# Inner and Outer Aspect in Cantonese

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## Motivation

- Cantonese (and other Chineses) makes extensive use of aspect
- Most sentences have some kind of aspect
- There are (at least) two ways to mark this, generally referred to as inner and outer aspect
  - ▶ We need to distinguish particles denoting **situation aspect** and **viewpoint** because these two types of particles can co-occur.
  - ▶ We need to distinguish **aspected** and **non-aspected** verbs because aspectual particles denoting viewpoint aspect cannot be stacked.

# Cantonese Examples

(1) Cantonese (yue)

  a.  我   食  <u>咗/緊</u>   麵
       ngo5 sik6 zo2/gan2   min6
       1SG  eat  PERF/PROG noodles

     'I have eaten noodles'/ 'I am eating noodles'      V-OAP

  b.  我   食  <u>飽</u>  *(*咗*)*  麵
       ngo5 sik6 baau2 zo2   min6
       1SG  eat  full   PERF noodles

     'I have eaten noodles to the point that I am full'   V-IAPi-OAP

  c.  我   食  <u>完</u>  *(*咗*)*  麵
       ngo5 sik6 jyun4 zo2   min6
       1SG  eat  finish PERF noodles

     'I have finished eating noodles' (maybe some left)   V-IAPe-OAP

# Aspect more generally

## Viewpoint Aspect (e.g., Smith, 1994)

- Concerned with temporal perspective of the event
- Encodes how much of a situation is made visible
- Perfective and imperfective viewpoints

## Situation Aspect (Lexical Aspect/Aktionsart) (e.g., Smith, 2019)

- Concerned with internal structure of the situation

| Type | Example | telic | durative | static |
|------|---------|-------|----------|--------|
| states | 'know' | - | + | + |
| activities | 'run' | - | + | - |
| accomplishments | 'build a house' | + | + | - |
| achievements | 'die' | + | - | - |
| semelfactives | 'cough' | - | - | - |

# Aspect in Mandarin (Chinese)

- Most accomplishments and achievements are produced syntactically
  - 看 *kàn* "look" (activity: -telic, +durative, -static)
  - 看 到 *kàn-dào* "see" (achievement: +telic, -durative, -static)

    到 *dào* adds an endpoint and makes internal structure inaccessible
- It is claimed that **NO** mono-morphemic verbs in Mandarin express accomplishments or achievements (Sybesma, 1997)
  - The main verb 死 sei2 'die' appears to us to be a counter example

# Inner vs. Outer Aspectual Particles

Previous work has shown:

## Inner Aspectual Particles

- Occupy innermost aspectual layer (closer to VP)
- Related to situation aspect
- Two kinds: resultative particles and phase complements
- Do not co-occur with each other

## Outer Aspectual Particles

- Signal viewpoint aspect
- Indicate whether event is viewed as complete or not
- Example: perfective marker 了 *le* in Mandarin

# Cantonese Outer Aspectual Particles

| Particle | Aspect | Comment |
|----------|--------|---------|
| 咗 zo2 | perfective | |
| 過 gwo3 | experiential | |
| 緊 gan2 | progressive | - stative (dynamic) |
| 住 zyu6 | continuous | activity or state without change |
| 吓 ha5 | delimitative | |

# Cantonese Inner Aspectual Particles

- **IAPi**: Inner aspectual particles **predicated of an individual**
  - ▶ 飽 baau2 'satiated'
  - ▶ 死 sei2 'die'
  - ▶ 親 can1 'hurt to a non-specific degree'

  resultative particles

- **IAPe**: Inner aspectual particles **predicated of an event**
  - ▶ 到/倒 dou2 'complete'
  - ▶ 好 hou2 'good'
  - ▶ 掂 dim6 'fixed'
  - ▶ 完 jyun4 'finish'

  phase complements

This analysis in terms of semantics is novel, explicitly writing the semantics forces us to be explicit

# Ordering and Constraints

- Ordering: **V-{IAP|OAP}**
- IAPi and IAPe do not co-occur
- Selectional criteria between event type and OAP:
    - 吓 ha5 (delimitative) only compatible with activities
      Not compatible with events containing IAP (always +telic)
    - 親 can1 not compatible with progressive 緊 gan2 (makes event +telic and -durative)
- There are more interactions (future work)
    - negation
    - different verbs or classes of verbs

# Cantonese Examples (again)

(2) Cantonese (yue)

   a. 我　食　咗/緊　　麵
      ngo5 sik6 zo2/gan2　min6
      1SG　eat　PERF/PROG noodles

     'I have eaten noodles'/ 'I am eating noodles'　　　　　V-OAP

   b. 我　食　飽　*(咗)* 麵
      ngo5 sik6 baau2 zo2　min6
      1SG　eat　full　PERF noodles

     'I have eaten noodles to the point that I am full'　V-IAPi-OAP

   c. 我　食　完　*(咗)* 麵
      ngo5 sik6 jyun4 zo2　min6
      1SG　eat　finish PERF noodles

     'I have finished eating noodles'　　　　　　　　V-IAPe-OAP

## Co-occurrence Table

| | Particle | Meaning | type | zo2 | gwo3 | gan2 | zyu6 | ha5 |
|---|---|---|---|---|---|---|---|---|
| 飽 | baau2 | full | x | + | + | - | - | - |
| 死 | sei2 | die | x | + | + | - | - | - |
| 親 | can1 | hurt | x | + | + | - | - | - |
| 完 | jyun4 | finish | e | + | + | - | - | - |
| 好 | hou2 | good | e | + | + | - | - | - |
| 到 | dou2 | complete | e | + | + | - | - | - |
| 掂 | dim6 | fixed | e | + | + | - | - | - |

# Analysis of Outer Aspect

- We analyze the aspect as head-marker: the verb is the *head*, the aspect particle is the *marker*
  - Actually, our rule is not headed, but most of the features come from the left (capitiform) daughter
  - The SPEC feature on the mother is determined by the marker
- We use this both for aspect markers and sentence markers (sentence final particles)
- Sentence-markers can constrain their complement to be SPEC non-empty (notionally compatible with combining with a marker), but stamp SPEC empty on the mother to block iteration of marker attachments
- Aspect markers propagate the SPEC value of their complement

# Head-Marker Construction

(3)
$$\begin{bmatrix} \textit{head-marker} \\ \text{CAT} \quad \begin{bmatrix} \text{VAL} \quad \begin{bmatrix} \text{SUBJ} & \boxed{0} \\ \text{SPR} & \boxed{1} \\ \text{COMPS} & \boxed{3} \\ \text{SPEC} & \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{LDTR} \quad \boxed{5} \begin{bmatrix} \text{CAT} \quad \begin{bmatrix} \text{VAL} \quad \begin{bmatrix} \text{SUBJ} & \boxed{0} \\ \text{SPR} & \boxed{1} \\ \text{COMPS} & \boxed{3} \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{RDTR} \quad \begin{bmatrix} \text{CAT.VAL} \quad \begin{bmatrix} \text{HEAD} & \textit{marker} \\ \text{SUBJ} & \langle \rangle \\ \text{SPR} & \langle \rangle \\ \text{COMPS} & \langle \boxed{5} \rangle \\ \text{SPEC} & \boxed{4} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$
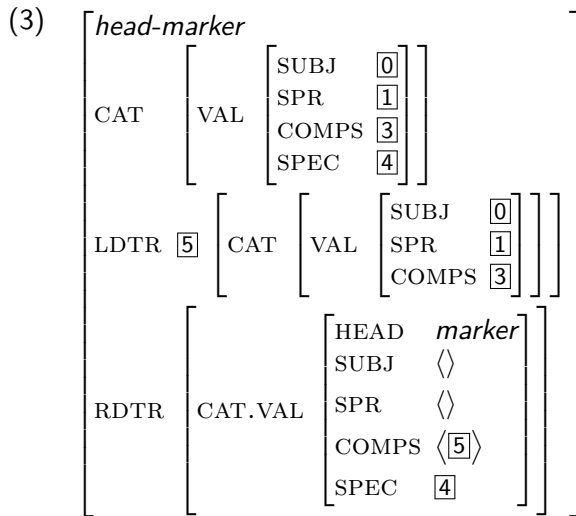
LDTR $\approx$ Head

# Aspect Marker Lexical Type (outer aspect)

(4)
$$
\begin{bmatrix}
\textit{aspect-marker-lex} \\
\text{CAT} \quad \begin{bmatrix} \text{HEAD} \; \textit{marker} \end{bmatrix} \\[2ex]
\text{VAL} \quad \begin{bmatrix}
\text{COMPS} \quad \left\langle \begin{bmatrix}
\textit{lex-synsem} \\
\text{CAT.HEAD} \; +\textit{vj} \\
\text{MODIFIED} \; \textit{notmod} \\
\text{VAL.SPEC} \; \boxed{0}
\end{bmatrix} \right\rangle \\[4ex]
\text{SPEC} \quad \boxed{0}
\end{bmatrix}
\end{bmatrix}
$$

- Requires complement to be verb or adjective ($+$vj)
- Complement must be non-phrasal (lex-synsem)
- Cannot be modified
- Propagates the SPEC value of their complement

# Aspect Type Hierarchy
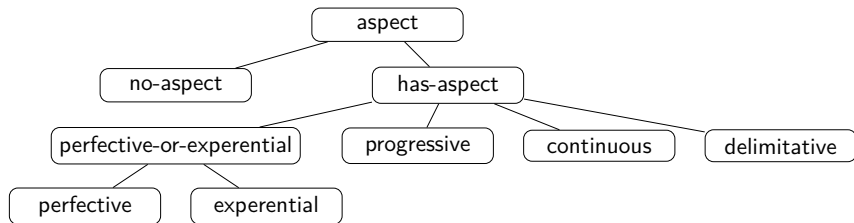


When we look at interactions with e.g., verbs or negation, we may need a more complicated hierarchy.

# Perfective Marker Lexical Type (for 咗 *zo2*)

(5) lexical type

$$\begin{bmatrix} \textit{pfv-marker-lex} \\ \text{VAL.COMPS} \ \Big\langle \big[\text{HOOK.INDEX.E.ASPECT } \textit{perfective}\big] \Big\rangle \end{bmatrix}$$

(6) lexical entry

$$\begin{bmatrix} \textit{pfv-marker-lex} \\ \text{STEM} \ \langle \text{`咗'} \rangle \end{bmatrix}$$

- Individual markers inherit from aspect-marker-lex
- Set appropriate aspect value
- Constrains complement's aspect

# Inner Aspect Analysis

- Inner Aspect Particles look very much like resultative verbs
- Treat as defective resultative verbs with three special properties:
  1. New kind of resultative verb whose predicate takes the predicate of the first verb as argument (for IAPe)
  2. Both IAPe and IAPi change aspect of head verb to *perfective-or-experential*
  3. Constrained so they cannot appear as main verbs

# Extended Resultative Construction Types
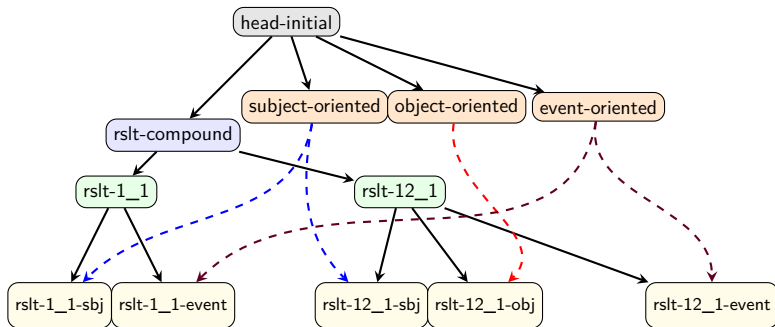


Reuse an existing analysis of resultative (Song, 2014)
We think the core ideas are compatible with the lexical rule analysis
(Müller, 2002; Lu et al., 2023), but did not investigate further

# Basic Resultative Compound Type

(7)

$$
\begin{bmatrix}
\textit{rslt-compound} \\
\text{VAL.SPEC } \langle \rangle \\[2pt]
\text{HD} \quad
\begin{bmatrix}
\text{CAT} \quad
\begin{bmatrix}
\text{HEAD} & \textit{verb} \\
\text{VAL.SPEC} & \langle\, [\,]\, \rangle
\end{bmatrix} \\[6pt]
\text{LIGHT} \quad - \\
\text{HOOK.INDEX } \boxed{1}
\end{bmatrix} \\[10pt]
\text{NHD} \quad
\begin{bmatrix}
\text{CAT} \quad
\begin{bmatrix}
\text{HEAD} & +\textit{vj} \\
\text{VAL.SPEC} & \left\langle\, \big[\text{HOOK.INDEX.E.ASPECT } \boxed{0}\big]\, \right\rangle
\end{bmatrix} \\[6pt]
\text{LIGHT} \quad - \\
\text{HOOK.INDEX } \boxed{3}
\end{bmatrix} \\[10pt]
\text{C-CONT} \quad
\begin{bmatrix}
\text{HOOK} \quad \big[\text{INDEX.E.ASPECT } \boxed{0}\big] \\[4pt]
\text{RELS} \quad
\left\langle
\begin{bmatrix}
\text{PRED } \textit{rslt\_v} \\
\text{ARG1 } \boxed{1} \\
\text{ARG2 } \boxed{2}
\end{bmatrix}
\right\rangle \\[10pt]
\text{HCONS} \quad
\left\langle
\begin{bmatrix}
\text{HARG } \boxed{2} \\
\text{LARG } \boxed{3}
\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
$$

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# Event-Oriented Extension

(8)
$$
\begin{bmatrix}
\textit{event-oriented} \\
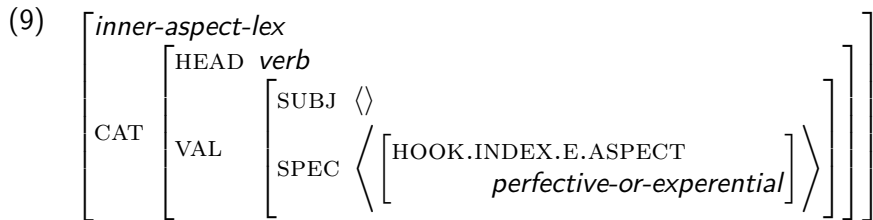\text{HOOK.INDEX } \boxed{0} \\
\text{NHD} \qquad \begin{bmatrix} \text{HOOK.XARG } \boxed{0} \end{bmatrix}
\end{bmatrix}
$$

- First argument of second verb is the event of the first verb
- Models semantics of IAPe particles
- Predicates over the head verb

## Inner Aspect Lexical Type

(9)

$$
\begin{bmatrix}
\textit{inner-aspect-lex} \\[2pt]
\text{CAT}
\begin{bmatrix}
\text{HEAD } \textit{verb} \\[2pt]
\text{VAL}
\begin{bmatrix}
\text{SUBJ } \langle \rangle \\[6pt]
\text{SPEC } \left\langle
\begin{bmatrix}
\text{HOOK.INDEX.E.ASPECT} \\
\textit{perfective-or-experential}
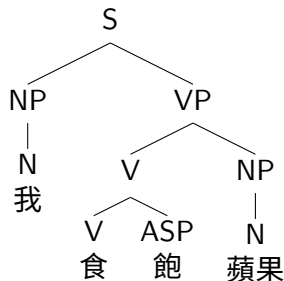\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

- Inherits from lex-synsem
- Cannot head a sentence (empty subject)
- Sets aspect to *perfective-or-experential*

# Inner Aspect Example

S
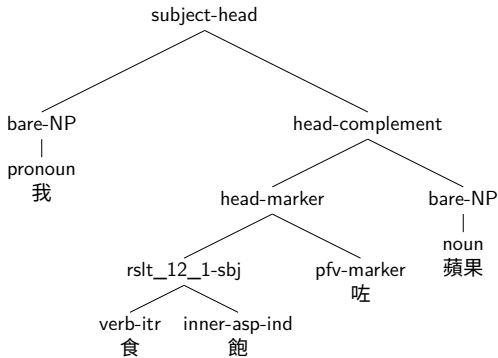NP VP
N V NP
我
V ASP N
食 飽 蘋果

```
[ mrs
  TOP   [0] h
  INDEX [2] [ e
              SF        prop-or-ques
              E.TENSE   tense
              E.ASPECT  perfective-or-experential
              E.MOOD    mood ]
  RELS  < [ exist_q_rel      [ _我_n_rel    [ rslt            [ _食_v_rel         [ _飽_v_rel        [ exist_q_rel      [ _蘋果_n_rel
            LBL   [4] h         LBL  [7] h     LBL   [1] h       LBL   [1] h         LBL   [11] h       LBL   [13] h       LBL   [16] h
            ARG0  [3][X]        ARG0 [3][X] ]  ARG0  [8] i       ARG0  [2][e]        ARG0  [12][e]      ARG0  [10][X]      ARG0  [10][X] ]
            RSTR  [5] h                        ARG1  [1] h       ARG1  [3][X]        ARG1  [3][X] ]     RSTR  [14] h
            BODY  [6] h ]                      ARG2  [9] h ]     ARG2  [10][X] ]                        BODY  [15] h ]
  HCONS < [ qeq            [ qeq            [ qeq
            HARG [6] h       HARG [5] h       HARG [9] h
            LARG [4] h ]     LARG [7] h ]     LARG [11] h ] >
  ICONS <>
]
```

We also get the slightly less likely reading where the apple is full :-).

# Inner and Outer Aspect Example

subject-head

bare-NP      head-complement

pronoun
我

head-marker      bare-NP

noun
蘋果

rslt_12_1-sbj      pfv-marker
咗

verb-itr    inner-asp-ind
食      飽

```
mrs
TOP     0 h
                e
                SF          prop-or-ques
INDEX   2 E.TENSE      tense
          E.ASPECT     perfective
          E.MOOD       mood
        exist_q_rel            rslt        _食_v_rel           _飽_v_rel        exist_q_rel          _蘋果_n_rel
        LBL    4 h    _我_n_rel   LBL   1 h   LBL    1 h    _飽_v_rel   LBL   11 h    _蘋果_n_rel
RELS    ARG0   3 X   LBL   7 h   ARG0  8 i   ARG0   2 e   LBL   12 h   ARG0  10 X   LBL   16 h
        RSTR   5 h   ARG0  3 X   ARG1  2 e   ARG1   3 X   ARG0  12 e   RSTR  14 h   ARG0  10 X
        BODY   6 h            ARG2  9 h   ARG2  10 X   ARG1   3 X   BODY  15 h
        qeq            qeq            qeq
HCONS   HARG  0 h   HARG  5 h   HARG  9 h
        LARG  1 h   LARG  7 h   LARG  11 h
ICONS <>
```

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# And can we parse an ungrammatical sentence?

我 食 飽 住 蘋果
SKIP: 我 食 飽 住 蘋果

can not!

*continous* (from 住) vs *perfective-or-experential* (from 飽)

# Conclusion and Future Work

## Summary

- Analysis covers main types of aspect in Cantonese
- Models semantics and constrains combinations
- Implementation released with full paper

## Future Work

- Resultative construction currently unconstrained
  - Some ambiguity increase
  - Need corpus parsing to identify restrictions
- Verb-specific aspect constraints required
- We need to look at the interaction with negation, separable verbs, coordination and more

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