What is an aspectual particle?

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Roadmap

• Overview of particles and specifically aspectual particles
• Study of aspectual particle *up* in naturally occurring data
  – Propose a method of sorting particles into three classes
  – Investigate the behavioral properties of aspectual particles according to Jackendoff (2002)
  – Classify apparent counterexamples
  – Suggest an expanded account of the behavior of aspectual particles based on frame semantics
Syntactic Properties of Particles

- A particle does not form a constituent with a following NP (Bolinger 1971)
  - “He raised up his hand.”
  - *“Up his hand he raised.”

- Two positional affordances with transitive verbs (Bolinger 1971)
  - complex predicate: He raised up his hand.
  - resultative predicate: He raised his hand up.

Semantic Properties of Particles

- Traditionally particles have been subdivided into 3 categories (Bolinger 1971, Brinton 1985, Emonds 1972, 1985, Jackendoff 1973)

<table>
<thead>
<tr>
<th>Directional</th>
<th>We pushed the chair out. I raised my hand up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiomatic</td>
<td>She’s gonna chew me out. Look up the word in the dictionary.</td>
</tr>
<tr>
<td>Aspectual</td>
<td>She dried out the glasses using a towel. Pat accidentally glued his fingers up.</td>
</tr>
</tbody>
</table>
Semantic Properties of Aspectual Particles

- Add change of state/telicity to verbs of process or activity
  - Example:
    “Would not the children [...] eat it up immediately?”
- For verbs with inherent telicity, the particle reinforces the telicity of the verb (Bolinger 1971, Brinton 1985)
  - Example:
    “Zach finished up his lunch.”
- Aspectual particles do not necessarily act on telicity of a verb
  - Particles such as away, through, and over do not add, reinforce, or modify telicity (Jackendoff 1997, 2002)
  - Example:
    “Should I write it over?”

Aspectual Particles

- If it is not telicity the particle necessarily adds/emphasizes then how would one characterize aspectual particles?
- Jackendoff (2002) provides a characterization of the aspectual particles based on their behavior.
Jackendoff (2002) observations of aspectual particles

- Unlike directional particles, an aspectual particle *does not satisfy an argument position of the verb.*
  - Therefore, the particle is freely omissible

- Unlike idiomatic particles, aspectual particles *do not form idiomatic combinations with the verb.*
  - Thus, the final meaning of the verb+particle combination is predictable

- Aspectual particles function semantically like aspectual modifiers.
  - “Pat *ate* the sandwich *(up | completely)*”.
  - “Pat *read* his notes *(over | again)*”.

- An aspectual particle is often redundant, as in
  - “Close up the suitcase”

Plan of Study

- Study of naturally occurring data
- Develop independent methods to classify the aspectual particles
- Test Jackendoff’s behavioral predictions on aspectual particles on the selected data
- Classify and explain apparent counterexamples
Corpus and Data Selection

- Corpus: Brown Corpus with additional Google searches
- Brown Corpus
  - million word corpus of American English
  - compiled ~ 1969 at Brown University
  - wide variety of genres including (e.g., news, fiction, narratives, humor)
- Treebank (Bies et al. 1995)
  - Sentences are annotated with part of speech tags and parsed into their constituent structure
  - Verbs are labeled VBx, where the x marks for tense, person, and number
  - Particles are labeled with PRT

Focus: Particle *up*

- Narrowing down the data:
  - *up* is the most frequently occurring particle in the corpus, followed by *out* and *on*.
  - chose only transitive cases as a way of narrowing down the data set
  - Selected for:

```
1180 32% up
962 26% out
333  9% on
315  9% off
295  8% down
234  6% in
146  4% over
 38  1% back
 36  1% about
 32  1% away
 19 >1% along
 17 >1% around
```
Classifying the data

- Classified data into the 3 categories: Directional, Idiomatic, Aspectual
- Data was intuitively labeled

- However ...
  Intuitions are difficult to capture and articulate.

- In order to trim the intuitions to make them more robust and scalable to the data, a more methodical classification was developed

Method of Classification

Stativity Test
Can the particle be restated as the resultant state of the object?

- yes: Directional
- no: Bare Verb Test

Bare Verb Test
Is the bare verb similar to the verb particle combination?

- yes: Aspectual
- no: Idiomatic
Method of Classification

“Pat raised up his hand.”

↓

Stativity Test
Can the particle be restated as the resultant state of the object?

Directional

Bare Verb Test
Is the bare verb similar to the verb particle combination?

Aspectual

Idiomatic

Method of Classification

“Pat raised up his hand.”

↓

Stativity Test
“Pat’s hand is up”

yes

Directional

Bare Verb Test
Is the bare verb similar to the verb particle combination?

Aspectual

Idiomatic
Method of Classification

Stativity Test
“Pat’s hand is up”

Bare Verb Test
Is the bare verb similar to the verb particle combination?

yes
Directional

“Pat raised up his hand.”

Method of Classification

“Pat looked up the word.”

Stativity Test
Can the particle be restated as the resultant state of the object?

Directional

“Pat raised up his hand.”

Bare Verb Test
Is the bare verb similar to the verb particle combination?

Aspectual

Idiomatic
Method of Classification

“Pat looked up the word.”

↓

Stativity Test

*“Word is up”

↓ no

Bare Verb Test
Is the bare verb similar to the verb particle combination?

↓ no

Idiomatic

Directional

“Pat raised up his hand.”

Method of Classification

“Pat looked up the word.”

↓

Stativity Test

*“Word is up”

↓ no

Bare Verb Test
Is looking up a type of looking?

↓ no

Idiomatic

Directional

“Pat raised up his hand.”

Aspectual
Method of Classification

Stativity Test
“Word is up”

no

Directional

“Pat raised up his hand.”

Bare Verb Test
Is looking up a type of looking?

no

Aspectual

“Pat looked up the word.”

Idiomatic

Method of Classification

“Pat ate up the pizza.”

Directional

“Pat raised up his hand.”

Stativity Test
Can the particle be restated as the resultant state of the object?

Bare Verb Test
Is the bare verb a type of verb-particle combination?

Aspectual

Idiomatic

“Pat looked up the word.”
Method of Classification

"Pat ate up the pizza."

↓

Stativity Test

*“Pizza is up”

no

Bare Verb Test

Is the bare verb a type of verb-particle combination?

Directional

no

“Pat raised up his hand.”

Aspectual

yes

Is eating up a type of eating?

Aspectual

Idiomatic

“Pat looked up the word.”
Method of Classification

Stativity Test

*“Pizza is up”*

no

Directional

“Pat raised up his hand.”

Bare Verb Test

Is eating up a type of eating?

yes

Aspectual

“Pat ate up the pizza.”

Idiomatic

“Pat looked up the word.”

Results: Frequency of UP

<table>
<thead>
<tr>
<th>Type</th>
<th>Token</th>
<th>V Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>659</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional</td>
<td>192</td>
<td>54</td>
<td>28.1%</td>
</tr>
<tr>
<td>Idiomatic</td>
<td>293</td>
<td>58</td>
<td>19.8%</td>
</tr>
<tr>
<td>Aspectual</td>
<td>174</td>
<td>92</td>
<td>52.9%</td>
</tr>
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</table>

• Having identified the aspectual particles via our independent classification scheme, we will now explore if the data behaves according to Jackendoff predictions.
Results: Exceptions to Behavioral Predictions

- Testing Jackendoff’s characterizations for aspectual particles on the classified data, we found counterexamples that fit into four classes:
  - Particle *up* is not omissible
  - Particle *up* satisfies goal complement
  - Particle *up* changes constraints on second argument
  - Particle *up* changes entailment

Sheer Indispensability

Contrary to the claim that “[up] can be freely omitted”, absence of particle *up* can cause agrammaticity.

<table>
<thead>
<tr>
<th>smell up</th>
<th>“The garbage smelled up the yard” (Google)</th>
</tr>
</thead>
<tbody>
<tr>
<td>smell</td>
<td><em>“The garbage smelled the yard”</em></td>
</tr>
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</table>

<table>
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<tr>
<th>speed up</th>
<th>“One expects that the decrease in friction would help speed the car up too.” (Brown)</th>
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</thead>
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<tr>
<td>speed</td>
<td><em>“One expects that the decrease in friction would help speed the car too.”</em></td>
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## Goal Argument Satisfaction

The particle UP satisfies the goal-argument requirement of a transfer verb.

<table>
<thead>
<tr>
<th>verb</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>add up</td>
<td>&quot;So each reading can be given [...] a score by adding up these weights.&quot; (Brown)</td>
</tr>
<tr>
<td>add</td>
<td>?“So each reading can be given [...] a score by adding these weights.”</td>
</tr>
<tr>
<td>tie up</td>
<td>“A band of robbers [...] ties up the telegraph operator, holds up the train and escape[s].” (Brown)</td>
</tr>
<tr>
<td>tie</td>
<td>&quot;A band of robbers [...] ties the telegraph operator, holds up the train and escape[s].”</td>
</tr>
<tr>
<td>hook up</td>
<td>“A telephone line had been hooked up to connect the ship with the Base exchange” (Brown)</td>
</tr>
<tr>
<td>hook</td>
<td>&quot;A telephone line had been hooked to connect the ship with the Base exchange”</td>
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</tbody>
</table>

## Argument Constraints

Up is not fully omissible because its presence changes what ARG2 types are possible.

<table>
<thead>
<tr>
<th>verb</th>
<th>example</th>
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<tbody>
<tr>
<td>break up</td>
<td>“Locust gum is added to pulp slurries to break up the lumps of fibers in making paper” (Brown)</td>
</tr>
<tr>
<td>break</td>
<td>&quot;Locust gum is added to pulp slurries to break the lumps of fibers in making paper”</td>
</tr>
<tr>
<td>smash up</td>
<td>“The Cure smashed up an Auckland hotel room while they were here too.” (Google)</td>
</tr>
<tr>
<td>smash</td>
<td>&quot;The Cure smashed an Auckland hotel room while they were here too.”</td>
</tr>
<tr>
<td>close up</td>
<td>&quot;Tilghman closed up the door behind him and walked towards the fire.”</td>
</tr>
<tr>
<td>close</td>
<td>&quot;Tilghman closed the door behind him and walked towards the fire.” (Brown)</td>
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</table>
### Entailment Change

**UP changes semantic entailment of the verb.**

<table>
<thead>
<tr>
<th>roll up</th>
<th>“Andy rolled up the revised script he had been studying.” (Brown)</th>
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<tbody>
<tr>
<td>roll</td>
<td>?“Andy rolled the revised script he had been studying.”</td>
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### Entailment Change (cont.)

**UP changes semantic entailment of the verb.**

<table>
<thead>
<tr>
<th>buy up</th>
<th>“He did this by the charming practice of buying up used electric blankets for $5 to $10 from survivors of patients who had died [...] and selling them at $185 each.” (Brown)</th>
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<td>buy</td>
<td>“He did this by the charming practice of buying used electric blankets for $5 to $10 from survivors of patients who had died [...] and selling them at $185 each.”</td>
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<tr>
<td>buy</td>
<td>“He bought a few electric blankets.”</td>
</tr>
<tr>
<td>buy up</td>
<td>“He bought up *a few electric blankets.”</td>
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</table>
Entailment Change (cont.)

UP changes semantic entailment of the verb.

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<tr>
<td>call (up)</td>
<td>“I did have the decency to call (up) Thelma and tell her I'd met old friends.” (Brown)</td>
</tr>
<tr>
<td>call</td>
<td>“The telemarketer called me at this number.” (Google)</td>
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<tr>
<td>call ?up</td>
<td>? “The telemarketer called me up at this number.”</td>
</tr>
<tr>
<td>call</td>
<td>“I called Thelma but she did not answer.”</td>
</tr>
<tr>
<td>call up</td>
<td>“I called up Thelma *but she did not answer.”</td>
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What’s going on?

- Omissibility cannot be an appropriate characterization of behavior shown by the particle *up*
- The claim that aspectual particles function semantically like aspectual modifiers cannot fully account for what is shown in the data
- We argue instead that the particle *up* alters verbal frame semantics
- Two major schematic associated with particle *up*, one image-schematic and the other decompositional
  - reflexive-trajector scheme (Lindner 1983)
  - accomplishment scheme (Moens & Steedman 1988, Rappaport Hovav & Levin 1998)
What’s going on?

- Sheer Indispensability

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- *(up) calls for an accomplishment scheme
- Selects for the meaning that involves a resultant state: state of saturation
- Bare verb does not have this option

What’s going on?

- Goal Argument Satisfaction

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<th>add *(up)</th>
<th>“So each reading can be given a score by adding *(up) these weights.”</th>
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- *(up) invokes a reflexive-trajector scheme (Lindner 1983)
- second argument acts as both the goal and theme of the verb

- Argument Constraints

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<th>break *(up)</th>
<th>“He placed it on a rock, and broke *(up) the lock with the edge of his shovel.”</th>
</tr>
</thead>
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- *(up) calls for an accomplishment frame
- adds run-up process to otherwise punctual/achievement event
What’s going on?

- **Entailment Change**

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- up calls for an accomplishment frame
- particle up will augment the verb’s frame to accomplishment type, by adding a run-process, a transition or a resultant state

Conclusion

- Jackendoff predicts omissibility as a characteristic of an aspectual particle.
- However, we argue, as attested in the data, that omissibility is not an appropriate prediction for particle up.
- We agree with Jackendoff that aspectual particles are best defined negatively—in contrast to idiomatic and directional particles.
- But aspectual up still contributes semantically: it can add a run-up process, a resultant state or an identity constraint equating the goal and theme argument.
- These contributions can be traced to aspectual and image-schematic content.
- The inventory of associated frames will grow as our data set grows.

*Thank you!*
References


Emonds, J. (1972) "Evidence that indirect object movement is a structure-preserving rule". In Foundations of Language 8: 546-561.


References (cont.)


