enables the reading of (22a). Her (2007) explains that "the two a-structures of (22a) and (22b), $<$x, y-z̶$>$ and $<$x, y̶-z$>$, respectively, share an identical argument-function linking and thus relate to the same reading of the sentence (22); in (22a) 'z' from V_2 is suppressed and thus the a-structure receives no causativity; yet (22b) is causative with x[caus] and z[af]; his account thus correctly predicts that the reading of (22) can be causative".

3.2 Weak Points of Previous Analyses

The previous analyses by Li (1995) and Her (2007) are observationally adequate in that they account for the issue of grammaticality and causativity in all three readings of (3), (4), and (5). Moreover, they accounted for the appearance of causativity when V_1 and
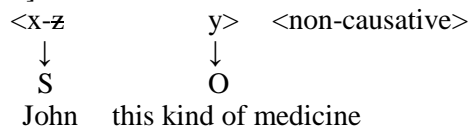
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V_2 merge to give a "resultative" compound well, though there is no causative predicate. However, there are some problems with these analyses. First, in Her's (2007) account, the causativity is only an independent stipulation from LCS, though his account is within the framework of LMT/LFG; there is no place to describe causation in a simple/regular LFG a-structure. Thus, the causative/non-causative stipulation has to be amended and better represented within the overall analysis. Second, Her (2007) made the criticism that Li's c-role argument (1995) was only specific to the resultative construction, but Her's analysis, shown in (19), is specific to the resultative construction. The reason that their analyses are specific to only the resultatives seems to be because their analyses do not capture the real semantics of causativity. In both Li and Her, the causer is regarded as an entity; it is thought to be either a subject or an object in a resultative sentence. However, as can be seen at least in (5), the causer looks like an event, which brings about another resultative event. This point of view of causation will be further discussed in section 4.1. Third, most importantly, Her's analysis does not account for the fact in (24), where the arguments of (5) are reversed.

(24) *John chi-si le zhe zhong yao   <non-existent>
    John eat-die PFV this kind   medicine
    Int. "John ate this kind of medicine and died."

Her's analysis implies that (24) should be grammatical with the non-causative subject-oriented reading, but in fact (24) is ungrammatical. The expected argument-function linking deducted from Her's theory for (24) is given in (25).

(25)   [Expected argument-function linking of (24) with Her's (2007) account]

$$\langle x\text{-}\cancel{z} \qquad\qquad y\rangle \quad \langle\text{non-causative}\rangle$$
$$\downarrow \qquad\qquad \downarrow$$
$$S \qquad\qquad O$$

      John   this kind of medicine

According to his analysis, the a-structure of (24) becomes $\langle x\text{-}\cancel{z}, y\rangle$, firstly because z must be semantically linked with the subject *John* but not with the object *zhe zhong yao* 'this kind of medicine'; simply, *John* can die but *the medicine* cannot, and secondly because the proto-subject

John stays in the subject position (there is no inverse-linking); z must be suppressed rather than *x*. This argument-function linking pattern leads to the grammatical non-causative reading as in (21), and its intended interpretation would be *John ate this kind of drug and died*. However, (24) is not grammatically acceptable.

Another fundamental weak point of the previous analyses derives from capturing the concept of causation as either causative or non-causative. That is, a consequence-depictive type as in (3) should not be construed as a mere non-causative construction, because there are two events in (3), and the occurrence of the secondary one fully relies on the occurrence of the primary one; the situation *in* (3) is totally different that in a sentence like *John is a student and Mary is a teacher*, where two the events are completely independent and both are without doubt non-causative. In sections 4 and 5, I will introduce the concept of indirect causation in order to offer an accurate analysis of the consequence depictives and internally-caused change of state.

4. LCSs

In section 4.1, following Folrey and Van Valin (1984) I will show that a causative construction should always carry two events, even when the content of the primary event is null, where the primary one brings about the second one. For all causative constructions, Folrey and Van Valin used CAUSE as the semantic predicate which connects the two events. This point will be later amended in section 4.2, where the indirect causation is described as CAUSE, and the direct or manipulative causation as CONTROL. At the end of 4.2 I will propose my LCSs for adjectives/intransitives of state. In section 4.3, Foley and Van Valin's proto-subject and -object properties will be introduced, which is relevant to section 6.

4.1 The Concept of Causatives by Foley and Van Valin (1984)

As Foley and Van Valin (1984) first indicated, there should potentially be two events in a causative event, where the first event (Process) brings about the second event (State). That is, the causer of a causative event should not be construed as a single entity such as Agent but as an event. This characteristic of causation must be common to all

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constructions with a causative interpretation, including the case that the primary event (Process) is not overtly expressed. Examples are given in (26), (27), and (28), where four types of causative verbs are illustrated; all these examples are based on Van Valin & LaPolla (1997).

(26) a. Causative state   The dog frightens John.
     b. Causative achievement   John popped the balloon.
     c. Causative accomplishment The hot water melted the ice.
     d. Causative activity   John bounced the ball around the room.

The basic logical structures of (26a, b, c, d) are given in (27).

(27) a. […] CAUSE [**feel'** (John, [afraid'])]   =(26a)
     b. […] CAUSE [INGR **popped'** (balloon)]   =(26b)
     c. […] CAUSE [BECOME **melted'** (ice)]   =(26c)
     d. […] CAUSE [**do'** (ball, [bounce' (ball)])] =(26d)

In the logical structures of (27), "[…]" denotes a causing event, which is not overtly expressed in a sentence. Van Valin & LaPolla (1997) argued that in complex induced affairs there are many instances where one state of affairs brings about another, and therefore the logical structure of a state activity achievement or accomplishment verb fills the gap […]. This is explained more in (28).

(28) a. Bill's owning a gun frightened Martha.
     a'. [**have'**(Bill, gun)] CAUSE [**feel'** (Martha, [afraid'])]
     b. The balloon's popping startled the baby.
     b'. [INGR **popped'** (balloon)] CAUSE [INGR **startled'**(baby)]
     c. The warming of the earth's atmosphere melted the arctic iceberg.
     c'. [BECOME **warm'** (earth's atmosphere)] CAUSE [BECOME **melted'** (arctic iceberg)]
     d. The dog's barking scared the boy.
     d'. [**do'**(dog, [**bark'** (dog)])] CAUSE [**feel'**(boy, [afraid'])]
                                        (Van Valin & LaPolla, 1997)

In the examples above, the nature of the cause is overtly specified within the sentences. However, Van Valin & LaPolla (1997) argued that even the sentences without a concrete description of the nature of the

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cause have the exactly same logical structure like (27) and (28). For example, a sentence such as *Max broke the window* is causative, but does not overtly describe how *Max* broke the window; for instance, by kicking, punching, or throwing a stone, and so on. Thus, the logical structure for *Max broke the window* should be illustrated as below. Importantly, the causer is not the single entity *Max* but is an event.

(29) a. Max broke the window.
     b. [**do'** (Max, φ)] CAUSE [BECOME **broken'** (window)]

(Van Valin & LaPolla, 1997)

4.2 List of Semantic Predicates of LCSs

The Lexical Conceptual Structure (LCS) consists of semantic predicates and their arguments/complements, and analyses the internal structure of syntactic predicates and their relations. LCS is not a fully unified model allowing variation in representation. In this paper I adopt Kageyama's (1996, 1997) theory of LCS as a basis of my theory of LCS, which will be adjusted at several points. Unlike Jackendoff's (1990) conceptual semantics, which focused upon the "localistic theory" of physical locations and abstract states, Kageyama's theory of LCS places more emphasis on event structure than localistic thematic relations. Kageyama (2007) explained that his concept of LCS was largely developed from Dowty (1979) and Van Valin (1990), including such predicates as manipulative or continuous causation (CONTROL), indirect or onset causation (CAUSE), change (BECOME), motion (MOVE), activity (ACT), experience (EXPERIENCE), and state (BE); the combinations of these predicates define the eventuality type of a given sentence, including not only Vendler's (1967) four aspectual types of verb (activity, state, accomplishment and achievement), but also other finer-grained semantic types such as direct vs. indirect causation, autonomous activity, contact/impact, control vs. spontaneity, and simple individual-level state vs. self-controllable stage-level state. Examples of these eventuality types are illustrated in (30), where *x*, *y* and *z* are variables.[9]

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[9] Kageyama (2007) used *x* for Actor and *y* for Undergoer, but in my LCSs of (30), they are simply variables.

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(30)   [Eventuality Types in LCS Representation]
    a. Autonomous state
       [$_{\text{STATE}}$ x BE AT-z]
    b. Change
      i. Transition from one state to another[10]
        [$_{\text{EVENT}}$ BECOME [$_{\text{STATE}}$ x BE AT-z]]
      ii. Locomotion
        [$_{\text{EVENT}}$ x MOVE VIA-z]
    c. Activity
      i. Autonomous activity
        [$_{\text{EVENT}}$ x ACT]
      ii. Transitive activity
        [$_{\text{EVENT}}$ x ACT ON-y]
    d. Experience
        [$_{\text{EVENT}}$ x EXPERIENCE […]][11]
    e. Causation[12]
      i. Direct/Manipulative causation
        [$_{\text{EVENT}}$ […] CONTROL […]]
      ii. Indirect causation
        [$_{\text{EVENT}}$ […] CAUSE […]]

Although the list above is based on Kageyama's (2007) analysis, it is different from his in three significant; according to Kageyama (1996) only the internal argument can appear as the single argument of the autonomous state and inchoative event such as (30a) and (30bi).

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[10] Unlike Kageyama (2007), I do not make a distinction between [$_{\text{EVENT}}$ x BECOME [$_{\text{STATE}}$ x BE AT-z]] and [$_{\text{EVENT}}$ BECOME [$_{\text{STATE}}$ x BE AT-z]] to differentiate "transition from one state to another" from "generation". Therefore, my LCS of (30bi) does not have an argument for BECOME; it will be a redundancy since the argument of BECOME and BE are always the same.

[11] In (30d, e), "[…]" indicates an event, like (27). It means the content of the event may or may not be filled up with other LCSs, but there must be an event even when it is not overtly expressed or filled up.

[12] Kageyama's (1996, 1997) definitions of the terms CONTROL and CAUSE seem to be different from those of Kageyama (2007). In Kageyama (1996, 1997), CONTROL and CAUSE corresponded to Pinker's (1989) 'cause-focus' and 'effect', where the distinction between CONTROL and CAUSE is whether the caused situation is successful or not. However, in Kageyama (2007), he used CONTROL as a manipulative (direct) causation, while CAUSE as an indirect causation. In this paper I adopt the idea of Kageyama (2007); CONTROL for direct causation and CAUSE for indirect causation.

However, I believe it is possible to have an external argument to appear in an autonomous state or change of state in the cases of indirect causatives. This will be later explained with Mandarin secondary predicates in section 6. In addition, in (30e) Kageyama expressed the causer as *x* (the external argument), but I suggest an event "[…]" instead of the *x*. This is based on the argument shown in (26) to (28). It is also important to note that the LCSs of (30a, b, c, d) describe non-causative events, which potentially fill up the […] of (30e) to form causative events.

These LCS templates fit the action/causal chain proposed by Langacker (1987) and Croft (1991) well. According to them, the realisation of a phenomenon can be summarised to three stages, activity/cause, change and state, and each stage can be represented by the LCSs shown in (31). Vendler's (1967) four aspectual types can be either one of the three stages or the combination of the three stages. Kageyama (2007) summarised the relation between the action chain and LCSs as in (31).

(31)   [Action Chain and LCSs]
        Activity/Cause (30c, d, e) $\rightarrow$ Change (30b) $\rightarrow$ State (30a)
                                                        (Kageyama, 2007)

As briefly mentioned earlier, not only Vendler's (1967) four aspectual types but some other finer-grained semantic types can be expressed with the combination of the LCSs above. As one of the finer-grained semantic types, I will here propose my theories of LCSs about adjectivals.[13] Previously, adjectives (or intransitives in some languages), which give the information about "State", have all been thought to compose the LCS of (30a) [$_{STATE}$ x BE AT-z]. However, I categorise the "State" predicates into three types; namely autonomous state, internally-caused change of state, and externally-caused change of state (Kageyama (2007) for autonomous state and Levin & Rappaport Hovav (1995) and McKoon & Macfarland (2000) for internally- and externally-caused ones). In (32), I will firstly illustrate the conventional analysis of the so-called stative predicate with an example sentence *John is afraid*. Then in (33) my account of the same sentence is described.

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[13] I used the term "adjectivals" to mean a predicate which denotes State. It contains some other syntactic categories such as intransitive verb in Mandarin Chinese.

(32)   [Previous Interpretation of *John is afraid*]
[$_{STATE}$ *John* BE AT-*afraid*]

However, I suggest a different LCS for *John is afraid*. This is illustrated in (33).

(33)   [My LCS of *John is afraid*]
[$_{EVENT}$ […] CONTROL/CAUSE [$_{EVENT}$ BECOME [$_{STATE}$ *John* BE AT-*afraid*]]].

(33) means an (null) event brings about the secondary event *being afraid*. This is simply because there has to be an event if someone is afraid; the unexpressed primary event can be *John saw/experienced something,* or *somebody did/said/showed something to John*. The adjective *afraid* must always contain this kind of causing event, otherwise nobody can be afraid. This is totally different from sentences with *clever* or *a teacher*.

(34) a. Mary is clever.   [$_{STATE}$ *Mary* BE AT-*clever*]
    b. Mary is a teacher.   [$_{STATE}$ *Mary* BE AT-*teacher*]

In (34), the AdjP *clever* and NP *teacher* give the information of attribute or nature to the argument *Mary*. Generally, these situations (34a, b) cannot be brought about by an event; that is, they describe the real autonomous state (30a).[14] Thus, I categorise adjectivals into three types in terms of their eventuality types, such as autonomous-state predicate, internally-caused change of state predicate, and externally-caused change of state predicate. Each type consists of different types of LCS, which is summarised in (35). The key point in (35) stays in the LCS of the internally-caused change of state predicate (35b), for Levin and Rappaport Hovav (1995) argued that the internally-caused change of state predicate, unlike the externally-caused change of state predicate, has a simple LCS structure like [$_{EVENT}$ BECOME [$_{STATE}$ x BE AT-z]]. However, I suggest that the LCS of internally-caused change of state predicate, at least in Mandarin Chinese, has a complex structure (i.e.,

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[14] Whether a predicate denotes an attribute or nature entirely depends on a language. For instance, *clever* might be construed as a temporal notion in some languages.

there are two events: Process and State). This will be later explained more accurately with some concrete examples in section 5.

(35) a. <Autonomous-state Predicate>
$[_{STATE}$ x BE AT-z]
  b. <Internally-caused Change of State Predicate>
$[_{EVENT} [\ldots]$ CAUSE $[_{EVENT}$ BECOME $[_{STATE}$ x BE AT-z]]]
  c. <Externally-caused Change of State Predicate>
$[_{EVENT} [\ldots]$ CONTROL $[_{EVENT}$ BECOME $[_{STATE}$ x BE AT-z]]]

4.3 Foley and Van Valin's (1984) Proto-SUBJ & Proto-OBJ

This section briefly lays out the characteristics of the subject and object proto-properties. The subject and object proto-properties are the extension of Dowty's (1991) idea of proto-agent and proto-patient properties. Thematic roles on their own are not articulated enough to explain proto-properties firstly because they sometimes do not capture the real semantics of an argument: e.g. internal-/external causation, stage-/individual-level, contact/impact and many others that cannot be expressed with thematic roles, though these categories do affect the syntactic properties of a sentence, and secondly because it is impossible to cover all types of lexical entities and their roles with thematic roles (an infinite number of thematic roles may be needed). Thus, another type of categorisation, which is less dependent on thematic roles, is needed. In this respect, I agree with Foley and Van Valin's (1984) notion of thematic relations, where they represented five categories for argument roles: (i) argument of **DO**, (ii) 1st argument of **do'**(x, …), (iii) 1st argument of **pred'**(x, y), (iv) 2nd argument of **pred'**(x, y)**, and** (v) argument of state **pred'** (x). Each of the five categories represents a/some subtype(s). This is illustrated in (36).

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(36)   Thematic relations continuum in terms of LS argument position
        with the Actor-Undergoer hierarchy; the diagram shown below is
        the fusion of the ones of Van Valin and LaPolla (1997, p127) and
        (1997, p146).

ACTOR $\longrightarrow$ **UNDERGOER**

$\longleftarrow$

Arg. of **DO**	1st arg. of **do'**(x,…	1st arg. of **pred'**(x,y)	2nd arg. of **pred'**(x,y)	Arg. of state **pred'**(x)
AGENT	EFFECTOR	LOCATION	THEME	PATIENT
	MOVER	PERCEIVER	STIMULUS	ENTITY
	ST-MOVER	COGNIZER	CONTENT	
	L-EMITTER	WANTER	DESIRE	
	S-EMITTER	JUDGER	JUDGMENT	
	PERFORMER	POSSESSOR	POSSESSED	
	CONSUMER	EXPERIENCER	SENSATION	
	CREATOR	EMOTER	TARGET	
	SPEAKER	ATTRIBUTANT	ATTRIBUTE	
	OBSERVER		CONSUMER	
	USER		CONSUMED	
			CREATION	
			LOCUS	
			IMPLEMENT	

['$\longrightarrow$' increasing markedness of realisation of argument]

The proto-subject property is equivalent to the roles which ACTOR in (36) covers; Argument of **DO** is the most prototypical property of subject, 1st argument of **do'**(x… is the second most prototypical **one,** and 1st argument of **pred'**(x, y) is the least prototypical one. The proto-object property is equivalent to the roles which UNDERGOER in (36) covers; Argument of state **pred'**(x) is the most prototypical property of object, 2nd argument of **pred'**(x, y) is the second most prototypical **one,** and 1st argument of **pred'**(x, y) is the least prototypical one. These two notions will be used in section 7.

5. ANALYSIS WITH MORE ARTICULATED SEMANTICS

While the previous analyses tried to give a syntactic solution to the linking pattern and causation of Mandarin "resultatives", it seems that the fact requires a semantic-based analysis to explain the linking and causation issues of Mandarin secondary predicates. Here I argue that it is the secondary predicate itself which generate the indirect- or direct-causative information in the sentence, as long as the main verb is non-causative.[15] This section particularly investigates the nature of the secondary predicates themselves.

Shibagaki (2009) proposed that there were two types of Mandarin secondary predicates in terms of their semantics, namely those with *either* internally- *or* externally-caused changes of state. In this paper I claim that those two types of change-of-state predicates correspond to indirect-causative and direct-causative, respectively (cf. section 4.2). The internally-caused change of state by definition describes an event of internal causation, where a person makes an action (too much) without volition and he ends up in a particular state, although a sentence with an internally caused change of state predicate corresponds to the conventional "non-causative resultative" in Mandarin and is thus incompatible with BA (affected object) / BEI (passive) constructions when the main verb is non-causative.[16, 17] So there is a clear relation between the primary and secondary events; the secondary event takes place only after the primary event occurs; the internally-caused change of state predicate generates the information of indirect causation when it is used on its own with an argument or as a part of a compound verb with a non-causative main verb. On the other hand, the externally-caused change of state represents the notion of direct causation in any case. In section 6, I will further argue that the argument undergoing internally-caused change always links to Actor and the one undergoing externally-caused change (a truly "affected" argument) always links to

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[15] When the main verb is causative, V_2 (secondary predicate) always only links to object. This will be discussed later at the end of section 6.

[16] Shen (2007) also deals the subject-oriented resultative sentence as a causative construction. His subject-oriented resultative sentences carry the internally-caused change of state predicates as their secondary predicates.

[17] As for BA (affected object) and BEI (passive) tests, I understand that they differentiate the direct causative from the indirect or non-causative; that is, in terms of LCS, they differentiate CONTROL from CAUSE or other non-causative semantic predicates.

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Undergoer. Several examples of internally- and externally-caused change of state predicates are laid out in (37). The bracketed words are likely to carry both semantic templates for some/many speakers; that is to say, these words are installed to those speakers as both internally- and externally-caused change of state predicates.[18]

(37)　　[Examples of internally- and externally-caused change of state predicates][19]
　　　a. [Internally-caused change of state] <indirect-causative>
　　　　bing, bao, le,　 yun,　shou, fafeng, (ni),　(zui),　(lei)
　　　　sick, full, happy, dizzy, thin, crazy,　 bored, drunk, tired
　　　b. [Externally-caused change of state] <direct-causative>
　　　　po,　　ping, gan, si,　　man, pang, dao, shang,　(ni),
　　　　broken, flat, dry, dead, full, fat,　 fall, injured, bored,
　　　　(zui),　 (lei)
　　　　drunk,　tired

The distinction between these two types of predicates can be observed even when they are not a part of the "resultative" VV compound construction. Firstly, in terms of meaning, the internal ones in (37a) tend to describe situations which are reversible within a relatively short period of time without external force, whereas the external ones in (37b) are likely to express non-reversible situations. This is language specific information; in a different language, the corresponding word/concept to Mandarin *pang* 'fat' (external/non-reversible) may be construed as an internal/reversible one. Secondly, the "*zhe* (ASP) test" clearly distinguishes the internal types from the external ones; the aspect marker *zhe* is better attached to the internal ones than the external ones. Examples are given in (38) and (39).

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[18] There is a slight dialect and idiolect difference as to whether a secondary predicate belongs to internally- and/or externally-caused change of state predicates. See the detailed discussion in section 6.

[19] There are three bracketed words *ni* 'bored', *zui* 'drunk', and *lei* 'tired'. Whether these words belong to the internally- or externally-caused change of state or to both seems to differ among dialects. This issue will be discussed in detail in section 6. Here I only say that the majority of words belong to either the internally- or externally-caused change of state.

(38)   [*zhe* with internally-caused state]
    a. wo (hai) bao *(zhe)
      I   still full   ASP
      "I'm still full."
    b. wo (hai) bing *(zhe)
      I   still sick   ASP
      "I'm still sick."

(39)   [*hai* 'still' with externally-caused state]
    a. *bo-li (hai) po   zhe
      glass still broken ASP
      Int. "The glasses are still broken."
    b. *ta (hai) pang zhe
      he still fat   ASP
      Int. "He is still fat."

The LCSs of the internally- and externally-caused change of state predicates are already shown in (35b, c). They both contain two events; one as unexpressed Process which brings about the secondary event, and the other as the secondary event which is the overtly expressed State. (35b, c) are repeated here.

(35) b. [Internally-caused Change of State Predicate]
      [$_{\text{EVENT}}$ […] CAUSE [$_{\text{EVENT}}$ BECOME [$_{\text{STATE}}$ x BE AT-z]]]
    c. [Externally-caused Change of State Predicate]
      [$_{\text{EVENT}}$ […] CONTROL [$_{\text{EVENT}}$ BECOME [$_{\text{STATE}}$ x BE AT-z]]]

Whether these two types of predicates truly carry two events such as Process and State can be examined with the "*almost* test" (Pustejovsky, 1991). According to him, the adverb *almost* can modify both Process and State. Non-causatives, such as simple activity, autonomous state, etc., carry either Process or State, whereas causatives including the indirect and direct causatives carry both Process and State. The semantic structure of *almost* modification is illustrated in (40).

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(40)   [The semantic structure of the "*almost* test" of Pustejovsky (1991)]

a. [non-causatives]   b. [causatives(indirect-&direct-caus.)]
    Process/State   Transition
         | ╱   ╲
      eat(x)   Process   State
                              break(x,y)   broken(y)

    P/S**[almost]**   T   T
         | ╱   ╲   ╱   ╲
      eat(x)   P**[almost]**   S   P   S**[almost]**
                      break(x,y) broken(y)   break(x,y) broken(y)
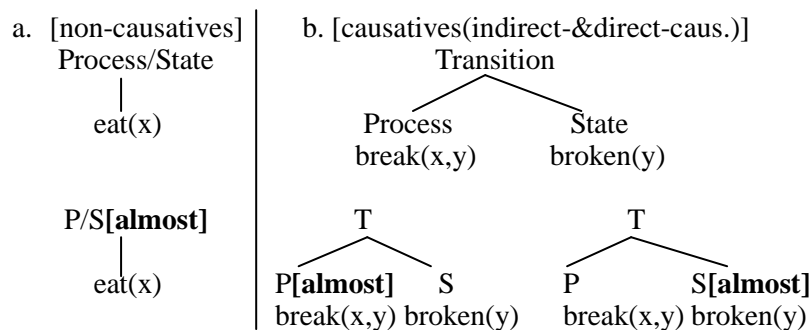
(40) explains that non-causatives with *almost* generate only one interpretation, while causatives, including indirect- and direct-causatives, generate two interpretations with *almost*.

Mandarin secondary predicates (i.e., the internally- and externally-caused change of state predicates) compose the LCSs of (35b, c), for the "*almost* test" in Chinese proves that the LCSs of these predicates carry two events: the primary (Process) and secondary (State) events. In Chinese, *cha-dian* 'almost' means "almost make an action or become a state". Inserting *cha-dian* 'almost' into a sentence with an internally- or externally-caused change of state predicate generates ambiguity in both cases. Examples are given in (41) and (42). In the examples, the primary actions (Process), which could indirectly or directly bring about a resultant situation, are not overtly expressed in the sentences. Thus the interpretations for these actions are the ones which can be typically imagined by native speakers.

(41)   [*cha-dian* 'almost' with internally-cause change of state]
        Ta   cha-dian   bing   le
        ta   almost   sick   ASP
    a. "He was nearly forced to work too hard and would be sick."
    OR
    b. "He was forced to work too hard and nearly become sick."

(41a) expresses that *cha-dian* 'almost' modifies the null action event (Process), while (41b) shows *cha-dian* 'almost' can modify the state part

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(State) as well. Thus, the internally-caused change of state indeed consists of Process and State, and is therefore not a non-causative predicate, for non-causatives consist of either Process or State and do not generate ambiguity when cha-dian 'almost' is inserted.

(42)   [*cha-dian* 'almost' with externally-caused change of state]
      bo-li cha-dian po   le
      glass almost   broken ASP
  a. "The glass was nearly hit and would have become broken."
  OR
  b. "The glass was hit and nearly became broken."

(42) shows that the externally-caused change of state also consists of Process and State as can be seen in the two interpretations (a) and (b); again it is not a non-causative predicate.

From the theoretical point of view, the LCSs (35b, c) well explain the lexical structure of Chinese compound verbs. In Chinese consequence-depictives and resultatives, the main verb and secondary predicate form a compound verb, where the main verb can be non-causative, such as *chi* 'eat'. As shown in (30c) the LCSs of a non-causative Activity form [$_{EVENT}$ x ACT] (intransitive) or [$_{EVENT}$ x ACT ON-y] (transitive), which does not contain CAUSE or CONTROL. If internally- or externally-caused change of state predicates formed a conventional stative LCS like [$_{STATE}$ x BE AT-z] and did not carry CAUSE or CONTROL at all as Levin and Rappaport Hovav (1995) suggested, consequence depictives and resultatives cannot form a grammatical LCS. This is shown in (43), using the consequence-depictive sentence (3) as an example. (3) is repeated here.

(3) John chi-ni   le   mantou   <consequence depictive>
    John eat-bored PFV bun
    "John ate the bun and John became bored with doing so."

(43)   [Hypothesis: Internally-Caused Change of State as [$_{STATE}$ x BE AT-z]]
    [$_{EVENT}$ x ACT ON-y]   ????   [$_{STATE}$ x BE AT-z]
    from *chi* 'eat'   from *ni* 'bored'

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In (43), the event of eating is expressed as [$_{EVENT}$ x ACT ON-y], and the event of being bored is illustrated as [$_{STATE}$ x BE AT-z]. Thus, the semantic predicate, which connects the primary and secondary events, does not exist in the LCS of (43).[20] (43) is ill-formed. I claim that this issue should be dealt within the frame work of lexical analysis. That is, the semantic connective CONTROL/CAUSE should not occur constructionally, but lexically. The LCSs I proposed in (35b, c) for the Chinese secondary predicates already carry CONTROL/CAUSE and only lack the overt expression of the primary event (Process). The […] of (35b, c) can well be filled with the Action denoted by the main verb. Look at (44).

(44)   [Composing two events in *John chi-ni le mantou*]
       [x ACT ON-y] + [[…] CAUSE [BECOME [x BE AT-z]]]
       from *chi* 'eat'   from *ni* 'bored' (internal)

       [x ACT ON-y] CAUSE [BECOME [x BE AT-z]]

The key additional fact now is that predicates which are purely statives (Autonomous State (30a)) and not change-of-state such as *jiu^3* 'long (of time)' are ungrammatical as secondary predicates in any complex resultative predicates. This would follow if they have simple LCSs like [$_{STATE}$ x BE AT-z], in contrast to the LCSs of internally- or externally-caused change of state predicates, and if CAUSE/CONTROL in resultatives is always contributed by the secondary predicate. Thus, as in (45), as long as the main verb is non-causative, the autonomous state predicates cannot be used as a secondary predicate; it is impossible to form a complex verb such as "(non-caus-V) + (Autonomous State)", because there is no semantic connective between the two events. When the main verb is a causative verb, it is possible to form a complex verb like "(caus-V) + (Autonomous State)", because the main verb carries "[x ACT ON-y] CAUSE/CONTROL [BECOME […]]", which connects the two events well, and the autonomous state only fills up the […].

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[20] Linguists of the GB/Minimalist programme may well argue that causation appears constructionally (see Hale and Keyser (1993) in English, and Huang (1997) in Mandarin about when "CAUSE" appears).

(45)   [*jiu* 'long' (Autonomous State) [$_{STATE}$ x BE AT-z] as a secondary predicate]

[$_{EVENT}$ x ACT ON-y] ???? [$_{STATE}$ x BE AT-z]
from main verb   from autonomous state (*jiu* 'long')

6. THEORETICAL ANALYSIS OF THE LINKING ISSUE AND CAUSATION

The LCSs of the three types of the Mandarin secondary predicates (3), (4), and (5) are given in (46), (47), and (48), respectively.

(46) John chi-ni   le   mantou   <consequence depictive>
      John eat-bored PFV bun
      John ate the bun and John became bored with doing so."
      [$_{EVENT}$ [$_{EVENT}$ x ACT ON-y] CAUSE [$_{EVENT}$ BECOME [$_{STATE}$ x BE AT-z]]]

(47) John niu-gan   le   maojin   <resultative>
      John wring-dry PFV towel
      "John wrung the towel, which made the towel dry."
      [$_{EVENT}$ [$_{EVENT}$ x ACT ON-y] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ y BE AT-z]]]

(48) Zhe zhong yao   chi-si   le   John   <inverse-linking result.>
      this kind   medicine eat-die PFV John
      "The eating of his kind of drug (by John) caused John to die."
      [$_{EVENT}$ [$_{EVENT}$ x ACT ON-y] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ x BE AT-z]]]

The primary data are shown in (46, 47, 48), with schematic LCSs to represent argument structures as in section 5.2. Examples with internally-caused predicates are shown as [$_{EVENT}$ [$_{EVENT}$ x ACT ON-y] CAUSE [$_{EVENT}$ BECOME [$_{STATE}$ x BE AT-z]]]. This structure represents indirect-causative. Those with external causation are given as [$_{EVENT}$ [$_{EVENT}$ x ACT ON-y] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ x/y BE AT-z]]]. This structure represents direct-causative. In order to explain the mechanism of mapping in this model, I propose a condition of the mapping in causative construction.

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(49) [Direct Causative Assignment Condition]
In all direct causatives the affected argument (the α under [$_{EVENT}$ BECOME [$_{STATE}$ α BE AT-z]]) has primacy to link to object.

By definition, affected argument only exists in direct causatives (the LCS with CONTROL). (49) means that the α of [[...] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ α BE AT-z]]] has primacy for linking; it links to the object in active clauses, with the other core argument linking to the subject, even though the argument has no subject proto-properties. For example, (46) is indirect-causative, since *ni* 'bored' is an internally-caused change of state. Thus, the proto-Agent *John* canonically maps to the subject, and the hierarchically less prominent argument *bun* maps to the object. The primary and secondary events are related by CAUSE, since it is indirect-causative. Thus, the LCS of (46) can be represented as [$_{EVENT}$ [$_{EVENT}$ *John* ACT ON-bun] CAUSE [$_{EVENT}$ BECOME [$_{STATE}$ *John* BE AT-*bored*]]].

(47) is direct-causative because *gan* 'dry' is an externally-caused change of state, where *maojin* 'towel' is the affected argument. This argument *maojin* 'towel' has the primacy to link to the object as in (47), and the other argument *John* has to map to subject, since the subject position is the only choice left (the object position is already occupied by *maojin* 'towel'). The primary and secondary events are related by CONTROL. Again, schematically, the LCS of (47) can be represented as [$_{EVENT}$ [$_{EVENT}$ *John* ACT ON-*Towel*] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ *Towel* BE AT-*dry*]]].

(48) is also direct-causative since *si* 'die/dead' is an externally-caused change of state, where the affected argument is *John*. This argument *John* has the primacy to link to the object as in (49), and thus the other argument *zhe zhong yao* 'this kind of medicine' has to map to the subject. The primary and secondary events are related by CONTROL. Thus, the LCS of (48) can be construed as [$_{EVENT}$ [$_{EVENT}$ *John* ACT ON-*this kind of drug*] CONTROL [$_{EVENT}$ BECOME [$_{STATE}$ *John* BE AT-*dead*]]].

(50) is the sentence made from (3)/(49) by replacing the two arguments with each other. The ungrammaticality of (50) can be well explained similarly.

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(50) *John chi-si   le   zhe zhong   yao
     John eat-die PFV this kind   medicine
     "John ate this kind of medicine which caused John to die."

Though (50) is ungrammatical. The reason is that the secondary predicate *si* 'die' represents the externally-caused change of state in Mandarin. This information is a part of the encoded lexical entries. Hence, not *zhe zhong yao* 'this kind of medicine' but *John* must be the affected argument which has the primacy for linking to the object, but *John* is actually mapped to the subject. This is why (50) is ungrammatical.

The patterns are slightly obscured by (51), an example that Li (1995) and Her (2007) used, where the argument of *lei* "tired" can link to SUBJ or OBJ. This is because *lei* "tired" in Chinese is one of the few secondary predicates that can allow for interpretations of internally- or externally-caused change. The prediction is that (51a) represents indirect causative and (51b) direct causative.[21]

(51)   John zhui-lei   le   Lee
        John chase-tired PFV Lee
   a. "John chased Lee and (John) got tired."   <indirect-causative>
   b. "John chased Lee, which made Lee tired."   <direct-causative>

Levin & Rappaport Hovav (1995) explained that the great majority of change of state verbs carries only one semantic template. This suggests that a secondary predicate carries the information of either an internally- or externally-caused change of state, but not both of them. Levin & Rappaport Hovav stated *burn* in English is the only exception they found, which seems to take both of two semantic templates. In Thai, the exceptional predicate carrying both internal and external ones is *taay*

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[21] As is well known, (51) has a third interpretation: the inverse-linking resultatives. When (51) is read with this third interpretation, the secondary predicate *lei* 'tired' plays a role of the externally-caused change of state predicate. Thus, there appear two interpretations with the external usage of *lei* 'tired': canonical resultative interpretation as in (51b) and the inverse-linking one. The reason is because in Chinese the main verb *zhui* 'chase' can be construed as either a verb with force recipient feature (the case of (51b)) or a verb without it (the case of the inverse-linking type). See Rappaport Hovav and Levin (2001) for the Force Recipient Principle (FRP). Huang (2006) also talks about the status of *zhui* 'chase' from the point of view of FRP.

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'dead', which can be used as both consequence-depictive and as resultative. In Mandarin Chinese, *burn* is an internally-caused state which only gives an indirect-causative interpretation to the sentence, and *si* 'dead' belongs to an externally-caused change of state. Hence, the question of which change of state predicate belongs to which predicate group is a language specific matter. As for the exceptional predicates which carry two semantic templates, native speakers tend to show different judgements. In this respect, *lei* 'tired' is without doubt one of the few predicates which carry both internally- and externally-caused states. I asked thirty-five native speakers of Mandarin Chinese for a judgement of (51). Twenty-one respondents selected (51a) as the only grammatically acceptable variant; five, (51b); and nine, both (51a, b). However, this data does not affect anything to the theory; it only means that the word *lei* 'tired' is installed as an internally-caused change of state predicate to the twenty-one native speakers, as an externally-caused change of state predicate to the five native speakers, and as both to the nine speakers. I think a language may well allow varieties in the installation of information about "internal and external".

Further exceptional data comes from *zui* "drunk" and *ni* "bored". (52a) and (53a) show the external usage of *zui* 'drunk' and *ni* 'bored', while (52b) and (53b) the internal usage of the same word.

(52) a. Na   ping jiu he-zui   le   John (*zui* as external)
        that bottle wine drink-drunk PFV   John
        "The drinking of that bottle of wine (by John) made John drunk."
     b. ?/*John he-zui   le   na   ping jiu (*zui* as internal)
         John drink-drunk PFV   that bottle wine
         "John drank that bottle of wine and became drunk."

(53) a. ?/* Zhe zhong mantou chi-ni   le   John (*ni* as external)
          this kind bun   eat-bored PFV   John
          "The eating of this kind of bun (by John) made John bored with doing so."
     b. John chi-ni   le   zhe zhong   mantou (*ni* as internal)
        John eat-bored PFV   this kind   bun
        "John ate this kind of bun and became bored with doing so."

The results for (52) and (53) indicate that there is a dialect/idiolect difference among the native speakers; that is, although the majority of speakers judge (52a) and (53b) to be the only grammatically acceptable forms, a certain number of speakers judge (52b) and (53a) to be grammatically acceptable variants. The reason why there is a dialect/idiolect difference for the installation of internal or external information seems to be related to a diachronic process. Her (2010) well explains the theory of lexical diffusion using the Mandarin VO construction, which involves the historical sound change in the first place and later extended to the grammatical variation and change. His theory seems to explain why there is a dialect/idiolect difference in the installation of lexical entries of secondary predicates.

In order to defend my arguments in this paper, I will lay out some possible counter arguments.

(54) a. John xia   bing le   Mary
        John frighten sick PFV Mary
        "John frightened Mary, which made Mary sick."
     b. John qi-bing   le   Mary
        John make someone angry-sick PFV   Mary
        "John made Mary angry, which made Mary sick."

In (54a, b) the secondary predicate *bing* 'sick' represents the internally-caused change of state predicate (cf. (37)). As can be seen in the interpretations, these secondary predicates link to the OBJ *Mary*. This phenomenon seemingly violates my proposal that the internally-caused change of state links to Actor. However, in fact these grammatical sentences do not violate my proposal, because in both sentences the main verb is causative, which means both sentences are direct-causative with/without internally-/externally-caused change of state predicates. When the sentences are direct-causative, my proposal of the "Direct Causative Assignment Condition" of (49) has to be taken into account; in all direct-causatives the affected argument (the α under $[_{\text{EVENT}}$ α BECOME $[_{\text{STATE}}$ α BE AT-z]]) has primacy to link to object. In (54a, b) *Mary* is the affected argument α, which links to OBJ. Thus the grammaticality of these sentences can be well explained with my proposals.

7. CONCLUDING REMARKS

So-called resultatives can be observed in many languages, allowing several sub-types.[22] Section 1 showed that Mandarin Chinese had consequence-depictives and canonical resultatives which adopt a true secondary-predicate scheme; other types such as spurious resultatives and canonical depictives are either adverbials or non-existent.

The theoretical analysis of the Chinese secondary predicate was illustrated in sections 2 to 6, with a focus on linking and causation; there are two classes of secondary predicates such as internally- and externally-caused change of state, where the former generates indirect causation and the latter direct causation. It was also argued that the semantic structures of both internally- and externally-caused change of state predicates consist of two events such as Process and State, unlike pure non-causative predicates. This analysis accounts for not only why there appear to be three different linking patterns, namely subject-oriented, object-oriented and inverse-linking, but also why autonomous state predicates cannot be used as a secondary predicate. The lexical analysis I offered, where the meaning of causation is entirely contributed from the secondary predicates, successfully shows the linking rule of Chinese secondary predicates and explains the ungrammaticality of (24), which previous syntactic accounts were not able to explain well.

The proposals in this paper do not include any theories or proposals with respect to resultative-special; the analysis does not require specific conditions or rules which are only available for resultatives. I expect that such an analysis (particularly of the classification of causation) would contribute to research in the domain of Chinese lexical semantics.

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[22] There are perhaps other types of "resultatives"/"secondary predicates" in addition to those that I showed in section 1: e.g., the SUBJ-oriented spurious resultative in Japanese and "backwards resultatives" in Kimaragang Dusun (Kroeger, 2004). These types do not exist in English or in Chinese.

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Ryosuke Shibagaki
School of Oriental and African Studies
University of London
London, United Kingdom
ryo@soas.ac.uk

漢語次要述語

Ryosuke Shibagaki
倫敦大學亞非學院

本文首先提出英文和中文裡（主語導向）結果描述式和（賓語導向）結果式中的（不及物動詞或形容詞）次要述語的一些語料。何（2007）的 LFG/LMT 研究假定兩個述語的論元結構會結合成為一個新的合成結構，因而決定一個結果句是否有致使的語意，也決定了論元與語法功能的連結。然而，本文將論證中文結果式複合詞的連結問題需要從更具解釋力的語意角度來解決，致使性的決定與兩個述語中論元的連結，都屬於語意的議題。具體來說，本文根據語意，論證兩種次要謂語的存在，一是內在致使狀態改變，另一是外在致使；它們分別是間接致使和直接致使。致使式必須區分成三類，非致使、間接致使和直接致使。本文進一步論證，當一個論元進行內部致使的變化時，常會和動作者連結，而當一個論元進行外部致使變化時，則常會和經歷者連結。

關鍵字：次要述語，結果式，描述式，結果描述式，非/間接/直接致使，內部/外部致使狀態改變，受影響者