

# Telicity and iconic scales in ASL

Jeremy Kuhn  
Institut Jean Nicod, CNRS, EHESS, ENS

February 2, 2018

*Paper:* [www.semanticsarchive.net/Archive/Tc2ZmRi0/](http://www.semanticsarchive.net/Archive/Tc2ZmRi0/)

## Section 1

# Overview

# 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).

# Overview

- ▶ 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

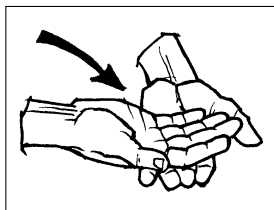
# Telicity in natural language

- ▶ 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’

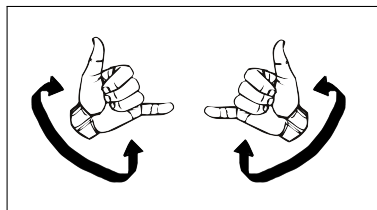
## Visible telicity

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

- ▶ 'end-marking' = sharp deceleration and possible contact



arrive (telic)



play (atelic)

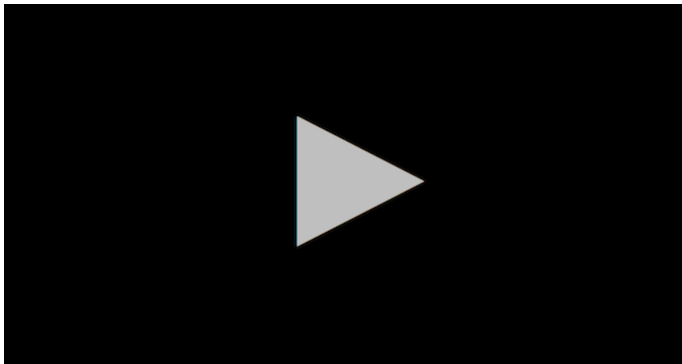
- ▶ Similar results for:  
Croatian SL, Austrian SL, Italian SL, SL of the Netherlands,  
Turkish SL (Malaia and Wilbur 2014, Strickland et al. 2015)

# 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.'

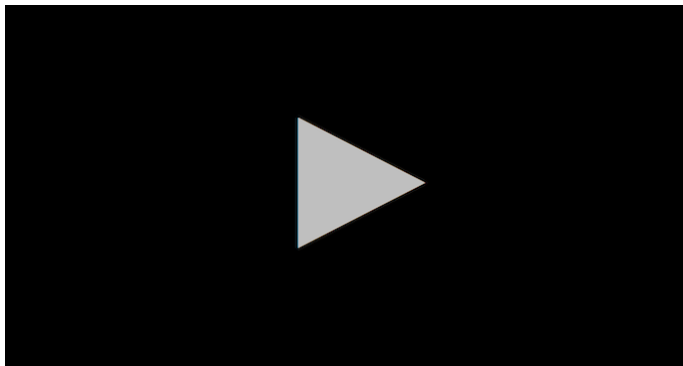


# Phonetic manipulations



- (1) LAST-YEAR MY GRANDMOTHER DIE- $\{normal/slow\}$ .  
'Last year, my grandmother  $\{died/died\ slowly\}$ .'

## Phonetic manipulations



- (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

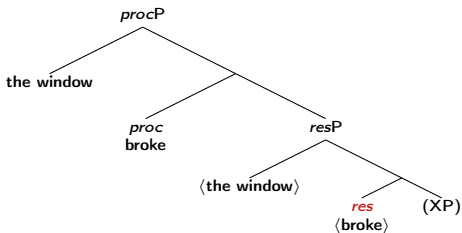
# Morphemic analysis

## 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.

# Telicity many ways

- ▶ 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)



# Ramchand - different ways to get telicity

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

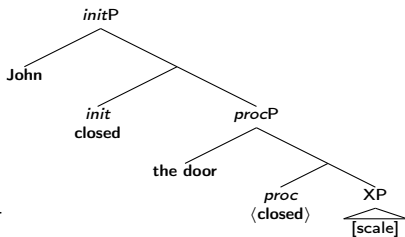
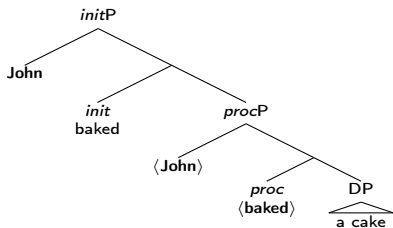
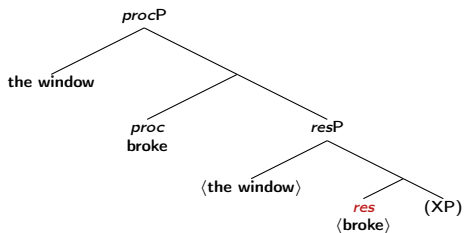
# Ramchand - different ways to get telicity

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

Other predicates inherit their telicity from an argument.

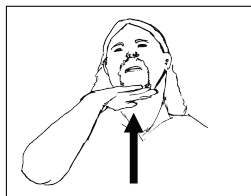
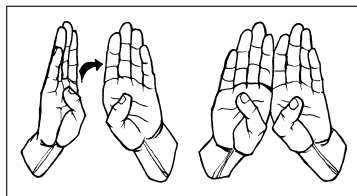
2. **Incremental theme verbs** (inherit their telicity from argument)  
*eat (an apple), paint (a picture), read (an article).*
3. **Degree achievement verbs** (inherit their telicity from scale)  
*dry, cool, straighten, close, fill.*





# 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, ... (good for Wilbur)
  - ▶ but also on CLOSE, FILL, ... (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.

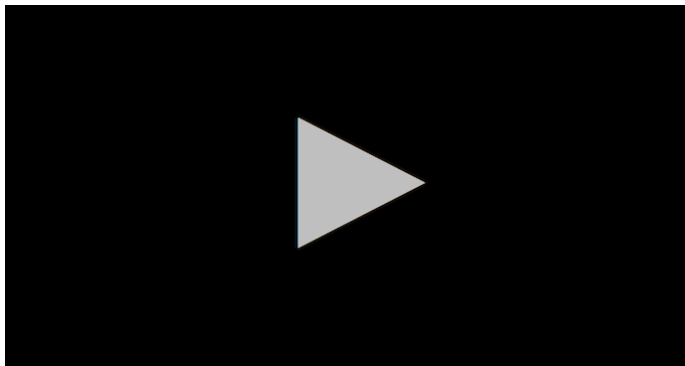
# Gradience of speed

- ▶ Recall: slow DIE  $\approx$  '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



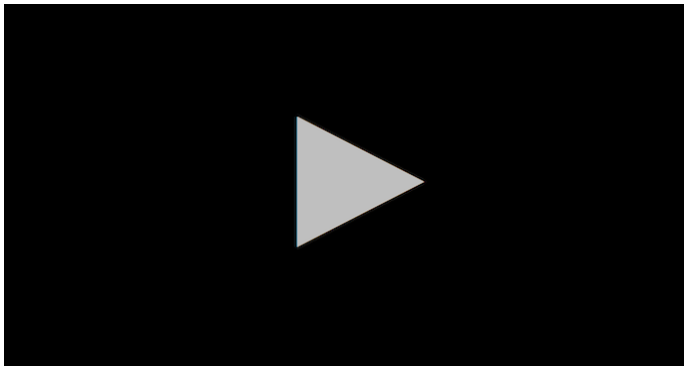
(5) GIVE-accelerating

# Gradience of event progression

- ▶ Recall: incomplete SIT-DOWN  $\approx$  '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

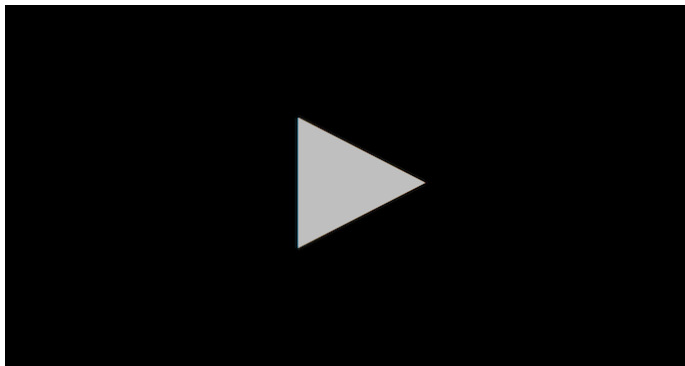


- (6) a. MY FRIEND FACE CHANGE.  
'My friend's face changed.'
- b. SINCE ONE YEAR MY FRIEND FACE CHANGE-bit-by-bit.  
'For a year, my friend's face has changed gradually.'

# 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
- gradually.'
  - gradually, health declining ever more slowly near end.'

## Summary: gradience

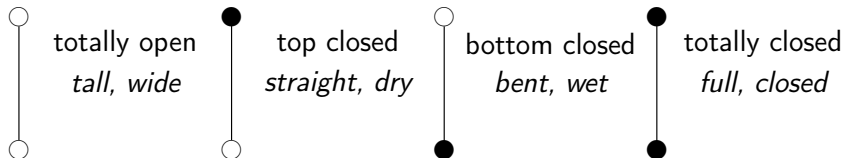
- ▶ In both cases, the manipulations are part of a more general pattern.
- ▶ Gradient interpretation provides evidence for an iconic mapping.
- ▶ This iconic mapping keeps track of both **time** and **event progression**.

## Section 5

# Iconic verbal scales

# Adjectival scales

- ▶ Kennedy and McNally 2005:  
Gradable adjectives are associated with scales.
- ▶ Possible scale structures:



- ▶ 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) wide =  $\text{pos}_A(\text{width})$   
 = True of an individual  $x$  iff the width of  $x$  is greater than some standard.

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



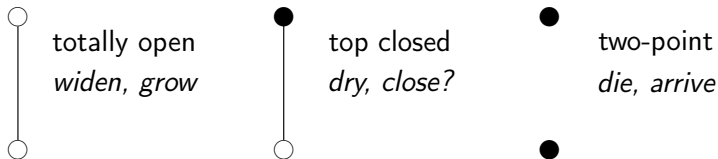
# Two-point scales

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.



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**.

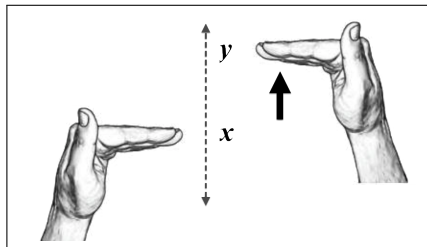
## Adjectival scales in sign language

- ▶ 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) MARIA TALL- $x$  GIANNI TALL-scale-more- $y$ .

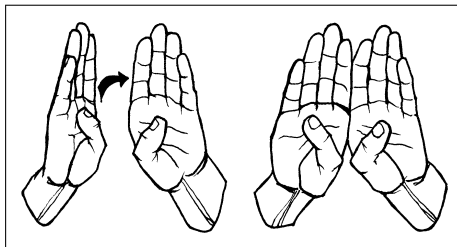
'Gianni is taller than Maria.'

(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.

(13) Definition ( $\tau_e$ ):

$$\frac{\tau_e(t_\Phi) - \text{start}(e)}{\text{end}(e) - \text{start}(e)} = \frac{t_\Phi - \text{onset}(\Phi)}{\text{coda}(\Phi) - \text{onset}(\Phi)}$$

(14) Iconic condition on scalar change and endpoints  
(defined when  $\max(d_v)$  and  $\max(e)$  exist):

$$\max(\mu) - \mu(x)(\tau_e(t_\Phi)) \propto \max(d_v) - d(t_\Phi)$$

## Proposal sketch

- ▶ Earlier, we decomposed a verb as  $\mathbf{pos}_V(m_\Delta)$ .
- ▶ Now, we decompose the verb into  $\mathbf{pos}_V(m_\Delta) \wedge \mathbf{Icon}^\Phi(m)$ .
- ▶  $\mathbf{pos}_V(m_\Delta) \wedge \mathbf{Icon}^\Phi(m) =$   
 '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:  $\text{pos}_V(m_\Delta) \wedge \text{Icon}^\Phi(m)$

- ▶ 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:  $\text{pos}_V(m_\Delta) \wedge \text{Icon}^\Phi(m)$

- ▶ 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) I SIT-incomplete FIGHT.

'I was sitting down when a fight broke out.'

# An iconic function

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

- ▶ Case study: DIE-incomplete
- ▶ Observation 3:
  - ▶ **Icon**<sup>Φ</sup> 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

- ▶ 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.)
- ▶ 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 **Icon**<sup>Φ</sup>?
  - ▶ (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.

# Thanks

Thanks to Jon Lamberton, Tricia Irwin, Mirko Santoro, Valentina Aristodemo, Carlo Geraci, Patrick Caudal, Philippe Schlenker, Louise McNally and *S&P* reviewers.

The research leading to these results received funding from the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013) / ERC Grant Agreement N°324115–FRONTSEM (PI: Schlenker). Research was conducted at Institut d'Etudes Cognitives (ENS), which is supported by grants ANR-10-IDEX-0001-02 PSL\* and ANR-10-LABX-0087 IEC.

## References I

- Aristodemo, V. and Geraci, C. (2017). Visible degrees in Italian sign language. *Natural Language and Linguistic Theory*. Available at <http://semanticsarchive.net/Archive/DJiZjUzM/>.
- Champollion, L. (2010). *Parts of a whole: Distributivity as a bridge between aspect and measurement*. PhD thesis, University of Pennsylvania, Philadelphia, PA.
- Dowty, D. R. (1979). *Word meaning and Montague Grammar: The semantics of verbs and times in generative semantics and in Montague's PTQ*. Reidel, Dordrecht, Netherlands.
- Emmorey, K. and Herzig, M. (2003). Categorical versus gradient properties of classifier constructions in ASL. In Emmorey, K., editor, *Perspectives on classifier constructions in signed languages*. Lawrence Erlbaum Associates, Mahwah, NJ.

## References II

- Hay, J., Kennedy, C., and Levin, B. (1999). Scalar structure underlies telicity in “degree achievements”. In Matthews, T. and Strolovitch, D., editors, *Proceedings of the 9th Semantics and Linguistic Theory Conference (SALT 9)*, pages 127–144, Ithaca, NY. Cornell University CLC Publications.
- Kennedy, C. (2007). Vagueness and grammar: The semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy*, 30(1):1–45.
- Kennedy, C. and Levin, B. (2008). Variable telicity in degree achievements. In McNally, L. and Kennedy, C., editors, *Adjectives and adverbs: Syntax, semantics and discourse*, pages 156–182. Oxford University Press, Oxford, UK.

## References III

- Kennedy, C. and McNally, L. (2005). Scale structure and the semantic typology of gradable predicates. *Language*, 81(2):345–381.
- Kimmelman, V. (2015). Distributive quantification in Russian Sign Language. Presentation at *Formal and Experimental Advances in Sign Language Theory*, Barcelona, Spain.
- Klima, E. and Bellugi, U. (1979). *The signs of language*. Harvard University Press, Cambridge, MA.
- Krifka, M. (1998). The origins of telicity. In Rothstein, S., editor, *Events and grammar*, pages 197–235. Kluwer, Dordrecht, Netherlands.

## References IV

- Liddell, S. (1984). Unrealized-inceptive aspect in American Sign Language: Feature insertion in syllabic frames. In Drogo, J., Mishra, V., and Teston, D., editors, *Papers from the 20th regional meeting of the Chicago Linguistic Society*, Chicago, IL. University of Chicago Press.
- Malaia, E. (2014). It still isn't over: Event boundaries in language and perception. *Language and Linguistics Compass*, 8(3):89–98.
- Malaia, E. and Wilbur, R. (2012). Telicity expression in the visual modality. In Demonte, V. and McNally, L., editors, *Telicity, Change, and State: A Cross-Categorical View of Event Structure*. Oxford University Press, Oxford, UK.
- Pedersen, W. (2014). A scalar analysis of *again*-ambiguities. *Journal of Semantics*.



## References V

- Pustejovsky, J. (1991). The syntax of event structure. *Cognition*, 41:47–81.
- Ramchand, G. (2008). *Verb meaning and the lexicon: a first-phase syntax*. Cambridge University Press, Cambridge, UK.
- Rappaport Hovav, M. (2008). Lexicalized meaning and the internal temporal structure of events. In Rothstein, S., editor, *Theoretical and crosslinguistic Approaches to the Semantics of Aspect*. John Benjamins, Amsterdam, Netherlands.
- Schlenker, P. (2011). Donkey anaphora: the view from sign language (ASL and LSF). *Linguistics and Philosophy*, 34(4):341–395.
- Schlenker, P., Lamberton, J., and Santoro, M. (2013). Iconic variables. *Linguistics and Philosophy*, 36(2):91–149.

## References VI

- Smith, C. R. (2007). 'almost' in ASL: Insights into event structure. MA thesis, Purdue University.
- Strickland, B., Geraci, C., Chemla, E., Schlenker, P., Kelepir, M., and Pfau, R. (2015). Event representations constrain the structure of language: Sign language as a window into universally accessible linguistic biases. *Proceedings of the National Academy of Sciences*, 112(19):5968–5973.
- Tenny, C. (1992). The aspectual interface hypothesis. In Sag, I. A. and Szabolcsi, A., editors, *Lexical matters*, pages 490–508. Stanford: CSLI Publications.
- Tenny, C. (1994). *Aspectual roles and the syntax-semantic interface*. Dordrecht: Kluwer Academic.

## References VII

- Vendler, Z. (1957). Verbs and times. *The Philosophical Review*, 66(2):143–160.
- Vicars, B. [www.lifeprint.com](http://www.lifeprint.com).
- von Stechow, A. (1996). The different readings of *Wieder* 'again': A structural account. *Journal of Semantics*, 13(2):87–138.
- Wilbur, R. (2003). Representations of telicity in ASL. In *Chicago Linguistic Society 39*, pages 354–368.
- Wilbur, R. (2008). Complex predicates involving events, time and aspect: is this why sign languages look so similar? In Quer, J., editor, *Theoretical Issues in Sign Language Research*, pages 217–250, Hamburg, Germany. Signum Press.
- Wilbur, R. (2009). Productive reduplication in a fundamentally monosyllabic language. *Language Sciences*, 31(2-3):325–342.