Telicity and iconic scales in ASL

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Section 1

Overview
In many sign languages, Wilbur (2003, 2008, 2009) observes that verbs display a non-arbitrary form-to-meaning mapping.

1. Representation of telicity in the lexicon
   - Telic verbs end with a sharp deceleration; atelic verbs do not.

2. Phonetic manipulations yield semantic effects
   - Interpretation of speed and event completion (telic predicates).
I will provide an analysis in terms of an iconic homorphism.

I assume that verb meanings are derived from scales.

(Hay et al. 1999, i.a.)

Verbs in ASL iconically represent these scales.

- Motion of the sign is mapped to progress of the event.
- End-marking iconically maps to the maximum of a closed scale.
Section 2

Visible events
Telicity in natural language

- Two categories of predicates in natural language.
  - Telic predicates: have a point of culmination
    - ‘John came to a decision in 30 minutes.’
    - ‘John arrived at the party in two minutes.’
  - Atelic predicates: happen over time with no culmination
    - ‘John pondered the question for 30 minutes’
    - ‘John played with his friends for two hours’
Visible telicity

**Observation:** In ASL, telic verbs display ‘end-marking’ (Wilbur 2003)

- ‘end-marking’ = sharp deceleration and possible contact

![Hand drawings showing gesture comparisons](image)

- arrive (telic) vs. play (atelic)

- Similar results for:
  - Croatian SL, Austrian SL, Italian SL, SL of the Netherlands,
  - Turkish SL

(Malaia and Wilbur 2014, Strickland et al. 2015)
Phonetic manipulations

- **Observation:** In ASL, Wilbur shows that the phonetic form of a verb may be manipulated with semantic effect.

- **Slow action**
  - DIE signed slowly $\approx$ ‘slowly die.’

- **Incomplete action**
  - SIT-DOWN ends with contact between the signer’s two hands; SIT-DOWN without contact $\approx$ ‘almost sit down.’
(1) LAST-YEAR MY GRANDMOTHER DIE-{normal/slow}.
‘Last year, my grandmother {died/died slowly}.’
(2)  a. I SIT.
    ‘I sat down.’

b. I SIT-incomplete FIGHT.
    ‘I was sitting down when a fight broke out.’
Two possible analyses

- Wilbur: these phonetic features are discretely codified as a finite set of combinatorial morphemes.

- Today: an iconic mapping that preserves abstract geometric structure from the form of a sign to its meaning.
  
  Examples with **gradient interpretive effects** cannot be generated by a discrete combinatorial system alone.
Section 3

Morphemic analysis
Telicity many ways

I have said ‘end-marking marks telicity,’ but this is incorrect.

Telicity is a property of predicates, that emerges based on a variety of factors. (Tenny 1992, 1994; Krifka 1998)

(3) a. John looked at rice. → atelic
    b. John looked at an apple. → atelic

(4) a. John ate rice. → atelic
    b. John ate an apple. → telic

The phonetic form of EAT does not change based on what the complement is.
Ramchand (2008): telicity of predicates is in part determined by the **sub-lexical decomposition** of the verb.

A class of inherently-telic verbs (roughly, ‘Achievements’) derive their telicity from the presence of a syntactic head res

Meaning: existence of a result state.  

(c.f Dowty 1979)
1. Inherently telic verbs (telicity from res morpheme)

break, throw, find, explode, enter, arrive, disappear.
Ramchand - different ways to get telicity

1. **Inherently telic verbs** (telicity from res morpheme)
   
   break, throw, find, explode, enter, arrive, disappear.

   Other predicates inherit their telicity from an argument.

2. **Incremental theme verbs** (inherit their telicity from argument)
   
   eat (an apple), paint (a picture), read (an article).

3. **Degree achievement verbs** (inherit their telicity from scale)
   
   dry, cool, straighten, close, fill.
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Telicity and iconic scales in ASL
What is end-marking tracking?

- So, what is end-marking tracking in ASL?
- Wilbur is very specific: end-marking = res.

- But, a problematic natural class:
  - End-marking on FIND, ARRIVE, ...
  - but also on CLOSE, FILL, ...

  (good for Wilbur)
  (unexpected for Wilbur!)

- **ASL internally**: atelic degree achievements are sensitive to similar phonetic manipulations (e.g. GROW)
Desideratum:

► Desideratum: a theory that unifies inherently telic predicates (die) with degree achievements (fill, grow).
Section 4

Iconicity and gradience
Iconicity

- **Iconicity (definition):** A construction is iconic if there is a structure-preserving mapping from the form of a sign to its meaning.

- It can preserve **geometric structure** (i.e. measurement).

- **Result:** gradient phonetic changes yield gradience in semantic interpretation.

- **Upshot:** the interpretation of gradient phonetic changes can serve as a diagnostic for iconicity.
Gradience of speed

► Recall: slow DIE ≈ ‘die slowly.’

► **Claim:** in comparative paradigms, *arbitrarily many* of levels of speed can be represented.

► Below, reduplicated GIVE accelerates from 0.27s to 0.07s.
  
  ► **Interpretation:** the speed of the event increased over time

► The interpretation of acceleration is only possible with arbitrarily many levels of speed represented.
Gradience of speed

(5)  GIVE-accelerating
Gradience of event progression

▶ Recall: incomplete SIT-DOWN ≈ ‘almost sit down.’

▶ **Claim:** arbitrarily many degrees of event progression can be represented.

▶ **Example:** pronunciation of a sign interrupted by pauses.
  
  ▶ **Interpretation of ‘bit-by-bit’ inflection:** the event occurred gradually, reaching successive states before completion.
Gradience of event progression

(6)  a. MY FRIEND FACE CHANGE.
     ‘My friend’s face changed.’

     b. SINCE ONE YEAR MY FRIEND FACE CHANGE-bit-by-bit.
     ‘For a year, my friend’s face has changed gradually.’
Gradience of event progression

- This is sensitive to fine-grained temporal and spatial modifications.

- **Example**: DIE signed with an increased number of pauses as the motion of the sign nears its end point
  - *Interpretation*: the subject’s health declined more and more slowly until the moment of death.

- Information preserved from at least two different dimensions:
  - the time elapsed
  - the distance that the hand has traveled
Gradience of event progression

(7) LAST-YEAR, MY GRANDMOTHER DIE-bit-by-bit. (two forms) ‘Last year, my grandmother died
   a. gradually.’
   b. gradually, health declining ever more slowly near end.’

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Telicity and iconic scales in ASL

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In both cases, the manipulations are part of a more general pattern.

Gradient interpretation provides evidence for an iconic mapping.

This iconic mapping keeps track of both time and event progression.
Section 5

Iconic verbal scales
Adjectival scales

- **Kennedy and McNally 2005:**
  Gradable adjectives are associated with scales.

- **Possible scale structures:**
  - totally open
    - *tall, wide*
  - top closed
    - *straight, dry*
  - bottom closed
    - *bent, wet*
  - totally closed
    - *full, closed*

- Natural language is sensitive to these distinctions.
  - slightly wet vs. *slightly {tall, dry}*
  - completely straight vs. *completely {wide, bent}*
Verbal scales

Hay et al. 1999, Kennedy and Levin 2008:
Verbs are sensitive to the same categories as adjectives.

- Clearest in morphologically-related adjective/verb pairs like wide/widen, straight/straighten, open/open.

Differences with respect to telicity!

(8) Verbs based on closed scales have variable telicity.
   a. The towel dried for an hour.
   b. The towel dried in an hour.

(9) Verbs based on open scales are atelic.
   a. The gap between the boats widened for a few minutes.
   b. ?? The gap between the boats widened in a few minutes.
Scalar semantics

- Both adjectives and verbs are built from the same scales.
  (Note: sub-lexical decomposition, like Ramchand.)

- For example:

(10) \[ \text{wide} = \text{pos}_{A}(\text{width}) \]
    \[= \text{True of an individual } x \text{ iff the width of } x \text{ is greater than some standard.} \]

(11) \[ \text{widen} = \text{pos}_{V}(\text{width}_{\Delta}) \]
    \[= \text{True of an individual } x \text{ and and event } e \text{ iff the change in width of } x \text{ over } e \text{ is greater than some standard (namely, 0).} \]
    \[= \text{True iff } x \text{ increases in width over } e. \]
Two-point scales

Recall earlier desideratum:

- **Natural class:**
  inherently telic verbs (DIE and ARRIVE)
  +
  degree achievements (CLOSE and FILL-UP)

- **How?**
  ‘inherently telic verbs’ are cases of **two-point scales**
Scale structures

- Verb meanings weak: ‘there is positive change along the scale.’
- Telic meanings arise if this change reaches maximum on scale.

- Totally open:
  - Verbs: widen, grow

- Top closed:
  - Verbs: dry, close?

- Two-point:
  - Verbs: die, arrive

Roughly:

- Open scales have no maximum so are never telic.
- Change along a closed scale can either reach the maximum or not, so are ambiguous.
- Change along a two-point scale always reaches maximum, so are always telic.
Adjectival scales in sign language

- Aristodemo and Geraci (2017) argue that scales are iconically represented for adjectives in Italian Sign Language.

- For some adjectives, a comparative form can be constructed by signing the adjective at two different positions along a path.

(12) \text{MARIA TALL-}x \text{ GIANNI TALL-scale-more-}y.

‘Gianni is taller than Maria.’ (LIS)
Verbal scales in sign language

▶ Proposal: The scales iconically represented in adjectives are also iconically represented in change-of-state verbs in ASL.

▶ End-marking on telic verbs is the iconic representation of the maximum of a closed scale.

CLOSE in ASL
Verbal scales in sign language

- **Specifically:** for each point in the production of a verb and corresponding time in the occurrence of an event:
  
  (a) the distance traversed from the beginning of the phonetic motion is proportional to the change along a scale from the initiation of the event.

- And,

  (b) When a phonetic form reaches a maximal distance (perhaps due to body contact), the event reaches a maximal degree.
Iconic constraints

For a phonetic form $\Phi$ and a measure function $m$, $\text{Icon}_\Phi(m)$ maps an individual $x$ and an event $e$ to true iff (14) is met.

\begin{equation}
(13) \text{ Definition } (\tau_e) \colon \\
\frac{\tau_e(t_\Phi) - \text{start}(e)}{\text{end}(e) - \text{start}(e)} = \frac{t_\Phi - \text{onset}(\Phi)}{\text{coda}(\Phi) - \text{onset}(\Phi)}
\end{equation}

\begin{equation}
(14) \text{ Iconic condition on scalar change and endpoints } \\
(\text{defined when max}(d_v) \text{ and max}(e) \text{ exist):} \\
\max(\mu) - \mu(x)(\tau_e(t_\Phi)) \propto \max(d_v) - d(t_\Phi)
\end{equation}
Proposal sketch

<table>
<thead>
<tr>
<th>Proposal sketch</th>
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<tbody>
<tr>
<td>Earlier, we decomposed a verb as $\text{pos}<em>V(m</em>\Delta)$.</td>
</tr>
<tr>
<td>Now, we decompose the verb into $\text{pos}<em>V(m</em>\Delta) \land \text{Icon}^\Phi(m)$.</td>
</tr>
</tbody>
</table>

\[ \text{pos}_V(m_\Delta) \land \text{Icon}^\Phi(m) = \]
‘There is increase in $m$, and the change in $m$ adheres to certain structural conditions that are iconically demonstrated.’

For verbs with end-marking:
‘There is increase in $m$, and the change in $m$ reaches a maximum degree.’

Result: the iconic predicate induces a telic meaning.
An iconic function

Let’s unpack this: \( \text{pos}_V(m_\Delta) \land \text{Icon}^\Phi(m) \)

- Case study: DIE-incomplete
- Observation 1:
  - **Possible:**
    DIE-slow = “He died and it happened like this: slowly”
  - **Not possible:**
    DIE-incom. = “He died and it happened like this: incompletely”
- Solution: \( \text{pos}_V(m_\Delta) \) can be very weak:
  - ‘There is increase along the scale.’
  - Two-point scales coerced to finer-grained scales.
  - Better translation: “He was dying, and ...”
An iconic function

Let’s unpack this: \( \text{pos}_V(m_\Delta) \land \text{Icon}_\Phi(m) \)

- **Case study:** DIE-incomplete

- **Observation 2:**
  - The current definition of \( \text{Icon}_\Phi(m) \) asserts the existence of an event in which an individual was dying, but had not yet died.
  - But, no entailment that the individual failed to die!
    - E.g.: Health starts declining in January and death a year later. Consider the subevent from January to November. This is a subevent in which someone is dying, but has not yet died.
  - The inference that the result is not reached is an *implicature*.

\[(15) \quad \text{ISIT}-\text{incomplete FIGHT.} \quad \text{‘I was sitting down when a fight broke out.’} \]
An iconic function

Let’s unpack this: $\text{pos}_V(m_\Delta) \land \text{Icon}^\Phi(m)$

- Case study: DIE-incomplete
- Observation 3:
  - $\text{Icon}^\Phi$ performing the role of an intensional function.
  - The inference that something is ‘incomplete’ requires reference to what would be the case if it were complete.
  - This is a modal meaning.

- Similar tools needed as for progressive marking, etc.:

  (16) I was crossing the street when I got hit by a car.
Iconicity and the grammar

Two points of interaction between iconicity and the combinatorial grammar:

1. An iconic predicate *feeds* a grammatical distinction.
   - (In other words, you can classify a pictorial representation as telic or atelic.)

2. The iconic predicate is *intensional*.
   - Similar semantic type to progressive aspect.
Section 6

Motivated mappings in the lexicon
End-marking and telicity

- So far, I’ve provided an account for the second observation: interpretation of phonetic manipulations.
- I haven’t directly addressed the first observation: the tendencies of the lexicon (telic verbs are end-marked).
- One difficulty: there are exceptions:
  - STAY
  - EXIT (telic) vs. SLEEP (atelic)
End-marking and telicity

I don't think that model theoretic tools are ideally suited for dealing with statistical properties of the lexicon.

(Plausibly, the core cognitive biases that make telic/atelic a common cross-linguistic distinction also stochastically influence the form of a vocabulary.)
End-marking and telicity

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A different point of view:

Instead of asking: which semantic class has a given phonetic property, let’s ask:

which semantic class *can be modified* with $\text{Icon}^\Phi$?

(This should be rather reminiscent of earlier tests: which adjectives have logical properties to be modified by *slightly*?)
End-marking and telicity

- **Important**: The degree of iconic information that is preserved is pragmatically determined.
  - *E.g.* DIE, when signed neutrally, is compatible with both slow and fast dying events.

- Thus, if there is no marked indication that there is an iconic mapping, no inference of telic meaning.
  - *E.g.* for neutral STAY

- On the other hand, if an iconic mapping is made salient, the iconic condition is only defined for verbs based on scales.
End-marking and telicity

Evidence in favor of this account: SLEEP (p.c. Mirko Santoro)

SLEEP ambiguous between *sleep* (atelic) and *fall asleep* (telic)

SLEEP-slow invokes the iconic mapping.

- Slow movement entails slow progress along a scale.
- Only defined for verbs that *have* a scale.
- **Result**: only telic reading available.

Note: here, no modification of end-marking/res

- Telicity arises not just from *res*, but from properties of scale.
Section 7

Conclusion
Conclusion

Today, we looked at a motivated-mapping of verbs.

- End-marking of telic verbs in the lexicon
- Synchronic manipulation of phonetic forms

Using cases of gradience, I argued for an iconic mapping.

A convenient strategy emerged from recent work on scales.

The iconic component interacted deeply with the grammar:

- An iconic function took a logical argument.
- The output of the iconic function could be logically classified as telic or atelic.
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References V


References VII


