Representations of Telicity in ASL

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1 Introduction
The purpose of this paper is to present an analysis of the ways in which telicity of events is encoded in the grammar of American Sign Language (ASL). The mapping of the semantic notion of telicity with various phonological forms is argued to be logically motivated but not merely iconic in that this mapping is only morphologically relevant within the predicate system, including their deverbal nominals, and in adverbial modifiers that share the same specific semantic characteristics. I will not deal here explicitly with the syntactic tree representation associated with telicity, temporal aspect, and perfectivity, but it is my belief that the strong position taken by Van Hout (2000) that such trees may be projected directly from event structure is a worthwhile candidate for how the syntax interfaces with the (lexical) semantics discussed here.

Previous research on telicity in ASL includes Brentari and Benedicto’s (in press) investigation of the syntax-phonology interface in the context of classifier constructions, Wood and Wilbur’s (2000) discussion of the role of pointing to disambiguate telic from atelic motion verbs, and Rathmann’s (in progress) work on the discourse-syntax interface from the perspective of Smith’s (1997) Situation model. I will focus here on overt morphophonological marking of event telicity in ASL predicate structures, which is accomplished by a clear indication of end-marking, of which there are a variety of possible forms. The idea that there is a correlation between the formation of verb signs and their temporal aspect is not a new one. Fischer (1973) noted the relationship between durative meaning and slow reduplication. Supalla and Newport (1978:103) make the following correlations: “in general single movement in the sign corresponds to single, punctual or perfective action. Repeated movement, in contrast, refers to durative or iterative activity which is made of repeated punctual actions (e.g. SMOKE is composed of iterative actions of bring a cigarette to the mouth).”

My work on this topic stems from a larger project on ASL reduplication demonstrating that the traditional templatic approach to aspectual modification (cf. Klima and Bellugi 1979) is instead amenable to a semantically compositional analysis (Wilbur 2002, in press). From this perspective, the input to reduplication is treated as morphologically straightforward, resulting from an event-semantically composed sequence of predicate morphemes, rather than as a series of learned templates overlaid on a basic verb form.

Here I will use Pustejovský’s (1992) terminology for event structure, with his notions of States, Processes, and Transitions, and will frame my arguments in
these terms so as not to unnecessarily complicate the presentation. The primary implication of this decision is that here I will deal only with the temporal components of events, and not with causation, agentivity, or linking. As part of the temporal components, I will include such things as spatial extent which, by virtue of the physics associated with them, imply temporal duration. However, I will not attempt to address further distinctions, such as ‘until,’ which is a temporal notion that does not permit a purely spatial reading. In particular, my claims include the following:

1. Transition Predicates, which are telic, have a phonologically overt marked ‘end-State’ in their form, whereas States and Processes, which are atelic, do not.
2. ASL also has a ‘resultative’ construction, in which context atelic States obtain telic meaning with added phonological movement and a ‘final state.’
3. The difference between telic, completive, and perfective in ASL is also overtly visible.

2 Definitions and assumptions

There have been a number of approaches suggested for the treatment of events, including those that distinguish four categories (e.g. Vendler 1967), or five (Smith 1997). I follow Pustejovsky’s (1992) analysis which distinguishes only three, and use his definitions of States, Processes (Vendler’s activities), and Transitions (Vendler’s achievements and accomplishments), as represented in Figure 1.

<table>
<thead>
<tr>
<th>States: S</th>
<th>Processes: P</th>
<th>Transitions: T</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>c₁, c₂, ..., cₐ</td>
<td>E, ¬E</td>
</tr>
</tbody>
</table>

Figure 1: Representations of three event types from Pustejovsky (1992)

Following Pustejovsky (1992: 56), a State (S) is “a single ongoing event (e) that is evaluated relative to no other event.” A Process (P) is “a sequence of events identifying the same semantic expression”, which can be divided at any point into an event that is just like the undivided event” (e.g. run, sleep): P → e, e, e. In contrast, a Transition (T) is “an event identifying a semantic expression, which is evaluated relative to its opposition”, and therefore has a final state eᵣ. Prior to the final state, there is either another State (the opposite of the final state) or a Process. Thus, T = S ¬S or T = P S. This approach views the construction of meaning as a compositional process, with the temporal event subcomponents “involving the concepts of initial, internal, and final temporal subperiods” (p. 48).
The notion of *telicity* used here is associated with the presence of a final end-State in the event structure, that is, with Transitions. Note that States and Processes do not have end-States, and are thus atelic. However, Transitions are composed of either an S or a P followed by an end-S. An atelic Process that occurs in the context of a final state or a bounding event is thus interpreted as part of a telic predicate (1).

(1)  
   a. Mary walked.  
   b. Mary walked to the store.  
   c. Mary walked for an hour.

The sentence in (1a) does not indicate anything regarding the spatial extent or temporal duration of the walking, whereas (1b) provides a spatial extent with a defined spatial end-State, and (1c) provides a temporal duration with a defined temporal end-State. The location of the store and the expiration of the hour provide the context in which walking ceases to be an ongoing activity of indefinite length (atelic) but rather participates in a telic frame, one with a well-defined end-State.

Similarly, the event of ‘reading’ in (2a) is atelic, whereas the one in (2b) is potentially telic, with the end-State “boundedness” provided by the internal object “the dictionary.”

(2)  
   a. Ezra tried to read.  
   b. Ezra tried to read the dictionary.

The reason that the reading event (2b) is only ‘potentially’ telic is that “the dictionary” can be interpreted in two different ways. Van Hout (2000) provides a clear discussion of the difference. In one case, the dictionary is an affected object (also called a “strong” object, or an object with Strong case) whereas in the other case it is a modifier of the reading event (cf. “to engage in dictionary reading”). The strong object reading is seen in (3a) and the modifier reading in (3b).

(3)  
   a. Quino ate a sandwich (for lunch). The sandwich is gone.  
   b. Quino ate seaweed (for years). Seaweed still exists.

In (3a), the sandwich is eaten and, being totally affected, does not persist beyond the end of the eating event (cf. Pustejovsky 2000). In (3b) there is no entailment that there is no more seaweed after Quino finishes engaging in seaweed-eating events. That is, seaweed is not affected, is not a “strong” object.

This distinction can now be clarified for “reading the dictionary”. In (4a), the dictionary is a strong, affected object and provides a boundary for the telic “reading the dictionary” event, namely reading the last word listed under the letter
“Z”. (4a) also indicates that this event never reached the end-State, terminating instead in the words listed under “E”. Note then that “telic”, with its end-State, does not imply completion; it merely makes it possible for there to be a state at which the event is considered complete. In (4a) then, the telic event has terminated but it is not completed.

(4)

a. Ezra tried to read the dictionary, but he only got to the E’s.
   b. Ezra tried to read the dictionary, but the print was too small.
   c. Ezra tried to read the dictionary all the way through, but the print was too small (so he had to stop).

In contrast, in (4b) dictionary modifies the type of reading event that Ezra tried to engage in, but the event was terminated because of reading difficulties resulting from small print. There is no state at which such a reading event would be considered complete because presumably (4b) does not imply that Ezra intended to read the dictionary from beginning to end; rather it is atelic and like (4a) has been terminated. The event is telic again when an end-State is overtly provided as in (4c), but the event is still incomplete.

To sum then, telic events have an end-State which may be reached (completed) or may not be (terminated before completion, incomplete). Atelic events have no end-State, thus cannot be completed, only terminated.

Finally, there are a number of standard tests for telicity (Dowty 1979:60). One commonly used test is the co-occurrence with the temporal expression “in 10 minutes/an hour” (telic) contrasted with “for 10 minutes/an hour” (atelic).

(5) Quino ate the sandwich in 10 minutes/ *for 10 minutes.

In this section, I have distinguished Processes (atelic) from Transitions (telic), and completion (relevant only to telic events) from termination (for atelic events; for telic events termination implies incomplete). In section 6, I will further distinguish perfective/imperfective aspect.

3 Phonological representation of event structure

Within the Brentari model, States have empty Prosodic Feature (PF) nodes (no movement), to which “trilled movement” [TM] can associate, providing rapid vibrating/oscillating/tremoring movement. [TM] indicates ‘no significant change in state during the passage of time’. That is, time passes but nothing changes (cf. also Givón 2001: 106).

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1 In contrast, Ritter and Rosen (2000) use the term “termination” for the end-State.
The phonological formation of Transition predicate signs shows the event structure, including the end-State. Pretheoretically, these end-States of Transition predicates are overtly marked in ASL by one of five different mechanisms. These are (1) change of handshape (open/closed or closed/open); (2) change of orientation; (3) change in position from one location to another; (4) abrupt stop at point or location in space; and (5) movement to contact. A systematic presentation of the phonological behavior of these signs can be given within Brentari’s (1998) Prosodic Model for ASL. Brentari (1998:22) defines *prosodic features* as “those properties of signs in the core lexicon that can change or are realized as dynamic properties of the signal (e.g., aperture, setting).” It is the prosodic features that represent movement in ASL signs. In Brentari’s terms, the features associated with movements that have marked end-States are change of aperture, of orientation, of setting, and of location. Examples are given in (6-9).

(6) Change of aperture

<table>
<thead>
<tr>
<th>a. open/closed</th>
<th>b. closed/open</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUESS</td>
<td>SEND</td>
</tr>
</tbody>
</table>

(7) Change of orientation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GIVE-UP</td>
<td>COME-ON</td>
<td>HAPPEN</td>
<td>START</td>
</tr>
</tbody>
</table>

(8) Setting change within a major body region

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2 There is a fifth orientation change, [abduction], illustrated by the sign INSULT. This movement occurs infrequently, and I have not been able to obtain a useable picture to include here.
a. contralateral/ipsilateral  b. top/bottom  c. proximal/distal
SHOW-AROUND  READ-THROUGH  POSTPONE

(9) Change of location: [direction], which entails [contact]

HIT  ARRIVE

These last two signs offer at least two possibilities with respect to their formation and their meaning. If the focus of the sentence is on the completion of the event, that is, that hitting or arriving did take place, then the formation involves only the minimal default directional path movement needed to show “not at the final state” followed by “at the final state”. If the process associated with these events is foregrounded instead of the end-State, then a more prominent path movement is required. This larger path movement is available for further modification, for example elongation or association with wiggling to show additional elapsed time, e.g. the protractive (Brentari 1998: 201). Predictably, the default short movement is associated with a punctual reading, whereas the larger path movement is associated with a durative meaning.

Significantly, Brentari’s feature [direction] on these paths (regardless of length) makes two additional meanings possible. One is that the direction itself is associated with the direction of the transfer of the theme argument, discussed in detail by Brentari (1998: 143) with respect to Jackendoff’s (1987) postulation of subordinate conceptual predicate.

The second possible meaning association with signs containing the feature [direction] comes from the fact that Brentari’s feature [direction] is defined to entail ‘contact’. This contact is specified on the second (final) x-slot associated with the Prosodic Features branch. In HIT and ARRIVE above, contact is presumably associated with the semantic notions ‘something is hit’ and ‘a location is arrived at’, respectively. That is, there is a variable x (individual regardless of
type, e.g. person, location, etc.) associated with the end-State indicated by the contact. This semantic interpretation is also available with signs containing the feature [direction] when there is no visible contact, for example, when the movement is to a location in space, e.g. POSTPONE (8c). I discuss the relevance of the availability of this variable in more detailed in discussion of the compositionality of the input to reduplicated forms in Wilbur (in press). Here the main relevance is that these contacts, whether overt or not, are associated with variables, and this association distinguishes these Transition predicates from atelic Process predicates.

In summary, all Transition events have a significant end-State. Supalla and Newport (1978:103) observed the correlation between the presence of an end-State and the movement of the sign: “while hold manner corresponds to an action with specified spatial end-points, the continuous manner is used for actions with unspecified spatial end-points.” Within Brentari’s model, in the formation of signs that denote Transition events, there is a specification associated with the second x-slot of the PF branch of the phonological representation of their movement. This specification is phonologically contrastive with the specification on the first x-slot, even though the specification may be predictable. For example, in a change of handshape sign, if the first value ‘open’ is known, the second value ‘closed’ is already predictable and to specify it in the phonological representation would be redundant. This is not relevant to the issue here. What is important is that the second specification is not the same as the first, thus providing a first (morpho-)phonological specification to be interpreted as ‘not the end-State’ and a second interpreted as ‘the end-State’. The phonology mirrors the semantic opposition identified by Pustejovsky in his definition of Transitions. From a morphemic perspective, these signs are (at least) bimorphemic.

In contrast, the phonological specifications for the second x-slot in Process signs cannot be distinctive from the first x-slot specification. In fact, it must be identical and hence can be treated as spreading from the initial x-slot. Thus, Processes have path movement, that is, movement over a line (regardless of geometric shape), indicating an event having a ‘significant duration’. This corresponds to Supalla and Newport’s “continuous” movement, which they describe as “continuous, with no interruption, smooth and loose.” Similarly, Brentari notes that the sign READ has a single path movement, which has the prosodic path feature [tracing] with the value [straight] (10).

(10) Atelic predicates
Unlike [direction], [tracing] does not entail contact or any other phonological marking that could be interpreted as the end-State of the event. Assuming the appropriate granularity, anywhere inside this event, a snapshot taken would record a sub-event identical to the event itself, e.g. ‘running’ as part of ‘running’. Also, when the Process stops, the movement simply ceases. From a morphemic perspective, Process signs are monomorphemic.

4 The resultative context
When atelic States appear in the context of the ‘resultative’, they obtain a telic reading (Wechsler 2002) and the overt phonological form of Transitions. Phonologically in ASL, a PF branch with path movement is added, which then provides a specification for the final x-slot to be interpreted as having an ‘end-State.’ For example, the State ‘be sick’ occurs in the resultative form ‘become sick’ (11).

(11)

Picture (11a) illustrates the ‘input’ to the resultative. It consists of a State that is phonologically represented as contact of the middle finger with the forehead. This articulation will become the specification of the final x-slot, hence the end-State, in the resultative form. As can be seen in (11b), a path movement has been added before the contact of the finger with the forehead. In terms of event structure, this

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3 That PLAY has path movement is established by Supalla and Newport (1978:101), who identify it as “continuous unidirectional repeated”. Here, the repetition is captured by [TM] and the path by the feature [tracing].

4 That is, Process predicates are unbounded [-b] and thus lack the semantics needed for licensing an end-State point in space. Further discussion in Wilbur (in press).
form is now a Transition with the internal structure P S. As discussed above, the added path indicates the passage of significant time during the Process, and the Process itself is the “coming” to be sick. However, the path by itself is insufficient to carry the full meaning of the resultative to distinguish it from the meaning “get sick”, which does not carry the implication of the “becoming” taking a while to happen. Thus, there is a further phonological specification – change of speed from slow to fast – which I argue carries the opposition meaning seen in all Transition events (Pustejovsky’s definition). It literally marks “change”, the inchoative, as seen in other Transitions as discussed above – change of aperture, orientation, body setting, and location. Finally, “sick” is the end-State, and it is phonologically represented by the contact, which is held as end-marking of the final state status.

To focus on the time it takes for the “transition” change to take place, the path movement is foregrounded. It maybe elongated to indicate extra duration of the event, and in the case of Transitions which are essentially change of state, path is added to create a Process after the initial State and before the end-State. For example, the formation of the sign DIE consists of a change of orientation of the palms. The punctual “die” is phonologically just this movement. However, to indicate “long time to die”, a curved path [tracing] movement is added to the change between the initial palm orientation and the final one. With an added path, it is also possible to terminate the movement before the final orientation position is reached, providing the incomplete meaning “almost die”, e.g. terminates but does not reach the final state.

5 The relevant geometry and physics

The above analysis of semantic components and phonological forms is not an accident, is not arbitrary, and is (probably) not specific to ASL. Instead, it is a systematic recruitment of characteristics of the underlying physical world for morphological, semantic and syntactic purposes. It is part of the adaptation to the modality in which signs are produced.

The geometry for this analysis includes: point (1-dimension), line (2-d), and plane (3-d) (see Brentari 1998 for an extensive discussion of how these contribute to the phonological component). Adding in the physics of dynamic motion, we have at our disposal: distance (d) from point_a to point_b, where a ≠ b; time (t) – how long it takes to traverse the distance; and velocity (v) = d/t.

It is important to understand why these geometric and physical notions are relevant to the linguistic analysis. In speech, the acoustic signal derives from, but is different from, the motion of the articulators. In signing, the visual signal – the hands moving – is the motion of the articulators, that is, what is seen is the dynamics of hand movement. Spoken languages have a choice of articulations, hence acoustic signals, that they recruit into distinctive and meaningful functions in their morphophonology, although of course certain ones are more prevalent than others. In signing, there are numerous, albeit finite, handshapes to choose
from, varied but limited locations for place of articulation, and perhaps a comparable number of contact arrangements that can be recruited for distinctions in the morphophonology of a given sign language. But the movement of the hands is relatively limited. At a single point in space, the hands may be static, or may change orientation or aperture, or may tremor/oscillate/vibrate (stretching the notion of single point in space). Or the hands may move between two points. In this latter case, we have the geometric options of lines (straight, curved) or tracing a figure, and the physical options of distance (long, short), duration (long, short) and velocity (fast, slow). We have seen these characteristics recruited for semantic purposes in the predicate system. Further evidence of their utility can be seen in the temporal aspect system (e.g. habitual, incessant, iterative) and in reduplicated forms (Wilbur in press). For example, since crossing a distance (path) involves elapsing time, it is not surprising that path movement also provides the meaning “time between events” in the habitual (short) and iterative (long, elongated semi-circular) aspects.

6 Distinguishing telicity, completive, and perfective

So far, I have identified telicity as semantically “having an end-State” and phonologically as “being end marked”, that is, having a distinct phonological specification on the second/final x-slot. Further, I have discussed completion as a relevant property of telic events, namely whether the Transition “reaches its final state.” Thus, the event of “arriving” has an end State “being located at the end location”, which may or may not be reached by the “arriving” process. In ASL, this difference is seen as one between “contact of the two hands” (complete) and “movement toward but stopping before reaching contact” (incomplete). Atelic events do not have end-States, and thus completion cannot be shown with the path movement of the sign.

Perfective events are ‘construed as closed intervals, for the event is viewed in its entirety’ whereas imperfective events are ‘intervals open at their right boundary’ (Bertinetto 2001). Complete and incomplete telic events and atelic events may be perfective, thus perfective is an aspectual notion in addition to those we have been discussing. Fittingly, in ASL perfective is marked with ‘single head nod’ (hn) at the right edge of the clause containing the perfective predicate to show ‘closed interval’ (Grose in progress) rather than as some modification of (path) movement. This newly identified marking allow us to see perfectivity separate from telicity and completion.

(12)

(a) Telic, perfective, complete
   IX3 ARRIVE \text{hn}
   ‘he arrived’

(b) Telic, perfective, incomplete
   IX3 ARRIVE[\text{interrupt}]\text{hn}
   ‘he almost arrived’
c. Atelic, perfective
   BEFORE TEST, IX3 SLEEP\textsuperscript{hn}
   ‘he slept before the test’

d. Atelic, imperfective
   BEFORE TEST, IX3 SLEEP[redup]
   ‘he is sleeping before the test’

8 Conclusion
I have argued that event structure as outlined by Pustejovsky (1992) has overt phonological consequences in the formation of ASL predicate signs. Telic events have clear markings of their end States, using changes of aperture, orientation, settings, and location, each of which involves a distinct feature specification for the final x-slot on the Prosodic Features branch of the tree. Atelic Process events have only one path feature [tracing] and thus cannot be marked for end State. States either have no PF branch, and hence no movement, or they have an empty PF branch, which is the docking site of “trilled” movement [TM] (Brentari 1998).

Morphology plays around with these pieces. This was illustrated with the resultative, in which context States are provided with telic readings through added path movement, changing speed to indicate change of state, and emphasizing attainment of the end-State with a final hold. Morphology uses these phonological pieces, along with points in space (x variables), to build durative, continuative, iterative, habitual, incessant, and other aspectual forms, which may also involve reduplication (Wilbur 2002, in press).

Given that these options are based on the physics and geometry of the real world and hence potentially universal, it is expected that other sign languages will recruit these options and assign them various meaningful functions. In fact, this grounding may provide the fundamental similarity that makes sign languages look more similar to each other than spoken languages do (Newport and Supalla 2000). It is an empirical question whether the functions that they are recruited to perform are similarly universal.

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Sources
References


