Degree Modification and Intensification in American Sign Language Adjectives

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Abstract: Scalar adjectives lacking closed upper boundaries (like *far*) can be coerced to have a closed upper boundary reading when combined with a degree modification with *too* which provides the limit, e.g. *too far to walk*. Parallel to the mapping of event structure to scalar structure in adjectives [4], we observe that scalar adjectives are *end-marked* in ASL. These adjectives receive marking similar to telic verbs, indicating that, like the visibility of event structure in verbs, scalar structure, or at least the upper boundary, is also visible in ASL. The Event Visibility Hypothesis (EVH) was formulated for sign languages based on the observation that telic verb signs are distinguished from atelics by end-marking reflecting the final state of telic events. Here, the EVH is extended to a general Visibility Hypothesis for sign languages.

1   Introduction

To date, adjectives in ASL have not received detailed investigation comparable to that of verbs and nouns. Two studies involving adjectives both focused on syntax [1-2]. MacLaughlin [1] explored the distinction between *attributive* and *predicative* adjectives and their related word order. Bernath [2] investigated their syntax and suggested that the different word orders result from movement of the noun. He further raised the question of whether adjectives like SICK[1] should be considered as adjectives at all, given that they can be aspectually modified, and suggested that they should instead be treated as verbs, e.g. BE-SICK or AIL. The present project takes a different perspective by focusing on the semantics of the adjectives. In particular, it focuses on gradable adjectives and their interaction with degree modification, reporting new observations on how such modification is marked.

Section 2 introduces gradable adjectives, scales, and the degree modifications to be dealt with. Section 3 presents examples of ASL gradable adjectives and how they are

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[1]   The glosses for signs are traditionally written in capital letters.

marked under degree modification. Section 4 considers the interaction of ASL gradable adjectives with the semantics of *too* used in the form *too Adjective to Verb* (e.g., *too hot to eat*, *too far to walk*). Section 5 ties the pieces together. We relate the marking of adjectives in *too A to V* to marking of end-state boundaries in ASL signs denoting telic events, previously discussed under the rubric of the Event Visibility Hypothesis (EVH) [3]. We suggest that this similarity of marking is not coincidence but related to the existence of boundaries/limits in the scales in both cases. We extend the EVH, broadening it to a more general Visibility Hypothesis (VH).

2   Gradable Adjectives, Scales, and Degree Modification

Following Kennedy and McNally [4], we take a relational approach and assume that gradable adjectives denote a relation (G) between individuals (x) and degrees (d) on a scale reflecting an appropriate dimension for that adjective. For example, the adjective *expensive* could be represented as a relation between objects and degrees of cost so that the cost of x equals d.

$$[[\text{expensive}]] = \lambda d \lambda x.\textbf{expensive}\,(x) = d \tag{1}$$

However, this representation does not take into account the idea that an object could have a cost d that would not be considered expensive but rather normal, fair, or even cheap. To decide that something should be called expensive, there needs to be a way of determining when a cost is big enough to be considered expensive.

 The notion of a scale for a dimension such as cost requires that the degrees of cost can be ordered in such a way that it is always possible to tell whether one particular degree is above or below another one. The variation along this scale is what allows us to talk about an adjective being gradable. For simplicity, let us assume that there is a generally agreed upon **standard of comparison** value (s) on the scale above which the cost of something is expensive. That is, the cost of x must be greater than ($>$) the standard d_S on the scale of degrees of cost.

$$[[\text{expensive}]] = \lambda d \lambda x.\textbf{expensive}\,(x) > d_S \tag{2}$$

However, what is expensive for a cup of coffee is different from what is expensive for a new car, that is, the standard of comparison may vary by context. Thus, the application of a gradable adjective to an object (deciding to call something expensive) always requires a comparison. Sometimes the comparison is contextually dependent (*relative* adjectives) and sometimes it is fixed (*absolute* adjectives) [5], even if it is not overtly mentioned.

Now assume that as the distance between the cost of x and the standard of comparison d_S becomes greater and greater, we want to talk about larger degrees of expensive. In English, this can be done with degree intensifiers such as *very* and *too*. Kennedy and McNally [6] provide a semantic analysis of *very* as in (3). *Very* applies to a gradable adjective and has the effect of increasing (*boosting*) its value by a contextually-determined large amount.

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$$[[\text{very}]] = \{\langle G, \langle d_{S(G)}, x \rangle \rangle \mid \exists d[G(x) \geq d_{S(G)} + d \wedge \text{LARGE}(d)]\} \qquad (3)$$

3 ASL Gradable Adjectives and Their Marking Under Degree Modification

To begin, the signing of an ASL lexical adjective is similar to that of any other lexical sign, in that the sign components (handshapes, place of articulation, movement, etc.) are lexically specified (as outlined in [7]). There are prosodic contextual effects, so that the actual production depends on sign position in its phrase (there is Phrase Final Lengthening), relative degree of stress or emphasis, and current signing rate [8].[2]

While there is a sign for *very* (Fig.1), it is considered 'English register' rather than daily ASL, and its use is extremely limited. Except for discussion of it, it does not occur anywhere in our extensive ASL corpus. Intensification is seen in alternate ways.

Fig. 1. VERY *very*; rejected as ASL degree intensifier

3.1 Plain Adjectives

The typical production of an adjective sign will be considered the baseline against which intensified productions must be compared. The baseline production is the one in which the standard for application of the adjective has been met, as in (2) above. Typically, the signs are accompanied by mouthing of the English word or by mouth positions that do not change during the movement of the sign, as seen in FAR (Fig. 2).
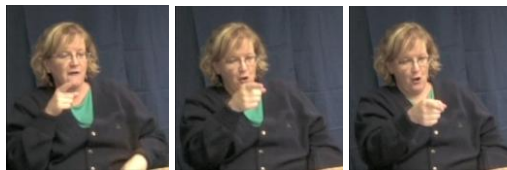

Fig. 2. The sign FAR

Among the adjectives we investigated for this paper are: BIG, CLOSE, FAR, HARD, HEAVY, LATE, LONG, MUCH, NICE, OBVIOUS, SMALL, SOON, SORRY. Data

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[2] We emphasize *lexical* here because there are also classifier-based constructions that are contextually-dependent. The form of the ASL translation of *thick* depends on whether one means *thick liquid*, *thick horizontal object* (book lying down), or *thick vertical object* (book standing up), and so on. That is, there is no lexical sign for *thick*.

includes elicited and natural productions, the latter coming from our lab archives, online videologs, published and youtube videos.

3.2   Phonological Marking of Intensification

An intensified ASL adjective must meet two criteria. First, it must contain the semantic degree *boosting effect* given in (3). Second, a sign language specific criterion: the intensified adjective must be visually distinct from the baseline adjective form. This leads to an unusual topic in a semantics paper, namely phonological marking that represents degree morphology. But it is not unusual in sign language research to talk about the semantics-phonology interface and the visibility of event structure in formation of predicate signs formalized as the Event Visibility Hypothesis (EVH) [3] [9].

In our data, we observed the following modifications to adjective signs under intensification:

- Overall increase in tension of the hands and face;
- Movement modifications;
  - Add or enlarge movement trajectory;
  - [delayed release] of the start of the movement;
- Non-manual modifications (face, head, body);
  - Frown on face;
  - Head tilt away from neutral.

Many intensified adjectives with [delayed release] have a prefixal hold prior to the onset of hand movement and, if there is any mouth position change, it occurs with the onset of hand movement.[3] To illustrate, we present a sequence of stills from the signing of FAR-intensified (Fig. 3). As can be seen, the production is distinct from plain FAR shown in Fig. 2. The mouth and hand position are held at the beginning (pictures 1 and 2), then hand and mouth movement begin, and the sign ends with the end of the hand movement and no further change in the mouth position (it stays open). The head is tilted for the entire sign.
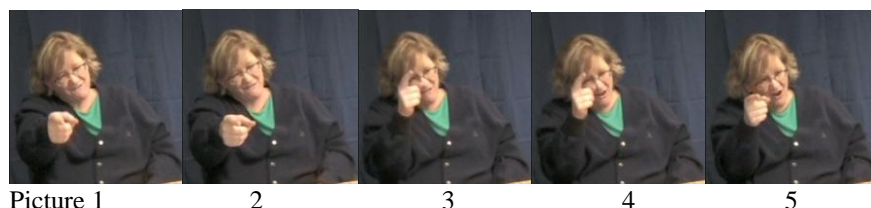

Picture 1   2   3   4   5

Fig. 3. FAR-intense with [delayed release], mouth opens with start of hand movement (3), mouth open at end (5); note head tilt, frown eyes and forehead.

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[3]   Some forms, HEAVY, prefixed additional movement prior to lexical movement rather than the hold seen in FAR, CLOSE, LITTLE. Both types constitute a delay of movement onset.

3.3   The Intensification Adverb Y-OO

Our investigation led to the realization that there is another sign in ASL that could be considered to have the meaning of *so, very* (Fig. 4). This sign has no known conventional gloss, and since we have not fully tested its semantics, we have dubbed it Y-OO, reflecting its use of Y handshape and circling movement.[4] Y-OO can be made with one or both hands. One observation is that Y-OO cannot modify all gradable adjectives. For example, it cannot occur with the sign SORRY, which readily takes the intensification modifications described in 3.2. But it does occur with HARD, FAST, HEAVY, BRIGHT/CLEAR/OBVIOUS, AWESOME, among others.
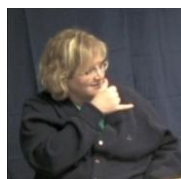

Fig. 4. The adverb sign Y-OO *so, very*

Furthermore, with the adjectives accompanied by Y-OO, we did not see [delayed release]. Another adjective structure we investigated was *Adj like a N*, for example, *hard like a brick*. This translated as Y-OO HARD SAME-AS (fs)brick *so/very hard like (a) brick*. In multiple appearances, HARD did not show [delayed release]. It may be that intensification morphology and Y-OO are mutually exclusive, but further investigation is clearly needed.

3.4   Direct Translations of English *too*

There are several ways that the meaning *too* can be shown. We observe some adjective signs produced with the simultaneous mouthing of *too*. Other adjectives may be preceded by the loan sign #TOO (derived from the fingerspelling of the English word *too*). So far, we are unable to predict which adjectives take which form, nor can we rule out the possibility of both markings occurring with the same adjective. The use of these two forms occurs in both elicited and corpus examples, but only in intensification contexts, not in the *too A to V* discussed below.

4   'Too Adjective to Verb'

In order to understand the interesting behavior of ASL adjectives in the context *too A to V*, we need to consider the meaning of *too*, and the role that is played by the infinitive *to V*. *Too* is often described as a form of degree morphology, along with English *-er*, *more*, *so*, and others. In one sense, like these other intensifiers, it implies a greater

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4   This sign should not be confused with the sign glossed SILLY, which has diagonal linear movement or bending at the wrist.

degree. But *too* differs from the others in containing the notion of excess, that is, beyond a limit, especially in the context *too A to V*. Meier [10] analyzes this construction by treating *too* as a comparative quantifier relating two values (treated as *extent* predicates but not as counterfactual conditionals [11-12]). The first extent is the maximal extent of the gradable adjective. The second extent comes from the maximal or minimal extent from a set of extents satisfying an 'incomplete conditional' related to the sentential complement *to V*. Consider the example of *too A to V* (4).

$$\text{The food is too good to throw (it) away.} \qquad (4)$$

Meier argues that the sentence in (4) has the form in (5), where two values are compared. One is that of the actual goodness of the food. The other is the maximal value of food-goodness to be allowed to throw it away (from the sentential complement represented as modalized proposition).

$$x \text{ is too adjective MODAL } p. \qquad (5)$$

The paraphrase she suggests for *too good to throw away* is "the value v such that the food is v-good is *greater* than the maximum of all values v^* such that if the food is v-good, we *are allowed* to throw it away". Note that this paraphrase has (a) a statement that the food is v-good, (b) a statement that this value is greater than the maximum of the conditional, (c) the conditional *if X, then Y* in the form *if food is v-good, we are allowed to throw it away*, and (d) the modal *be allowed to*. Similarly, for negative adjectives, e.g. *too young to date*, the paraphrase would be the same but the comparison in (b) would require that the value be smaller than the minimum of the conditional. The paraphrases in (c) and (d) provide the contribution of the complement *to V*.

Let us turn now to the ASL structure of interest. What happens to an adjective like FAR when it is put into 'too far to walk' and why does it happen? Given that *too* is a degree intensifier, we should not be surprised to find that TOO-FAR exhibits the [delayed release] of the hand movement identified in section 3 (Fig. 5).[5]

Fig. 5. *Too far to walk*: TOO-FAR with [delayed release] (pictures 1-2), mouth opens at *end* of hand movement (picture 5)

However, there are at least three differences in the *too A to V* productions compared to the A-intensified productions seen in Fig. 3. Note first that the head tilt seen in Fig. 3 is not used. Second, there is a striking difference in the mouth behavior, with the mouth opening at the start of the hand movement in Fig. 3 but not until the *end* of the

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[5]   [5] refers to *too* as a sufficiency morpheme, while [10] separates it from sufficiency *enough* and refers to it as a morpheme of excess.

hands movement in Fig. 5. Third, what cannot be seen in a sequence of still pictures is the sharp ending of the adjective sign movement in the *too A to V* contexts. The mouth position change at the end of the movement and the sharp ending of the movement itself caught our attention, because we have seen these two linguistic features together before, namely at the end of movements in verb signs that denote a telic event [9][13]. The mouth position change is referred to as a *transition non-manual* (T-NM). The sharp ending of the movement is due to a rapid deceleration from the peak velocity to the end stop [14-15]. This end-marking is considered to reflect the end state of a telic event, and led to the formulation of the Event Visibility Hypothesis: In the predicate system, the semantics of event structure is visible in the phonological form of the predicate sign. Its presence in the *too A to V* context suggests that it may have a broader function.

Kennedy and McNally [4] discuss the parallelism between spoken language adjectives derived from verbs and the aspectual properties of those verbs with respect to their common scales, noting there is a general correlation between event structure and scale structure. Their suggestion is that the deverbal adjectives inherit their scale structure either from the event denoted by the source verb or from the entity to which the adjective applies. In particular, deverbal gradable adjectives derived from state and activity denoting atelic verbs tend to be associated with scales that are open on the upper end (have no maximum value) because atelic events have no natural endpoint. In contrast, deverbal adjectives derived from achievement and accomplishment (those with incremental themes) denoting telic verbs are associated with closed upper scales (do have a maximum value) because telic events have endpoints reflecting the end state of the event.[6]

What we have found is that our gradable adjectives display the same end marking that we observe on telic predicates in ASL. That is, they behave as though they had end states, or more appropriately for adjectives, closed upper boundaries. Yet only one of our current adjectives, HARD, passes the tests for closed upper boundary, and indeed it is totally closed [6] [16]. That means that the other adjectives, e.g., FAR, which themselves have open upper scales, are displaying the behavior of a closed upper scale in the *too A to V* context even though alone they do not have maximum values.

5   Putting the Pieces Together

To combine with *too*, a maximum value is required, which is what [10] provides through the hidden incomplete conditional analysis. Thus, scalar (non-deverbal) adjectives lacking closed upper boundaries (like *far*) can be coerced to have a closed upper boundary reading when combined with a type of measure phrase providing the limit in the construction *too A to V*. How do we compose *too A to V*?

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[6] The ASL adjectives that we investigated for this report are not deverbal, but it would be interesting to see how ASL adjectival predicates behave in this regard.

Beginning with sentence (6), we use rule (2) and treat the distance of the restaurant as being greater than a distance that justifies the use of *too*.

$$\text{The restaurant is too far to walk (to).} \tag{6}$$

$$\lambda d\lambda x \text{far}(x) > d_{too} \tag{7}$$

This needs to be combined with the value that is *walkable*, which we get from the modalized conditional suggested by [10].

$$\text{If } x \text{ is } d\text{-distance, we can walk to it.} \tag{8}$$

The distance to the restaurant exceeds the maximum value that we can (are able to, or are allowed to) walk to.[7]

$$\lambda d\lambda x \text{ too-far } (x) > \text{MAX } d \text{ such that if } x \text{ is } d\text{-distance, we can walk to it.} \tag{9}$$

That is, the distance is greater than the maximum value of the scale of *walkable*, and this maximum is where the closed upper boundary comes from in *too far to walk*. Thus, *the restaurant is at a distance that is greater than the maximum distance that we can walk (to).*

The ASL structure has the following pieces in it. The adjective FAR takes the prefix [delayed release] for intensification; this affects both the hand movement and the mouth change. It also takes *end marking* consisting of sharp movement to a stop and the T-NM consisting of [closed -> open]. [7] notes that [delayed release] in the *delayed completive aspect* attaches to the first timing slot of a telic verb; here we suggest that it attaches to the first timing slot of the adjective.[8] The end marking attaches to the second timing slot of telic verbs, and here to the second slot of the adjective, and is aligned to the right edge. Thus, the mouth does not open until the end of the movement. The sharp movement is the result of later peak velocity and greater deceleration than plain signs. The end result is that the adjective has the same motion characteristics as a delayed completive telic verb (but without the tongue wagging that [7] notes). This same form is seen with other open scale adjectives, e.g. HEAVY, but interestingly, not with HARD, which is a closed scale adjective. Instead, HARD is modified by Y-OO, and there is no mouth change or noticeably different movement pattern compared to its plain form. A more systematic investigation is needed.

This parallel between end marked verb signs and end marked *too*-Adjectives suggests that the original formulation of the Event Visibility Hypothesis, based on verbs only, is too narrow. We propose an extended version, the Visibility Hypothesis, which reflects the idea that sign languages have grammaticalized resources from physics and geometry for perceptual and production purposes to convey the meanings that humans wish to express. However, this is not the 'iconicity' that many people think is there.

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[7] As [10] notes, this can be epistemic or deontic. Explicit modals (TOO-FAR WALK CAN'T, TOO-HARD EAT CAN'T) were rejected. One paraphrase was suggested: CAN'T LIFT WHY, BOX HEAVY-intens. *I can't lift the box because it's too heavy.*

[8] The typical sign is monosyllabic, consisting of two timing slots which associate to the movement.

The semantics-phonology interface goes well beyond the typical notion of 'iconicity' ('guessability') [9]. End-marking is an example of grammaticalization of physics (deceleration) for linguistic purposes. Thus, whereas [4], among others, noted the parallel between event predicates and scalar adjectives in spoken languages, in ASL and probably other sign languages, you can actually *see* it.

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