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Event Structure of Resultatives in ASL

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ABBREVIATIONS

Δ	Change
1	in conjunction with CL or handshape, used to indicate a specific handshape where only the index finger is extended
B	in conjunction with CL or handshape, may be used to indicate a specific handshape where all fingers are extended and close together
CL	Classifier
EXT/CL	Extension classifiers, a sub-group of classifiers that are used to indicate the extent and often physical proprieties, such as flatness, of an object
G	in conjunction with CL or handshape, may be used to indicate a specific handshape where the thumb is fully extended and the index finger is bent at the first joint
GLOSS	Signs are traditionally glossed with small caps
HANDL/CL	Handling classifiers, a sub-group of classifiers that are used to indicate how objects are being handled or manipulated
IF	Inherent Features
TM	Trilled movement

ABSTRACT

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The relationship between the duration and telicity of the causing predicate and the gradability and standard of comparison of the resultant predicate in resultative constructions in American Sign Language (ASL) is investigated. Two homomorphic accounts of resultative constructions are considered, the feature-based approach of Beavers (2008), and the compositional approach of Ramchand (2008). The analysis utilizes morpho-phonological and semantics interface properties in ASL in order to discriminate between the two approaches. These properties are expressed by the Visibility Hypothesis (VH) in Wilbur, Malaia, and Shay (2012), which posits that the ends of semantic scales are phonologically marked in ASL in particular, but also in sign languages more generally. It is concluded that the compositional approach of Ramchand (2008) better accounts for the data.

1. INTRODUCTION

Resultatives provide a unique window into the structure of languages because they cut across lexical categories and through the semantic, syntactic, and pragmatic modules of the grammar. In the case of American Sign Language (ASL), there is reason to believe that they interact with the morpho-phonological module of the grammar as well.

1.1 Research Questions

The main research question of this project is what, if any, patterns are to be found in the interaction of the morpho-phonology and the scale structure of property-denoting predicates with the semantics of resultative constructions in ASL. This should illuminate parallels between event structure and scale structure, expand the current understanding of the Visibility Hypothesis (VH) and provide a means to evaluate differing homomorphic approaches to resultatives. Before this can be done, it will first be necessary to investigate whether resultatives, broadly defined, exist in ASL.

1.2 Resultative Constructions

The constructions of interest here typically have the form X Y Z where X and Z are both predicated of Y and have roughly the meaning of someone/something does X, the primary predicate, to Y such that Y becomes Z, the secondary predicate.[1] The classic example is

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[1]Though ASL is also an SVO language, it is common for the object to shift, particularly if classifiers are involved. Therefore, it is highly likely to find items with the form Z X Y instead.

(1.1) *John hammered the metal flat.*

In the literature, the term resultative is frequently limited to those cases where Z is an AP, though it has been argued that it can be a PP, or in rare cases a DP, and that it is possible for it to be a VP in serializing languages. (See Napoli, 1992; Stewart, 1998 for examples and discussion.) For the purposes of this study, a resultative construction will be defined primarily by the semantics and will refer to constructions having two predicates that share one argument where the primary predicate is read as a causing event and the secondary predicate is read as the result of the causing event and where the resultant predicate may have the semantics of either a property-denoting or change-of-state predicate. Furthermore, this study will only investigate cases involving agents as the instigators of the causing event.

As far as syntactic considerations go, this study will use the distinctions and terminology found in Ramchand (2008), which divides resultatives into two categories, those with selected objects and those with unselected objects.[2] A resultative is considered to have a selected object if the object in the construction can occur with the primary predicate outside of a resultative construction. The following is an example of a selected object resultative:

(1.2) (a) John hammered the metal flat.

(b) John hammered the metal.

A resultative is considered to have an unselected object if the object in the construction does not occur with the primary predicate outside of a resultative construction. Contrasting 1.3 with 1.2 illustrates this distinction.

(1.3) (a) Alice ate herself sick.

(b) *Alice ate herself.

The current study only investigates selected object resultatives.

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[2]For an overview of the literature on different syntactic issues with and approaches to resultatives, see Boas (2003), Ch. 2 'Syntactic Approaches to Resultatives'.

1.3   ASL Morpho-Phonology

An important starting point for this investigation is that as a signed language, ASL is able to recruit physical movement as a means of generating contrasts that can be utilized by the grammar in order to map form to meaning. As will be discussed in more detail later, one such contrast involves the presence or absence of rapid deceleration in the sign. This contrast is systematically employed by the morpho-phonology of the language to mark verbs for telicity (Wilbur, 2003, 2009). There is additional evidence that this contrast marks scale structure as well (Wilbur et al., 2012). It is the interaction between this morpho-phonological marking of scale structure with the corresponding morpho-phonological marking of the event structure in resultative constructions that will be of particular interest to this study.

2. REVIEW OF THE LITERATURE

In order to investigate these questions, it is first necessary to review what typological considerations may need to be given while searching for resultative constructions in ASL. Afterwards, it will be helpful to consider the relationship between the scale structure of property and event denoting predicates before examining various homomorphic approaches to resultatives. Then, an overview of relevant facts about ASL will be provided before finally presenting the Visibility Hypothesis and its application to the current study.

2.1 Typological Considerations

2.1.1 Complex Events & Resultatives

It has been observed that there appears to be a relationship between the expression of complex motion events and the expression of resultatives in a language. (See Levin & Rapoport, 1988; Talmy, 1991; Napoli, 1992; Snyder, 1995; Fontanals, 2000; Talmy, 2000; Croft, Barðdal, Hollmann, Sotirova, & Taoka, 2010 inter alia for discussion). Under the analysis in Talmy (1985, 1991), languages can be categorized as either verb-framed or satellite-framed when it comes to the expression of motion events.[1] A verb-framed language is one where the verb typically provides the information about the path of a motion event with the manner being expressed by an additional phrase (Talmy, 1991). The prototypical example from (Talmy, 1991) is

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[1]This categorization has been extensively debated and revised. The main question here is what form resultative constructions can be expected to take in ASL and the main point is that the form of the more extensively studied complex events in ASL might provide a clue. The original two-category distinction is sufficient for illustrating why. See Talmy, 2000; Slobin, 2004; Beavers, Levin, & Tham, 2010; Croft et al., 2010 for more recent discussion on complex event typologies.

(2.1) *La   botella entr-ó   flot-ando   a   la   cueva*
DET   bottle   enter-PST;3SG   float-PRST;PTCP   to   DET   cave
'The bottle floated into the cave.'

Talmy (1991)[p. 488]

A satellite-framed language, on the other hand, is one where a satellite to the verb, such as a preposition, typically provides the information about the path and the manner of motion is typically encoded in the verb (Talmy, 1991). Compare the English translation of example 2.1 with the Spanish. Where Spanish uses the main verb *entró* to indicate the path of motion, English prefers to use the satellite *into*.[2]

The relationship that has been observed between complex motion events, utilizing the typology of Talmy (1975, 1985, 2000), and resultatives is that verb-framed languages, like Spanish, tend to resist narrowly defined AP resultative constructions while satellite-framed languages, like English tend to be amenable to them (Levin & Rapoport, 1988; Talmy, 1991; Snyder, 1995; Fontanals, 2000; Tomioka, 2004). It has additionally been noticed that languages tend to express the semantics of resultative events in much the same way that they choose to express motion events (Talmy, 1991, 2000). For instance, compare the form of the English resultative and the corresponding Spanish translation in example 2.2.

(2.2)   (a) *I kicked the door shut*

(b) *Cerr-é   la   puerta de una patada*
close-PST;1SG   DET   door   by DET kick

Talmy (1991)[p. 490]

While there is still debate about the proper classification of complex event expressions, the general observation that a language's preferred form for expressing the semantics of complex motion events is correlated to the preferred form for expressing the semantics of resultative events seems to hold. This suggests that knowing the way

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[2]This categorization depends on the preferred form for the language and does not claim that verb-framed languages can never use satellites or that satellite-framed languages never use the main verb in order to express the path of a complex motion event.

a language organizes motion events provides a good starting point for investigating how that language conveys the semantics of resultatives.

2.1.2 Resultatives in SVC Languages

As will be discussed in detail, ASL has been argued to prefer Serial Verb Constructions (SVC) for conveying complex motion events (Supalla, 1982, 1990). Given that languages tend to have a relationship between the preferred form for expressing complex motion events and for expressing resultative constructions, the question of what resultatives look like in SVC languages is raised.

Stewart (1998) shows that Èdó has an SVC similar both syntactically and semantically to AP resultative constructions in non-SVC languages.[3] The resultative SVC receives the interpretation of a single event and is characterized by object sharing[4], a second verb that is typically unaccusative and a complement of the first verb with no intervening functional phrases. The syntactic representation proposed in Stewart (1998) is shown in figure 2.1 This construction is contrasted with two other multi-verb constructions found in Èdó, consequential SVC's and covert coordination (CC). All three constructions can have the surface order [NP VP NP VP] and are perceived as a single macro-event.[5] Consequential SVC's, like resultative SVC's, involves object sharing but the second verb is usually transitive, and the verb phrases are in a c-commanding relationship to each other. Both resultative SVC's and consequential SVC's are contrasted with covert coordination, which unlike resultative or consequential SVC's, has sub-events that are in a sister relationship and can behave more independently, by for example, receiving separate iterative morphemes that change

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[3]Stewart (1998) takes syntactic resultative AP constructions to be similar in structure to resultative SVC's due to work indicating that for languages with the lexical category of adjectives, those adjectives tend to pattern syntactically with unaccusative verbs (M. C. Baker & Stewart, 1997; M. Baker, 1996), though for more recent discussion, see (M. C. Baker, 2003).

[4]This term is frequently used in Stewart (1998) to indicate that the deep object is the same for the second verb as for the first but with only one spell-out.

[5]Macro-event is Stewart's phrasing. Since the time of that publication, macro-event has come to take on a more technical meaning with a series of testable criteria, mostly laid forth in Bohnemeyer et al. (2007). These definitions and their attendant implications do not necessarily apply here.

Figure 2.1. Representation of Èdó Resultative SVC's in Stewart (1998)[cf. p. 36, 47-48]
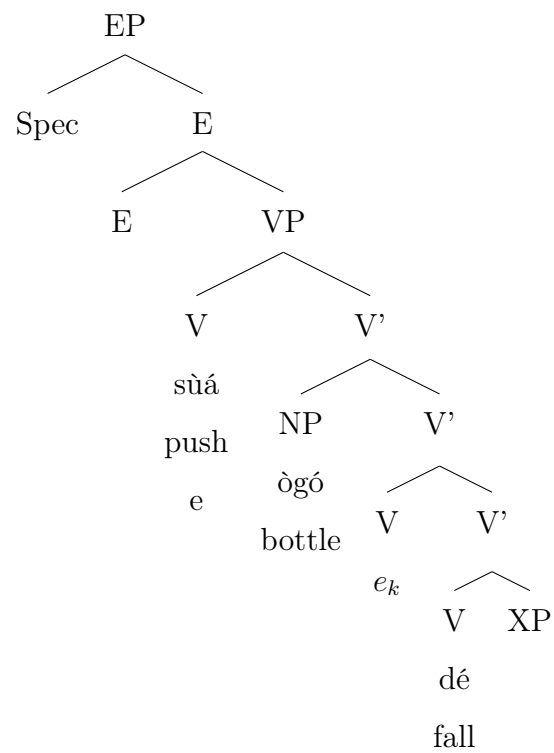
Figure 2.2. Representation of Èdó Consequential SVC's in Stewart (1998)[cf. p. 77-78]

```
                          EP1
                        /     \
                     Spec      E'
                             /    \
                           E       VP1 (e₁, e₂)
                                 /        \
                            VP1(e₁)        EP2
                            /   \          /   \
                          V1    NP      Spec    E'
                          lé    èvbàré         /   \
                          cook  food_k        E    VP2(e₂)
                                                   /   \
                                                 V2     NP
                                                 ré     pro_k
                                                 eat
```
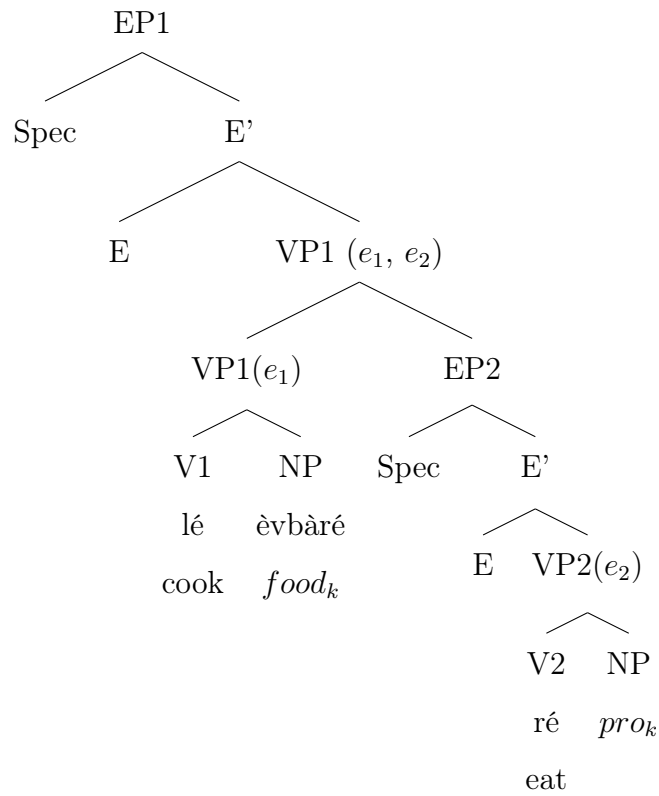
the interpretation only of the verb the morpheme is attatched to. A critical distinction Stewart (1998) makes is that CC's do not involve object sharing. It's important to note that while Èdó has resultative SVC constructions, it is also able to form a resultative construction involving an AP as well, though the main example given in Stewart (1998) involves an AP that is morphologically related to the VP and both forms seem equally permissible as a secondary predicate.

All of this means two things for the current study. First, the constructions being searched for may surface as an SVC with a VP instead of an AP. Whether the secondary predicate is a VP or an AP, the word order will be the same. This is beneficial since ASL does not have a set of well-documented, clear syntactic tests

Figure 2.3. Representation of Èdó CC's in Stewart (1998)[cf. p. 39-40]

```
                          EP
                  _____|_____
                 |                 |
                EP                 EP
            ____|____          ____|____
           |         |        |         |
         Spec        E'     Spec        E'
                  ___|___          ____|___
                 |       |        |        |
                 E      VP1       E       VP2
                        (e1)              (e2)
                      ___|___          ____|___
                     |       |        |        |
                     V       NP       V        NP
                   gbó!ó    ívìn    bó!ló      ókà
                   plant   coconut   peel      corn
```
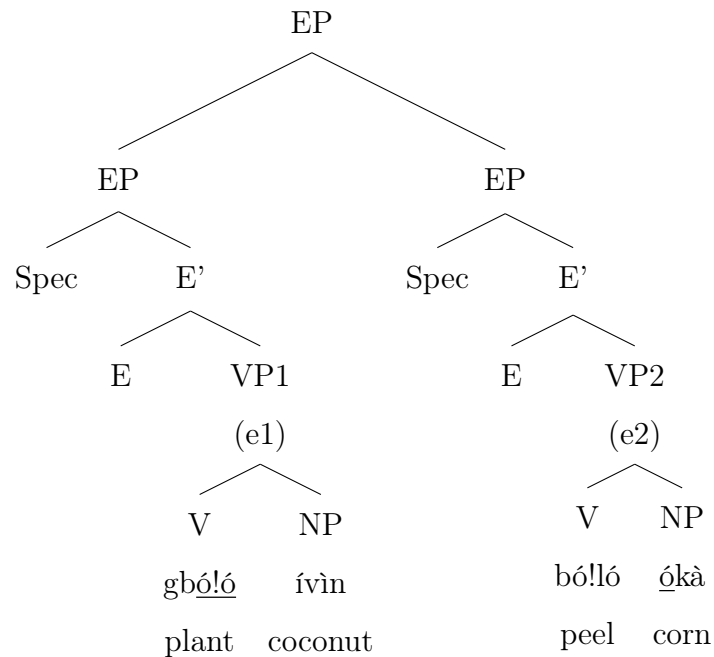
for determining the lexical category of a sign. The difficulty of making sure to test the scale properties of adjectives can be circumvented by expanding the criteria to include any property, opposed to event, denoting predicates. The second is that care will need to be taken to not confound other structures that have the same surface word order as resultative constructions. This concern will resurface when discussing the methodology as well as the analysis of the results.

2.2 The Relationship between Scale & Event Structure

2.2.1 Structure of Scalar Adjectives

Since the two main accounts of resultatives being considered in this study rely on Kennedy and McNally (2005), that will be taken as the starting point for discussing the structure of scalar adjectives and by extension property denoting predicates in

general. A full picture of the structure of scalar adjectives under this framework requires consideration of polarity, boundedness, comparison class, and the standard of comparison.

It has been noted that adjectives frequently occur in antonym pairs along the same dimension and that the behavior of both items needs to be taken into consideration when describing the scale. One adjective in these pairs often exhibits behavior associated with negative polarity items (Seuren, 1978). Accordingly, that adjective is referred to as negative and its counterpart as positive. There are at least three tests for determining the polarity of an adjective in a pair. If the dimension is able to take a quantifier phrase, then the positive item in a set will be the one that does so under a default reading. Additionally, negative items can license downward entailments and negative polarity items, such as *even*, whereas positive items cannot. (See Kennedy, 2001b, 2001a for more examples and a further overview of the literature.) While there have been claims about an adjective being positive or negative affecting its ability to be in a resultative construction (Wechsler, 2001, 2005), this line of inquiry will not be pursued. Of greater interest is the expansion in Kennedy and McNally (2005) of the idea that gradable adjectives make use of closed or open scales (Hay, 1998; Hay, Kennedy, & Levin, 1999). Closed scale adjectives are marked by their compatibility with proportional modifiers, such as *half* or *mostly*, which require reference to specific endpoints, that is, for the scale to be bounded. Conversely, open scale adjectives, which are unbounded, are incompatible with such proportional modifiers as it is impossible to determine what half of that scale would be. For example, it is possible to say

(2.3) The door is half shut.

but not

(2.4) #The door is half large.

Expanding on this distinction between an open and a closed scale, Kennedy and McNally (2005) go on to observe that the idea of a scale being bounded or unbounded

can be extended by considering whether it is bounded or unbounded on one or both sides of the scale. This gives rise to the following logical combinations: a scale may be unbounded on both ends, which they define as completely open, it may be bound on one end yet unbounded on the other, or it may be bounded on both ends, which they define as completely closed. Making use of the idea that antonym pairs are positioned along the same scale and represent opposite poles of the same dimension, Kennedy and McNally propose that maximal modifiers such as *completely* and *100%* can be used to target the boundedness of one end of the scale at a time. In order to determine if an unbounded scale is completely unbounded or only unbounded on one end, the compatibility of a maximal modifier must be tested with both antonyms in a pair. For example, consider how the antonym pair *quiet* and *loud* interact with *100%*.

(2.5) (a) The dog was 100% quiet.

(b) # The dog was 100% loud.

(c) The dog was 30 dB loud.

As example 2.5(c) shows, while *loud* cannot occur with *100%*, it can occur with a quantifier phrase, *30 dB*. The fact that *loud* is actually the preferred adjective if the quantifier phrase is used also indicates that *loud* is the positive and *quiet* is the negative adjective of the pair.

The scales which are bounded on only one side are referred to as lower-closed or upper-closed depending on whether the maximal modifier is compatible with the negative or positive antonym of the pair, respectively. The previous example would be considered lower-closed, since *100%* is preferred with the negative item, *quiet.*

Throughout this paper, the use of the term bounded will be preferred. Completely or fully bounded will be used to indicate what Kennedy and McNally (2005) refers to as a closed scale. Lower-bounded and upper-bounded will correspond to lower-closed and upper-closed, respectively, with half-bounded used interchangeably for either term. Finally, unbounded will be preferred over open scale.

Also of importance is the concept that adjectives can require one of two standards of comparison. One is a relative standard and the other is an absolute standard. In both cases, the comparison class is introduced by a frequently null morpheme referred to as *pos*[6]. The key difference between these two standards lies in the entailment patterns. In the case of adjectives with absolute standards, negation of one item in an antonym pair entails affirmation of the other. Consider,

(2.6) The door is not open (closed). $\vDash$ The door is closed (open).

(Kennedy & McNally, 2005[p. 359] Ex. (39a))

For adjectives with relative scales, this is not the case. Consider,

(2.7) The door is not large (small). $\nvDash$ The door is small (large).

(Kennedy & McNally, 2005[p. 359] Ex. (40a))

When discussing absolute standard adjectives, the standard may be seen as either minimum or maximum. *Awake* is an example of a minimum standard absolute scale adjective. It is only necessary for someone to be some non-zero degree of awake to count as awake. On the other hand, *closed* is seen as a maximum standard absolute scale adjective. Something counts as closed in the event that it is completely closed Kennedy and McNally (2005)[7]. When discussing relative scale adjectives, the standard is defined contextually and mediated by the *pos* morpheme.

2.2.2 Event Structure Correspondences

The scale structure of adjectives furthermore has a correlation with event structure (Hay, 1998; Hay et al., 1999; Kennedy & McNally, 2005). Broadly speaking, and simplifying the issues to a degree, de-adjectival verbs, such as *quieted*, receive telic readings if the corresponding adjective has a bounded scale and de-verbal adjectives,

---

[6]This morpheme, while similar in name to "positive" is not associated with the polarity distinction mentioned earlier, but stands for Positive Form (Kennedy & McNally, 2005)[p. 350], which is a term used in contrast with comparative and superlative forms of adjectives.

[7]Kennedy and McNally (2005) note that these items are highly subject to pragmatic halo effects and do not always strictly require the maximum or minimum standard be met.

such as *cut*, receive a bounded scale interpretation if the corresponding verb is subject to telic interpretation. However, the bound of a de-verbal adjective can still be provided by the noun phrase it's describing. Take, for example, a verb that has an incremental theme, such as *eat*, and that appears to have a completely closed structure in its participle form as demonstrated by the permissibility of the following:

(2.8) *half eaten cookie*

  (Kennedy & McNally, 2005[p. 363]).

It is still the *cookie* that is providing the boundary for the adjectival form in this case. This can be seen by the oddity of applying the expression to a mass noun like *rice*:

(2.9) # *half eaten rice.*

  Nonetheless, the general observation that the event structure of a verb appears to be able to predict the scale structure of its adjective form and vice versa. Considering the opposite case of a de-adjectival verb, an adjective that has an open scale such as *wide*, has an atelic verb form, *widen*, whereas an adjective that has a closed scale, such as *flat*, receives a telic verb form, *flatten* (Hay et al., 1999).

  Again, these forms may interact with the object being described to affect the interpretation. If the object can provide an implicit boundary, or if the act is interrupted, then the meaning of the verbal form can be changed. Hay et al. (1999) provides an example of this effect with *lengthen*. The adjective form has an open, or unbounded, scale as evidenced by its incompatibility with *100%*. The verbal form also tends to have an unbounded, or atelic reading. However, consider

(2.10) *The tailor almost lengthened my pants.*

  (Hay et al., 1999[p. 128] Ex. 6(a))

Here the reading is ambiguous between whether *almost* indicates that the event didn't actually take place or whether the act was begun but not completed. The second interpretation would not be available if there was not an implied boundary supplied by real world knowledge of how pants are lengthened. These tendencies will be

revisited when discussing how the Visibility Hypothesis applies to the data collected in this study.

Facts such as these motivate homomorphic approaches to telicity that map an event to a scale, which can be supplied by a DP, PP or AP in the sentence, in such a way as to preserve the structure of both sets (the structure of the event and the scale). Such an approach to resultatives will be described in the next section.

2.3 Homomorphic Models of Resultatives

2.3.1 Beaver's Homomorphic Account of Resultatives

Following a tradition where the telicity of dynamic predicates is seen as resulting from the mapping of a scale onto the event so that the scale effectively measures out or provides a boundary to the event[8], Beavers (2008) seeks to formalize the conditions that predict what XP's may occur in resultative constructions. That is to say, Beavers (2008) suggests a homomorphic approach to account for the semantic restrictions placed on resultative constructions[9].

Under a homomorphic model, the telicity of a dynamic predicate need not reside in the verb, but may arise from bounds imposed onto the verb by some scale.[10] Consider two prototypical dynamic predicates in the homomorphic literature, *eat* and *run*. One involves an implied scale given by a DP and one a path scale given by a PP. Consider the following sentences:

(2.11) (a) The monkey ate an apple.

(b) The dog ran to the post office.

---

[8]Beavers (2008) specifically cites Tenny (1987, 1992, 1994); Krifka (1989, 1992, 1998); Jackendoff (1996); Kratzer (2004) as examples of this tradition.

[9]See also Wechsler (2001, 2005); Wyngaerd (2001); Beavers (2002) for additional discussion on what kinds of scalar XPs provide appropriate bounds for resultative constructions under a homomorphic model.

[10]Such models are called homomorphic since they seek to map the two sets, the event and the scale, onto each other while preserving the structure of each, and comes from a tradition of formal semantics tied to mathematics and set theory where the term homomorphism is used in a similar manner.

Figure 2.4. Visual Representation of Homomorphic Mapping

aspect of event e.g. eating

imposed scale e.g. apple
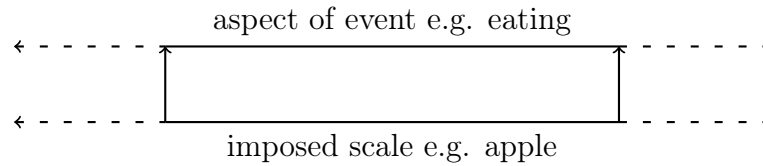
In each case, the question of when the event must end is determined by the DP or PP, respectively. In 2.11 (a), the particular act of eating under discussion must be completed when the apple is gone and in 2.11 (b), the act of running must be completed when the dog arrives at the post office. Though either event may be interrupted sooner, the events may not continue past those points. If that scale does not have a bound, then the event does not have a natural end point. Consider

(2.12)   (a) The monkey ate apples.

(b) The dog ran in the post office.

In 2.12 (a), the eating is not required to stop at any given point and in 2.12 (b), neither is the running. Note that the number of apples eaten or the amount of distance in the post office contributing to the path still determines the application of the verb, though. The scale of the DP and PP can be seen as mapping onto the verb.

A visual representation of the mapping is shown in figure 2.4. The dashed lines indicate the possibility of a continued scale or event, but the solid line is the scale that is realized, such as a definite apple, which is then imposed on the aspect of the event and determines its bounds. This imposition of bounds by the scale is indicated by the upward arrows connecting the two.

A similar "measuring out" can be seen in resultatives. Consider the following example discussed in Beavers (2008):

(2.13) John stamped the tulips flat.

The default interpretation of the event is that it will end once the tulips have become flat in the same way that the default interpretation in example 2.11 is that the running will continue until the path has been completely travelled and the eating will continue until the apple has been completely eaten.

Beavers (2008) focuses on formalizing the mapping conditions between the scale and event utilizing a featural approach. In particular, the article focuses on the Movement Relation aspect of Krifka (1998) and proposes expanding it into a General Movement Relation (GMR). Following Dowty (1979), in turn following Taylor (1977), Beavers (2008) starts with a distinction between durative and punctual events and then treats durative events as having at least three subparts, a beginning, a middle, and an end, and punctual events as having only two, a before and an after. Additionally, scalar adjectives can be seen as having counterparts to durative and punctual events, which is gradable and non-gradable, respectively. This brings us to Beavers (2008) first claim:

(2.14) "Durativity and gradability reflect two mereological complexity types: bipartite structures and greater than bipartite structures." (Beavers, 2008)[p. 3]

As noted by Beavers (2008) and others, there appears to be a correspondence between the event structure of the primary predicate and the scale structure of the secondary predicate in resultative constructions. Beavers (2008) notes, however, a few cases where gradable scalars occur with punctual verbs and appear to be exceptions to this neat dichotomy. The combination of the punctual reading of the verb *stamp* and the gradable scalar adjective *flat* are particularly examined. Beavers (2008) argues that when the punctual reading of the verb is used, the scalar adjective is interpreted as a non-gradable scalar, that the object is seen as going directly from not-flat to flat without the possibility of undergoing various degrees of flatness along the scale. Therefore, some adjectives that have been classified as gradable scalar adjectives should actually be treated as being *underspecified* for gradability. The

correspondence between the durativity of the event and the gradability of the scalar structure can be preserved. Furthermore, the article argues, this correspondence between durativity and gradability is seen in non-resultative dynamic events as well. Hence, we arrive at Beavers (2008)'s second claim:

(2.15) "All dynamic predicates correlate durativity with gradability." (Beavers, 2008)[p. 3]

The last two claims of Beavers (2008) are best reviewed together. They are as follows:

(2.16) "The appropriate homomorphism to explain both the scalar boundedness/ telicity correlation and the gradability/durativity correlation is an abstract movement relation between the event and scale of change, which preserves the relevant mereological properties of each." (Beavers, 2008)[p. 3]

(2.17) "Movement relations are the core property of dynamic predicates." (Beavers, 2008)[p. 3]

These movement relations are, loosely defined, understood as the means of performing the mapping operation between the event and the scale and are semantic rather than syntactic in nature. Beavers (2008) informally defines movement relations as functions from an event to a path with the properties of Coextensiveness, Adjacency, Surjective Functionhood, and Minimality. Informally, Coextensiveness ensures that the event and the scale occur in tandem by mapping the first part of the event to the first part of the scale and the last part of the event to the last part of the scale; Adjacency makes sure that the subparts of both the event and scale maintain their original sequence by prohibiting for example, e_1 to be mapped to p_5 rather than to p_1; Surjective Functionhood ensures that each part belonging to the set of the event has a correspoding part in the set of the path and vice versa; and Minimality requires the event to begin once movement through the path has started and to end when the end of the path has been reached (Beavers, 2008)[p. 12].

Figure 2.5. Visual Representation of Gradable Scalar Mapping onto Durative Event
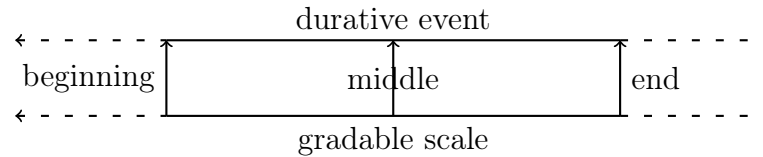
Figure 2.6. Visual Representation of Non-Gradable Scalar Mapping onto Punctual Event
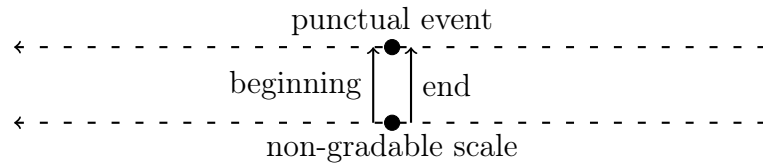
These properties of movement relations ensure that when either the event or the path, that is the scale, has a complex structure, so does the other. In other words, movement relations ensure isomophism with respect to mereological complexity (Beavers, 2008)[p. 13].

To return to the visualization of figure 2.4, the ability of the scale to impose or map itself onto the event is dependent on having a corresponding number of parts. The correspondence of gradability with durativity is depicted in figure 2.5 and the correspondence of non-gradability with punctuality is depicted in figure 2.6.

2.3.2 Ramchand's Mixed Approach to Resultatives

Another approach to resultatives that assumes a homomorphic model is presented in Ramchand (2008). Unlike Beavers (2008)'s account, Ramchand (2008)'s account involves a decompositional event model instead of feature specifications, and this approach allows for a larger number of potential outcomes and does not always require the application of homomorphic matching requirements between the verb and the

secondary predicate. While this model focuses on features of the syntax-semantic interface, the focus here will be on the semantic aspects.

This decompositional event model has three phrases that may be involved in the composition of a verbal element, and if all three are involved they will occur in the following order: a causing phrase (initP), a process phrase (procP), and a result phrase (*res*P). Each phrase contributes specific semantic information to the interpretation of the event and thematic roles are composite. The content occupying the specifier position of each phrase is referred to as follows: INITIATOR, UNDERGOER, and RESULTEE, respectively. The lowest phrase in a verbal element may take as a complement rhematic material that provides additional information about the subevent. These rhemes may be DP's, PP's, or AP's. The semantic restrictions imposed upon the rhemes varies depending on the phrase selecting them, but is underlyingly always one of homomorphic matching.

Figure 2.7. Ramchandian Event Structure
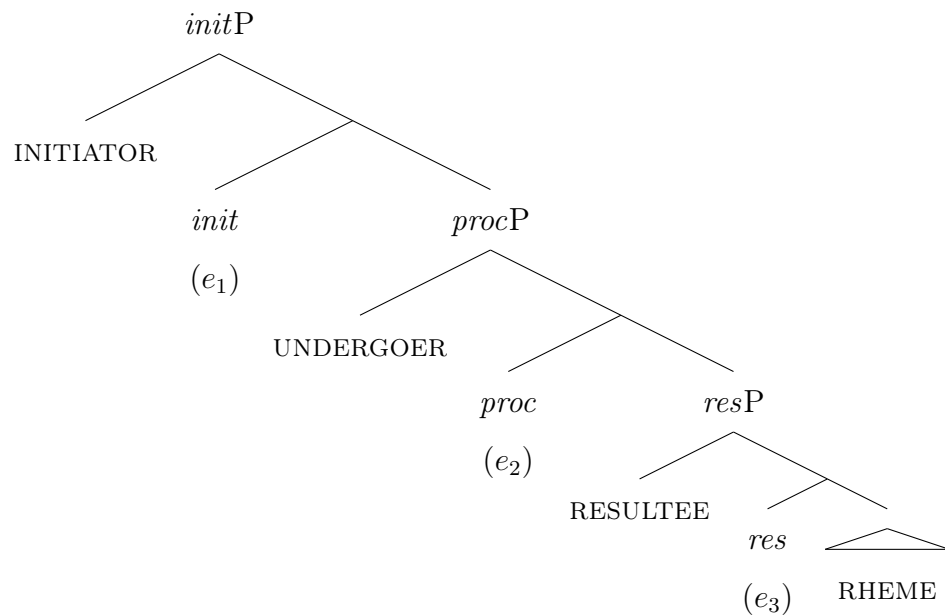
(cf. Ramchand, 2008[p. 39])

Two additional features of this model that are important for the purposes of this study are one, that it is possible for lexical items to contain underassociated category

features, and two, that there are rules governing event coherence and composition that depend on whether sub-events are identified by the same lexical material or not.

Under Ramchand (2008)'s model, lexical items are conceived of as having their syntactic category features listed in their entry in the lexicon. However, Ramchand (2008) allows for underassociation. This is defined as "use of a lexical item that bears a superset of the category features it actually spells out in the structure" [p. 97]. While lexical items may underassociate with certain category features, there are specific restrictions governing this underassociation. Ramchand (2008) proposes the following rules for underassociation:

(2.18) "*Underassociation*

If a lexical item contains an underassociated category feature,

(i) that feature must be independently identified within the phrase and linked to the underassociated feature, by Agree;

(ii) the two category features so linked must unify their lexical-encyclopedic content"

(Ramchand, 2008[p. 98])

Additionally, the material in the *init*, *proc*, and *res* heads have coherence constraints that in the event the heads are not unified by the same lexical content, then the following constraints apply:

(2.19) (a) "*Init-proc coherence*

Given a decomposition $e_1 \rightarrow (e_2 \rightarrow e_3)$, e_1 may temporally overlap e_2."

(b) "*Proc-res coeherence*

Given a decomposition $e_1 \rightarrow (e_2 \rightarrow e_3)$, e_3 must not temporally overlap e_2.

(Although they may share a transition point.)"

(Ramchand, 2008[p. 130])

Figure 2.8. 'Path' Resultative Structure
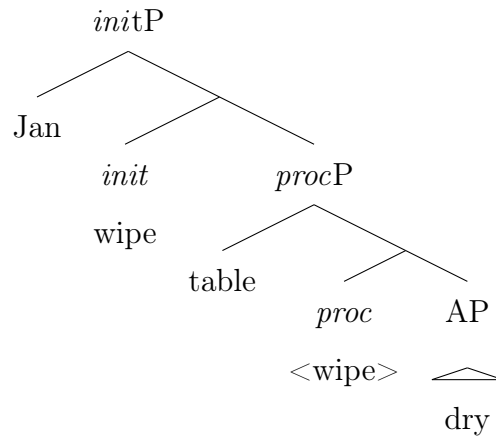
(cf. Ramchand, 2008[p. 122])

Within this model, Ramchand (2008) makes a distinction between two kinds of resultatives: 'path' resultatives, and 'result' resultatives. The same semantic interpretations and homomorphic constraints proposed under Wechsler (2001, 2005) and Beavers (2008) apply to the 'path' resultatives and one case of 'result' resultatives. The flexibility of Ramchand's compositional account, however, gives rise to different possibilities among selected-object resultatives.

The first case of 'path' resultatives is used to describe constructions such as *Jan wiped the table dry*. The causing predicate, *wipe* does not license a *res* head, which is evidenced by the fact that *wipe* by itself receives a default atelic reading. Instead, the *proc* head takes on an AP rheme that provides a path and potential bounds for the event via its scale structure. Due to homomorphic matching constraints applying to the rheme, the path must be gradable, but there is no requirement as to whether or not the scale must have an endpoint. However, should the scale be closed in the Kennedy and McNally (2005) sense, then it will give rise to telicity effects. The general analysis given to 'path' resultatives under Ramchand (2008)'s analysis is shown in figure 2.8.

For the second case of 'result' resultatives, there is a *res*P in the structure. In this case there are at least four possibilities. The first option is that for verbs that

Figure 2.9. 'Result' Rheme Resultative Structure: Selected Object

```
                        initP
                       /    \
                    Jess     \
                         /    \
                      init    procP
                     shoot   /    \
                           Jo      \
                              /      \
                           proc      resP
                         <shoot>    /    \
                                  Jo      \
                                      /    \
                                    res     AP
                                  <shoot>   /\
                                           dead
```
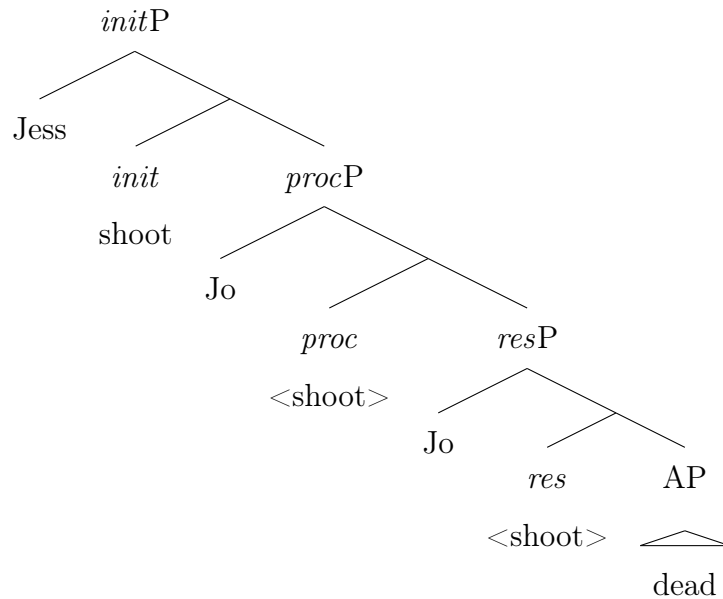
(cf. Ramchand, 2008[p. 128])

already license all three phrase projections and where the object is an UNDERGOER-RESULTEE, then the resP can take an AP rheme that provides further information about the result. In such a case, the AP must be non-gradable. This should be the structure assigned to English AP resultatives like *Jess shot Jo dead*, which is shown in figure 2.9.[11]

The second option is that a language may make use of a phonologically-null lexical item in the *res* head if the semantics of the lexical item in the *proc* head supports it. In such a case, the superficial object is only a RESULTEE, and not an UNDERGOER. This is the analysis provided in Ramchand (2008) for unselected object resultatives in English. Accordingly, the representation offered for *Ariel ran her shoes ragged* is as depicted in figure 2.10.

---

[11]Elsewhere in Ramchand (2008), semelfactive verbs are argued to indicate lexical content that is consistent with either an init-proc or init-proc-res structure with the former giving rise to a durative and the latter a punctual reading.

Figure 2.10. 'Result' Rheme Resultative Structure: Unselected Object

*init*P
Ariel
 init
 run
  *proc*P
  Ariel
   proc
   <run>
    *res*P
    her shoes
     res
     ∅
     AP
     ragged
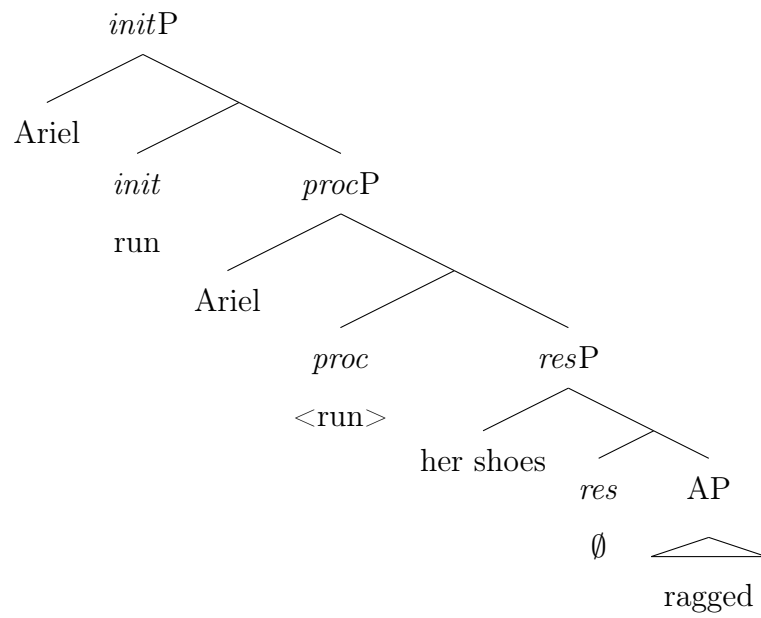
(Ramchand, 2008[p. 124])

Figure 2.11. 'Result' Underassociated Resultative Structure

(cf. Ramchand, 2008[p. 119-20])
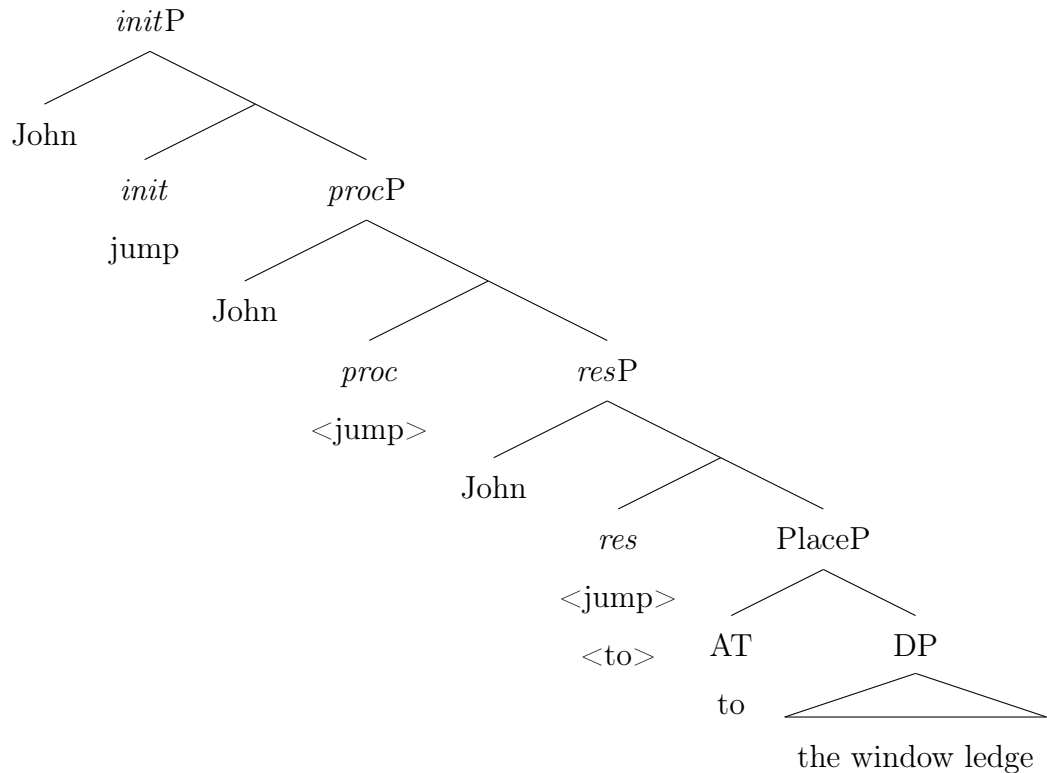
The third possibility is one that involves underassociation, where both the verbal item and the rheme may contain elements that independently license a *res* head, but where one of them underassociates. In such a case, different homomorphic requirements may apply where the scale is allowed to be gradable so long as it can identify an endpoint. The primary example of this in Ramchand (2008)[p. 120], *John jumped to the window ledge,* involves a PP rather than an AP. Its representation is shown in 2.11.[12]

The fourth possibility is not discussed in detail in Ramchand (2008), but is a logically possible outcome given the system. This is a case where different verbal

---

[12]Elsewhere, Ramchand makes various arguments for English *to* as an item that carries *res* features and can license a *res*P.

Figure 2.12. Visual Representation of Semantic Interpretation of Distinct *proc* and *res* Head Content

elements fill the *proc* and *res* heads. Such an analysis has been offered for at least one SVC language (Basu & Wilbur, 2010). In this case the second item would not impose a scale on the event, or measure out the event. Instead it would be read as coming after the first subevent, which is shown in figure 2.12. Compare fig 2.5 and 2.6 with 2.12. If such a construction were to additionally have XP rhematic material, it is not clear whether homomorphic matching constraints should require that any rhematic XP have gradability and an identifiable endpoint, as offered as a possibility in the case of underassociation, or if it must be non-gradable, as would be the case if a single verbal element filled both the *proc* and *res* heads.

Compared to Wechsler (2005) or Beavers (2008), Ramchand (2008) makes similar predictions if the property denoting predicate is in the rhematic position, but Ramchand (2008) also predicts that more than the strict "measuring out" semantic interpretation will be available for resultatives[13].

---

[13]The most salient difference between Ramchand (2008)'s approach and the approach in Borer (2005) comes from how the lexicon is structured. While in Ramchand (2008), syntactic category information is part of a listeme's entry in the lexicon, in Borer (2005), syntactic category information comes only from functional heads introduced by the syntax and is not part of a listeme's entry. Also, in Borer (2005), the effects brought about by homomorphic approaches is largely implemented (with some modifications made about the assumptions of what, exactly needs to be achieved) through quantification in the functional heads, which can be assigned through various means. It may be possible to feed the approach taken in Ramchand (2008) into the functional-head model of Borer (2005) by translating the *init*, *proc*, *res*, and gradable/ungradable distinction into the appropriate quantification features residing in functional heads. At the present time, I do not think doing so would necessarily result in any different empirical predictions than those generated under Ramchand (2008)'s model.

2.4 ASL

2.4.1 Syntax of Adjectival Predicates

The majority of the work on adjectival predicates in ASL has focused on their ability to come either before or after the noun phrase they modify. Padden (1983, 1988), using a relational grammar framework, is the first to touch on the syntactic properties of adjectival predicates. The main observation is that adjectival predicates may appear either before or after nouns, and the hypotheses that if they occur after the noun, then they are outside of the noun phrase is put forth, but not tested. Afterwards, Bienvenu (1992) relates the results of a few simple judgment tests on the permissible ordering of nouns and adjectives and concludes that adjectives in ASL may function predicatively or descriptively. Later, in an article focusing on the Quantification Phrase in ASL, Boster (1996) using a generative framework, suggests that the AP may be freely attached either before or after the NP it modifies. Subsequently, MacLaughlin (1997), also working in a generative framework, investigates the internal structure of the determiner phrase for a single consultant and concludes that adjectives occur in both pre- and post- nominal positions within the noun phrase. She further claims that prenominal adjectives are attributive while postnominal adjectives are predicative, and proposes that each position has a different underlying syntactic structure. More recently, Bernath (2010) has explored the ordering of adjectival predicates and foregrounded the issue of determining lexical category membership of different items in ASL. Due to these current concerns about how to syntacticaly test for lexical category membership, the phrase 'adjectival predicate' will be used throughout the review of the literature in order to more accurately indicate how concepts have been discussed previously, but the phrase 'property denoting predicate' will be used in reference to the current study in order to reflect the appropriate semantics but agnosticism in terms of syntactic category.

2.4.2 Morphology of Adjectival Predicates

Aside from syntactic concerns, the seminal work of Klima and Bellugi (1979) describes various morphological properties that adjectival predicates exhibit in ASL. The chapter "Aspectual Modulations on Adjectival Predicates," labels a series of morphemes characterized by changes in the production of a sign. For example, one morpheme, named the *intensive aspect*, is produced by altering the sign so that the initial position is held slightly longer, and the sign is produced with extra tension and speed. This particular morpheme is translated into English using the word *very* ; however, the distributional properties of this morpheme are still not well known. Additionally, one morpheme is called the *resultative.* This morpheme indicates a complete change of state and is translated into English using the expression *to become fully x.* It is produced with a tense motion, starting slowly before accelerating into a long final hold. (Klima & Bellugi use the term *accelerando modulation* to describe the movement of this inflection.) It is just these sorts of alternations in sign production caused by these kinds of morphemes that are expected to interact significantly with the primary event-predicate in the resultative constructions.

The most recent work on the morphology of adjectival predicates in ASL, Wilbur et al. (2012) presents an argument for re-formulating the Event Visibility Hypothesis (EVH) into the Visibility Hypothesis (VH). The arguments and history of this hypothesis will be provided in greater detail in a later section. For now, it suffices to introduce that the VH states "Sign languages express the boundaries of semantic scales by means of phonological mapping." (Wilbur et al., 2012)[p. 100]

2.4.3 Phonology

Before exploring the details of EVH and the subsequent VH, it will be useful to discuss the prosodic phonological model of sign languages (Brentari, 1998). First, the two main branches of the prosodic phonological model, the inherent and the prosodic features branches will be laid out. Then the relevant aspects of the prosodic features

branch to EVH, VH, and by extension the hypothesis currently under investigation will be outlined.

The Prosodic Model (Brentari, 1998) distinguishes the features of signs as being either inherent or prosodic and represents them as attached to the Inherent Features (IF) Branch or the Prosodic Features (PF) Branch respetively. The definitions for inherent and prosodic features are provided as follows:

(2.20) "Definition of inherent features

Inherent features are those properties of signs in the core lexicon that are specified once per lexeme and do not change during the lexeme's production (e.g., selected fingers, major body place)."
(Brentari, 1998)[p. 22]

(2.21) "Definition of prosodic features

Prosodic features are those properties of signs in the core lexicon that can change or are realized as dynamic properties of the signal (e.g., aperture, setting)."
(Brentari, 1998)[p. 22]

Within the prosodic features branch, there can be one or two specifications, depending on the kind of movement involved. Contrastive movement, such as a change in aperture, that references the IF branch will have two end nodes whereas singular movement, such as tracing, will only have one node in the PF branch. These terminal nodes are then matched to timing slots through a series of constraints. Essentially, if there are two terminating nodes in the PF, each one will be associated with one timing slot, and if there is only one node, it will spread to associate with both timing slots. One syllable is comprised of two timing slots.

To consider how all of these features work together, take for example, the sign FALSE, illustrated in figure 2.14 would be represented phonologically as follows:

The parts of the sign that do not change during production, such as the selection of a 1-handshape, are associated to the IF branch. Those aspects that are dynamic

Figure 2.13. Representation of FALSE in Prosodic Model

```
                              root
                         /           \
                       IF              PF
                    /      \            |
                   A        POA      setting Δ
                   |         |        /      \
                 hand     x-plane    IF    [contra]
                 [RAFI]    /   \      |        |
                 /    \ ['nose'] head x        x
          nonselected  selected
               |          |
           [flexed]    fingers
                          |
                        [one]
```
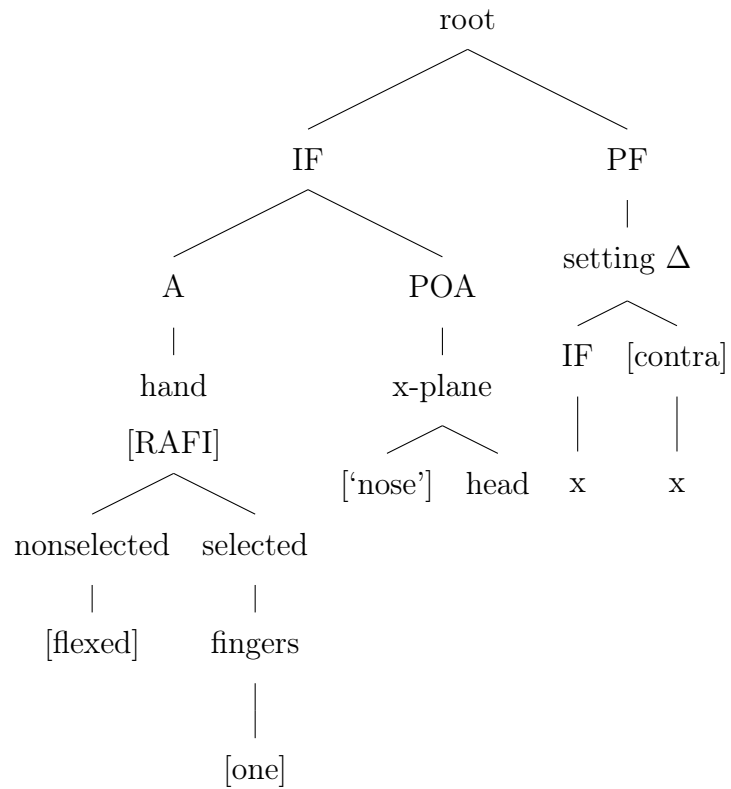
Figure 2.14. FALSE
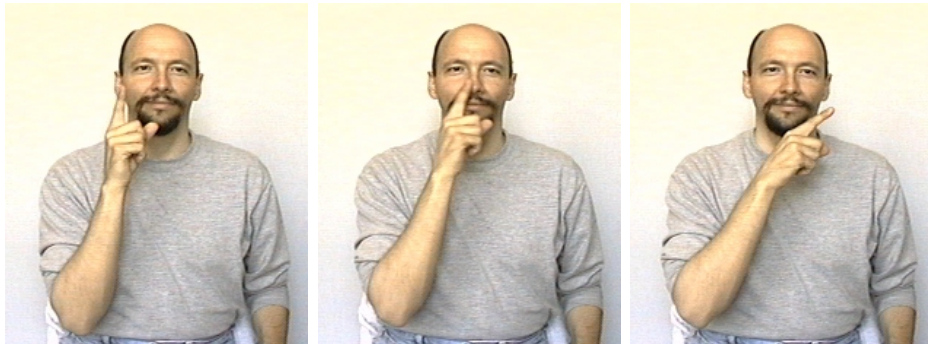
(Used by permission of Dr. Bill Vicars)

during the production of the sign, in this case movement from the position specified in the IF branch to [contra], are specified in the PF branch. These two contrastive

nodes in the PF branch each associate to a different timing slot and the two timing slots are both associated to a single syllable.

Understanding this phonological analysis is important for making sense of the claims involved in the Visibility Hypothesis since it makes use of the Prosodic model to capture the representation of the morpho-phonology associated with making semantic structures visible in ASL. This will also be the phonological model assumed for this project.

2.4.4   VH: Visibility Hypothesis

The initial observations leading to the Event Visibility Hypothesis were initially laid out in Wilbur (2003). After an introduction to Pustejovsky (1991)'s division of events into three categories (states, processes, and transitions) Wilbur shows a systematic correspondence in the phonology and morphology of ASL signs representing events with these categories. States, such as the citation form of SICK, depicted in figure 2.15 do not have any movement. Pure processes, that is, items which receive a default atelic interpretation, such as RUN, depicted in figure 2.16 may have a tracing movement, but will not have a phonological change that indicates an end-state. Transitions, however, will have a phonological change, such as a change in aperture, orientation, or location accompanied by rapid deceleration, that marks an end-state. (See Malaia and Wilbur (2012) for confirmation and details of the kinematic signatures associated with this morpheme.) Critically, either the process or the transition part of such events can be emphasized in various ways. The process part can be emphasized by extending the movement, as movement through space in sign languages receives a default interpretation of time passing. The end-state can be emphasized by rapid deceleration (reference Morphology of Adjectival Predicates above). Furthermore, these observations can be easily analyzed under the Prosodic Model (Brentari, 1998) as associating with the x-slots associated with the specifications under the PF branches of these signs. States have nothing specified within their PF branch, pro-

Figure 2.15. SICK
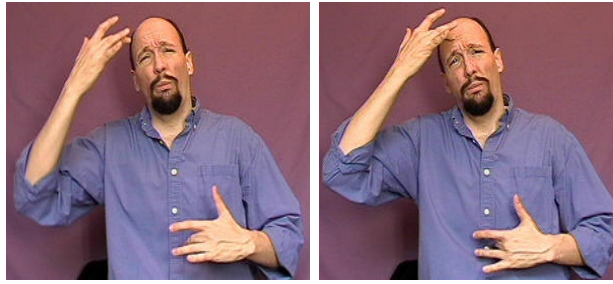
(Used by permission of Dr. Bill Vicars)

cesses have one specification which spreads over the x-slots, and transitions have two specifications, one associated with each x-slot. Crucially, as verbs like READ and HIT illustrate, while there may be a default specification used in citation forms, morphemes can be added to either create a transition such as for READ, or to emphasize the process, such as in HIT. The citation form of READ is presented in 2.17. Typically, it is signed with a tracing movement that lacks rapid deceleration; however, if it is signed with rapid deceleration, it takes on a telic interpretation. On the other hand, signs like HIT, which is presented in its citation form in 2.18, have rapid deceleration in their citation form, but can be modified by extending the physical space travelled while moving towards its contact point, typically with an added arcing movement, in order to emphasize the duration of the event.

Recently, the EVH has been reformulated into the Visibility Hypothesis (VH) in Wilbur et al. (2012). This suggestion is based on Kennedy and McNally (2005)'s arguments, discussed above, for the relationship between the event structure of verbs and the scale structure of adjectives and their own study of the semantics and phonological representation of adjectives modified by degree adverbs, particularly "too A to V" constructions. These constructions are characterized as having sharp deceleration towards a point at the end in much the same way as telic verbs. Crucially, the semantics of such constructions, like telic verbs, need to reference an endpoint on the scale,

Figure 2.16. RUN

(Used by permission of Dr. Bill Vicars)

Figure 2.17. READ

(Used by permission of Dr. Bill Vicars)

Figure 2.18. HIT

(Used by permission of Dr. Bill Vicars)

that is the point at which something is past a contextually determined place on scale A such that it is no longer appropriate to V. In order to capture these observations, the EVH is reformulated as the VH:

(2.22) "Sign languages express the boundaries of semantic scales by means of phonological mapping." (Wilbur et al., 2012)[p. 100].

This is a crucial point of departure for the current investigation.

2.4.5 Path Movements in Motion Events: SVC Considerations

The last thing that will be particularly important to keep in mind about ASL is how the language typically expresses path movements in motion events, since, as discussed above, a parallel has been noted in how languages express motion events and how they express resultatives. To begin with, Supalla (1982, 1990) examines restrictions on the morphological representations of motion events in ASL. In particular, Supalla (1990) notes that manner of motion is typically (if not always) indicated separately from manner of path in a serialized verb structure. Slobin and Hoiting (1994) later add onto the descriptive information by examining complex path structures in both ASL and Sign Language of the Netherlands. An example of a complex path structure is the preposition "into" in English. They find that ASL utilizes a serial verb construction for complex path structures as well. Subsequently, Benedicto, Cvejanov, and Quer (2008) provides a syntactic analysis of these motion event constructions. Their analysis proposes a vp(/VP) shell analysis in the fashion of Larson (1991), but raises the question of whether V-V compounding may be involved. Taken altogether, this crucially highlights the possibility that resultative constructions in ASL may appear as SVCs. This means that tests may need to be found that can address the concerns raised in the previous section about needing to be able to distinguish resultative SVC constructions from other constructions that give rise to the same surface word order. It should be noted that the constraint on motion and path co-occuring does not apply across all ASL dialects. Wilbur (2008) notes that the Indi-

ana ASL dialect frequently exhibits violations of this constraint and portrays manner of motion and path simultaneously. However, note that this tendency still places this dialect typologically in line with particle-framed languages, which still suggests that resultative constructions will be permitted.

3. HYPOTHESES

The current study takes the Visibility Hypothesis as a means of further examining and evaluating the different homomorphic approaches to resultatives laid out in Beavers (2008) and Ramchand (2008). While Beavers (2008) maintains a mapping approach to the event, Ramchand (2008) takes a mixed compositional/mapping approach. Analyzed under the VH, these two accounts make different predictions as to how the morpho-phonological forms of the causing and resultant predicates are expected to interact with each other in ASL resultative constructions.

As noted previously, the VH simply states "Sign languages express the boundaries of semantic scales by means of phonological mapping." (Wilbur et al., 2012, p. 100). Previous work under the initial formulation of the VH as the Event Visibility Hypothesis (EVH) has established particular markers for telicity, statives, process verbs, and transition verbs (Wilbur, 2003, 2005, 2009) while more recent work has indicated that morpho-phonological markers for telicity, or the end of an event structure, correspond to morpho-phonological markers for the end of property denoting scales in *too x to y* constructions (Wilbur et al., 2012).

Because both scales, the scale of the event and the scale of the property, are visible in ASL, and because there are specific morpho-phonological features that are expected to be associated with the various parts of those scales, certain predictions can be made under both Beavers (2008) and Ramchand (2008)'s accounts if they are analyzed under the VH.

3.1 Predicted Outcomes Under Beavers (2008)

Given the understanding of Beavers (2008)'s account that has been presented here, the causing and resultant predicates are expected to exhibit morpho-phonological

correspondences that mirror the semantic correspondences between them. To review, the GMR is an extension of Movement Relations (Krifka, 1998) and simply relates events to scales and ensures that the appropriate constraints on both the event and scale are compatible in terms of their mereological complexity. In other words, it ensures that the parts, or scale, of the event in the primary predicate contains as many parts as the scale of the secondary predicate in resultative constructions (Beavers, 2008). This means that if the causing event has duration, then the resultant predicate should have gradability and that if the causing event is punctual, then the resultant predicate should focus on an end-point of a scale in a manner that allows for a non-gradable reading. Morpho-phonologically, duration and punctuality correspond to the presence or absence of [extent], respectively. Synthesizing these claims with the VH, we can formulate the following hypothesis:

(3.1) Resultative constructions in ASL will require a morpho-phonological symmetry between the primary event-denoting predicate and the secondary property-denoting predicate.

This claim in turn generates the following hypotheses:

(3.2) The causing event predicate shows morpho-phonological features consistent with [extent], such as [TM], [tracing], or extended path features if and only if the resultant predicate also exhibits morpho-phonological features consistent with [extent].

(3.3) The causing event predicate shows morpho-phonological features consistent with punctuality, such as rapid deceleration without an extended path, change in orientation, change in aperture, or change in setting, if and only if the resultant predicate also shows morpho-phonological features consistent with punctuality.

(3.4) If the causing event has two distinct morpho-phonological forms, one consistent with durativity and one with punctuality, then both hypothesis 3.2 and 3.3 must hold.

This means that of the nine possible combinations of morpho-phonological marking possible, five are predicted not to occur under the interpretation of Beavers (2008) currently under consideration. Unpredicted combinations are marked by shaded cells in table 3.1.

3.2 Predicted Outcomes Under Ramchand (2008)

On the other hand, if the variety of resultatives posited in (Ramchand, 2008) is allowed, then there are only three unpredicted morpho-phonological combinations of causing event and resultant state predicates. These are marked by an x in table 3.1.

Since the account of resultatives in Ramchand (2008) imposes homomorphic matching constraints on rhematic material, and since the account presupposes matching conditions laid forth in Wechsler (2005), which are consistent with Beavers (2008), the set of correspondences laid out in the previous section are still possible combinations under the account in Ramchand (2008). The only correspondence that's still required is that laid out in hypothesis 3.3. In order to make clear which hypotheses are expected to apply under which accounts, it is repeated here as 3.5:

(3.5) The causing event predicate shows morpho-phonological features consistent with punctuality, such as rapid deceleration without an extended path, change in orientation, change in aperture, or change in setting, if and only if the resultant predicate also shows morpho-phonological features consistent with punctuality.

The other two hypotheses generated under Beavers (2008), however, do not apply under Ramchand (2008), because there are two additional ways to compose resultative constructions that rely on the resultant predicate interacting with the *res* head rather than simply being in a rhematic position. One additional possibility involves underassociation, which would allow the morpho-phonology and corresponding semantics of a durative/telic causing predicate and a punctual/telic resultant predicate if both can independently license the *res* head and underassociate with it.

Table 3.1

Predictions of Homomorphic Models Under VH Analysis

Causing Predicate \ Resultant Predicate	Punctual/Telic	Durative/Telic	Durative/Atelic
Punctual/Telic		X	X
Durative/Telic			X
Durative/Atelic			

Shaded cells = predicted under Beavers (2008)

x = predicted under Ramchand (2008)

The other possibility involves independent lexical items saturating the *proc* and *res* heads, in which case it would be possible for the causing predicate to have durativ/atelic morpho-phonological features and for the resultant predicate to have punctual/telic morpho-phonological features. Also, if this is the case, then the semantic interpretation is not that the resultant predicate measures out the causing predicate, but that it occurs afterwards. This second possibility yields the following hypothesis:

(3.6) If the causing predicate has a durative/atelic form and the resultant predicate has a punctual/telic form, then the interpretation received is that of two events in sequence and not that of the resultant predicate measuring out the causing event.

There is an additional outcome that is expected, but it is the weakest of the claims being considered. On this account and with the application of the VH previously sketched, the additional outcome is not expected:

(3.7) If the morpho-phonological form of the causing predicate is durative/telic, then the resultant predicate will not be durative/atelic.

4. METHOD

4.1 Interview-Elicitation Format

In order to test the hypotheses under consideration, a series of interviews utilizing mixed elicitation and judgment tasks were conducted with two Deaf signers. Interviews were comprised of two distinct sections.

The first section involved a series of questions about potential resultative constructions with particular attention paid to the morpho-phonological form of the causing events and the resultant predicates. The choice of which causing and resultant predicates to focus on as potential resultative constructions was based on three things. One was equivalent items that had been noted in the literature for various languages. This relied particularly on the review of the literature and the corpus information presented in Boas (2003). The second consideration was the need to have causing predicates that could realistically alternate between durative and punctual interpretations in order to test the hypotheses under consideration. Finally, items that were found in ASL data previously collected for various projects that appeared to potentially be resultative constructions were included for investigation.

Tasks included both elicitation of target constructions and acceptability judgments of target constructions that were presented to them. After the acceptability of the construction was established, three distinct types of questions were asked about the construction. The first type of questions concerned the form of the causing event and the second type of questions concerned the form of the resultant predicate. For both of these types of questions, the form was altered along the lines of atelic and telic formations which also often involved an alteration along the lines of durativity and punctuality. For example, if the construction initially elicited had the causing predicate HIT signed with an atelic form that lacked rapid deceleration, the interviewer

would ask first if a telic form of HIT with rapid deceleration was possible, and if so, how to sign the construction using that form. The third type of question concerned the constituency relationship between the causing event and the resultant predicate. Also, a wh-cleft construction was used to test for constituency structure of the two predicates.

The second section focused on determining the gradability of the property denoting predicates that occurred as resultant predicates in the resultative constructions. This was done by asking if each property denoting predicate was compatible with intensifiers such as WOW or Y-OO or with qualifiers like KINDA. Questions were also asked about how to convey the concept of *half* or *completely* in connection with the property denoting predicate.

4.2 Initial Analysis of Results

After the data was collected, it was analysed in terms of the syntax, the morpho-phonology, and the semantics. Only items that contained two easily distinguishable manual signs, one expressing the causing predicate and one the resultant predicate, were considered. For the syntactic analysis, the outcome of the wh-cleft tests were considered. For the morpho-phonology, the causing and resultant predicates were scored based on their form and then the constructions were sorted based on which combination of forms occurred.

4.2.1 Syntax

For the syntax, each construction was placed into a wh-cleft of the form 'agent; causing predicate; resultant predicate; WH; affected object' and presented to the signer for an acceptability judgment in order to obtain a first approximation of the syntactic structure. This insured that items being considered had causing events and resultant predicates that were likely to be contained in the same CP and to be contained within the same constituent at some point in the computation. Only items

that could undergo wh-cleft formation were analyzed. No further syntactic analysis was conducted.

4.2.2 Morpho-Phonology

For the morpho-phonological analysis, the forms of the causing and resultant predicates were scored for two categories, each with two possibilities. First, they were scored for atelicity/telicity based on whether the morpho-phonology of the predicates was consistent with atelic or telic morphology following Wilbur (2003, 2005). Then they were scored for punctuality based on whether the morpho-phonology was consistent with punctual/extent (Wilbur, 2003, 2009). It should be emphasized that in both cases what is being scored and described is the morpho-phonological form of the signs and that this form may or may not coincide with the semantics. For the causing events, it will be taken for granted that it does since that has been handled in previous research. For the resultant predicates, however, it will be necessary to compare the forms with the results obtained in the semantic analysis.

Predicates were scored as atelic if they were realized without rapid deceleration, that is with epenthetic movement due to no specifications in the PF branch, or movement referenced only in the first node of PF branch and that spreads to the second. If the speed of the sign appeared constant and seemed to only gradually decelerate as entering into the transition of the next sign, then it was marked as atelic. For those signs with specified movement but without rapid deceleration, this usually meant there was a tracing movement specified in the Prosodic Features branch (Brentari, 1998).

The predicate was scored as telic if both a particular, non-epenthetic movement was necessary to properly form the sign and that movement had rapid deceleration. This kind of movement usually involved changes of handshape, setting, orientation, or contact. The key difference between whether a sign was scored as atelic or telic was whether the movement was seen as having rapid decleration at the end of the

sign. For determining whether to score a predicate as punctual or extent, the use of local movement was considered: signs having only local movement without extended paths, excepting trilled movement [TM] and [tracing], were marked as punctual and all others as durative. The scoring system is summarized in the following table:

Table 4.1
Scoring for Morphology of Causing and Resultant Predicates

Score	Characteristics
Atelic	Only transitional or required movement, but no final rapid deceleration
Telic	Required movement, final rapid deceleration
Punctual	Local movement w/o extended path (except [TM] & [tracing])
Durative	Not punctual (includes [TM] & [tracing])

4.2.3 Semantics

Finally, resultant predicates were analyzed for scale structure independent of the morpho-phonological scoring. First, items were scored as gradable or non-gradable. Normally, the preferred test for gradability would be the ability of an item to undergo comparison (Kennedy & McNally, 2005). However, during piloting, attempts to elicit comparative forms in ASL proved difficult and there seemed to be a distinct preference for implied rather than direct comparisons[1]. Therefore, for this study, items were scored as gradable if they could be intensified, either with a separate manual intensifier, such as WOW, Y-OO and TRUE, by morpho-phonological modification of

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[1]There is a way to form comparatives that uses the form Noun1;Property Denoting Predicate; BETTER; THAN; Noun2, but this was judged to be very Englishy. When asked about how to compare things like two people's heights, the response was typically along the lines of $3 - IX_k$ TALL; $3 - IX_j$ SHORT. Stassen (1985) reports a typological category of Conjoined Comparatives that take this form. However, at this time it is unclear whether ASL is actually of this type due to the limited amount of data collected.

the sign itself, or by the addition of a nonmanual. Those that could not were scored as non-gradable. Next, items were scored for polarity and marked either as bi-polar or other.[2] Items that had a lexical semantic opposite that signers showed agreement on were scored as bi-polar while those that signers could not assign a lexical, semantic opposite to were scored as other. Those signs that were scored as bi-polar were then scored as having absolute or relative scales. Entailment patterns were used to determine whether an item should be marked as absolute or relative. If signers indicated that negating the application of one pole of a scale entailed affirmation of the other, then the item was scored as absolute. If negation of one pole did not entail affirmation of the other pole, then the items was scored as having a relative scale. Returning to the examples presented in the Review of the Literature, if signers indicated that something cannot be both *not open* and *not closed*, then the item would be scored as having an absolute scale, whereas if signers indicated that something could be both *not small* and *not big*, then the scale would be scored as relative. Finally, bi-polar items were scored as having unbounded, bounded, or half-bounded scales based on the whether the pair of opposites could be modified, either morpho-phonologically or by the addition of another sign, to indicate the equivalent concept of *half* or *completely*. Pairs that were not able to express either of these concepts were scored as having an unbounded scale. Pairs where both items could take on modification were scored as having a bounded scale. Pairs where only one item could take on such modification were scored as having a half-bounded scale. The scoring system is summarized in the following table:

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[2]The reason for marking items not exhibiting bi-polarity as "other" rather than as mono-polar is to indicate agnosticism as to whether these items have a mono-polar dimension, or are perhaps instead multi-dimensional, particularly for items that are not monotonic. For example, it is quite feasible that color terms are better conceived of as bundling the dimensions of value, hue, and chroma rather than simply encoding a single, mono-polar dimension of the color under consideration.

Table 4.2
Scoring for Scale Structure of Resultant Predicates

Score	Characteristics
Gradability	
Gradable	Compatible w/ overt intensifiers
Non-gradable	Not compatible w/ overt intensifiers
Poles	
Bi-polar	Opposite pair
Other	No opposite pair
Comparison Scale	
Absolute Scale	Affirmation entails neg. of opp.
Relative Scale	Affirmation does not entail neg. opp.
Boundedness of Scale	
Unbounded	No expression of *half* or *completely*
Bounded Scale	Expression of *half* and *completely*
Half-bounded Scale	One pole expresses *completely*

5. RESULTS

In this chapter, the initial results of the interviews and scoring procedures are briefly presented with additional analysis and discussion occurring in the following chapters.

5.1 Morpho-Phonological Forms of Causing & Resultant Predicates

Since the central part of the current investigation relies on the predictions regarding the morpho-phonological forms of the causing and resultant predicates, the raw data and initial statistical analyses are presented first.

5.1.1 Raw Scores

Presented in table 5.1 are the raw numbers for how many examples of each potential cross combination of morpho-phonological form in the causing and resultant predicate were collected and analyzed. The full list of items collected along with their morpho-phonological forms is provided in Appendix A. Six items were collected but not scored for their morpho-phonology. Those items and the reasons for excluding them from the current analysis will be discussed further below.

In the data collected and analyzed for morpho-phonological form, the most common form for a causing predicate was durative/atelic with 22 items, and the most common form for a resultant predicate was punctual/telic with 23. The most common combination was a punctual/telic causing predicate matched with a punctual/telic resultant predicate. When combining with a causing predicate that had a durative/atelic form, the form of the resultant predicate was almost equally likely to be any of the three forms. There were no items where the causing predicate had a durative/telic form. Because of the focus on items with causing predicates that could

have punctual/durative alternations, this may be an accidental gap in the data and not reflect actual tendencies of the language.

The numbers themselves at this point are not as important as which cells in the table are and are not occupied. Areas predicted as not possible under the hypotheses generated by considering Beavers (2008) in light of the Visibility Hypothesis (Wilbur et al., 2012) are again shaded gray and those incompatible with the hypotheses generated by considering Ramchand (2008) are also again marked with an x.

Table 5.1
Results of Morpho-Phonological Scoring

Causing Predicate \ Resultant Predicate	Punctual/Telic	Durative/Telic	Durative/Atelic
Punctual/Telic	15	1x	3x
Durative/Telic	0	0	0x
Durative/Atelic	8	8	6

Shaded cells = predicted under Beavers (2008)

x = predicted under Ramchand (2008)

5.1.2 Initial Statistical Analysis of Beavers (2008) under the VH Analysis

In order to more accurately examine the strongest claim, hypothesis 3.4, resulting from the current interpretation of Beavers (2008), only those items where a corresponding durative and punctual item could be paired together were scored as either predicted or unpredicted under each of the hypotheses generated by considering Beavers (2008) in light of the Visibility Hypothesis (Wilbur et al., 2012) were used for statistical analysis. This decision helped to ensure that the statistical analysis for all of the hypotheses where comparable. Furthermore, this decision helped to prevent

the results associated with any one resultant state from skewing the data. This was of particular concern due to the number of causing events that were collected only with the resultant state CLEAN.

Overall, this reduced the number of constructions considered from the 41 reported in the previous chart to 30 items with 15 pairs. A detailed list of these items as well as their corresponding scores for each of the three hypotheses under consideration can be seen in Appendix B. Here, only an adjusted version of the previous table is presented in table 5.2.

Table 5.2
Adjusted Results of Morpho-Phonological Scoring

Causing Predicate \ Resultant Predicate	Punctual/Telic	Durative/Telic	Durative/Atelic
Punctual/Telic	13	1	1
Durative/Telic	0	0	0
Durative/Atelic	7	7	1

Shaded cells = predicted under Beavers (2008)

x = predicted under Ramchand (2008)

For each hypothesis, the adjusted results where statistically analyzed using a Binomial Distribution in order to determine whether the outcome was just as likely to have been a result of chance rather than an outcome predicted by the hypothesis. This provides a first approximation of how the homomorphic account of resultatives given in Beavers (2008) fared under a VH analysis. The outcome of each hypothesis will be considered separately, and then the different outcomes will be considered together.

The first hypothesis to consider is that given in 3.2, which predicts that if the causing predicate has durative morpho-phonology, then so too should the resultant predicate. If the causing predicate is durative, there's a two-thirds chance the resultant predicate is also durative. For fifteen pairs, then, the mean would be 10 with a standard deviation of 1.83. This is to say that if a random distribution governed only by chance were being observed, one would expect 10, $+/-$ 1.83, of the items with a durative causing event to also have a duarative resultant predicate. In order for the outcome to be considered to have been less probable than mere chance, the actual outcome would ideally be outside of three standard deviations from the mean. However, of the 15 items with a durative causing predicate, only 8 had a corresponding resultant predicate with a durative morpho-phonological form, which actually falls bellow the mean (within two standard deviations). Thus this particular hypothesis does not hold up.

The second hypothesis under consideration was that given in 3.3, according to which the resultant predicate should have a punctual form if the corresponding causing predicate does. Assuming, then, a one-in-three chance for the resultant predicate to match the causing predicate in punctuality, a mean of 5 and standard deviation of 2.24 was calculated. Of the fifteen items with a punctual form, 13 of them had a corresponding resultant predicate with a punctual form. This condition did the best and the outcome fell well above three-standard deviations from the mean, which means it is unlikely to have been an outcome of pure chance. However, this is also the only hypothesis that is valid on both Beavers (2008) and Ramchand (2008)'s account, and therefore does not discriminate between the two.

The last hypothesis that was generated considering Beavers (2008) under the VH was also the strongest claim. Under this claim, if the morpho-phonological form, and hence the corresponding semantics, of the causing predicate was changed from punctual to durative or vice versa, then so, the morpho-phonological form of the resultant predicate should undergo a corresponding change as well. Assuming that each pair had a four-in-nine chance of matching, a mean of 6.66 and a standard

deviation of 2.04 was calculated. Of the fifteen pairs, only 6 of them showed this kind of correspondence, an outcome which does not differ from the mean and would be equally as well predicted under a system governed by pure chance.

Overall, the statistical analyses provided do not favor the account of resultatives presented in Beavers (2008), which is a strictly homomorphic account where gradability features are checked against durativity features. Only one of the three hypotheses that are are entailed by analyzing this account under the VH reached statistical sinifigance, and it is the exact same hypothesis that is a consequence of both Beavers (2008)'s and Ramchand (2008)'s accounts. Overall, the Beavers (2008) does not hold up under this method of analysis. Potential arguments as to why these scores may not provide an accurate analysis of this account will be considered in subsequent discussion sections.

5.1.3   Initial Statistical Analysis of Ramchand (2008) under the VH Analysis

It's now time to turn to a first approximation analysis of the approach to resultative constructions laid out in Ramchand (2008) under the VH approach. Again, the individual hypotheses laid out in Chapter 3 will be considered first before considering the overall set of predictions made by the account.

The first hypothesis that was proposed for examination, 3.5, was identical to 3.3, which has already been examined above. It is the only hypothesis working from Beavers (2008) that matched the observed results at a level well above that of chance.

The second hypothesis generated under Ramchand (2008), 3.6, predicted that if an item had a durative/atelic causing predicate and a punctual/telic resultant predicate, then an event followed by an event interpretation rather than a measuring out interpretation is to be expected. Of the eight items that had this morpho-phonological combination, presented in table 5.3, the impressionistic and anecdotal evaluation is that that interpretation seems appropriate for all eight of the items.

This was not, however, systematically explored in that there was no single test, or set of tests, designed to be able to reliably discriminate between the two interpretations that was applied to all forty one collected items. Even though there was no discriminatory power to them, comments and responses to questions about only the eight items under consideration were consistent with the two sub-event interpretation.

Table 5.3
Durative/Atelic X Punctual/Telic Resultative Constructions

Causing Pred.	Obj.	Resultant Pred.
HAMMER	DUCK	DEAD
HIT	DUCK	DEAD
HIT	FOOT	SWELL
HIT	THUMB	HURT
HIT	TIRE	DEFLATE
LICK	ENVELOPE	CLOSE
SHOOT	DUCK	DEAD
SHOOT	TIRE	DEFLATE

The last hypothesis generated was that if a causing event had a durative/telic form, then the resultant predicate would not have a durative/atelic form. Since no items that had causing predicates with a durative/telic form were collected, this hypothesis cannot be evaluated at this time.

Finally, the total number of expected and unexpected combinations under Ramchand (2008) was compared with the data. For the same 30 items used to evaluate the predictions under Beavers (2008), 29 were scored in accordance with the account of resultatives in Ramchand (2008). Assuming a seven in nine chance of an item falling in line with this analysis, a mean of 23.33 with a standard deviation of 1.83 is found, which puts the results of 28.8 just outside of three standard deviations removed from the mean. However, if the unadjusted data is used, 37 out of 41 items were scored

as allowed under Ramchand (2008), with a calculated mean of 31.89 and a standard deviation of 2.13 and the outcome of 37 falls outside of two but under three standard deviations from the mean. The analysis given to Ramchand (2008)'s account does better, but still does not return results with as high of a confidence level as would be preferred.

5.1.4 Excluded Items

Altogether, six items were excluded from analysis even though they met all the criteria laid out in the methods. A set of three constructions that involved describing various body parts becoming *red* was excluded because they appeared to be essentially the same as another set of constructions with the resultant predicate *swell*, only with more specific information about the resultant predicate supplied. These were excluded in order to prevent double-counting the same items and creating an imbalance in the data. A different set of elicited items that involved the resultant predicate of creating a hole in a wall was also excluded. In this case it was because the cause of creating the holes appeared to be a second object and the requirements on the morpho-phonology were unclear. The item would translate roughly *shoot a hole into the wall*, but it did not involve the *wall* as the object of *shoot*, but rather appeared to involve a *bullet* as the object of shoot and then the *wall* as the object of the *bullet creating a hole*. The last two items that were excluded involved cutting an apple. These were excluded because the resultant predicates appeared to involve whole entity classifiers rather than extension or handling classifiers. If they had been included, there would have been an additional matching pair for the analysis of the hypothesis given in 3.4, but the new total number of matching pairs, 7 would still not have surpassed the new mean of 7.1.

5.2   Scale Structure of Resultant Predicates

Independent of the morpho-phonological analysis, information on the scale struc-
ture of the resultant predicates was gathered in order to help with evaluating the way
in which the VH worked in the data.

Table 5.4
Results of Scale Structure Scoring

Sign	Gradability	Poles	Comp. Scale	Boundedness
CLEAN	Gradable	Bi-Pol.	Absolute	Unbounded
DEAD	Non-Gradable	Bi-Pol	Absolute	Half-Bounded
EXT/CL:DEFLATE	Gradable	Bi-Pol.		Bounded
HURT	Gradable	Other	–	–
RED	Gradable	Other	–	–
SWELL	Gradable	Bi-Pol.		Bounded
'bend-over'	Gradable	Bi-Pol.	Absolute	Bounded
'envelope-close'	Gradable	Bi-Pol.	Absolute	Bounded
'wall-collapse'				

Another observation made about the data is that there was a distinct preference
for items with resultant predicates that transparently coded change-of-state. Only
three of the nine items, CLEAN, HURT and RED, could be used in a stative form.
Of those, RED was preferred in a change-of-state form. Among the items that went
against the expected results under the Ramchand (2008) analysis, three of the four
had resultant predicates that did not transparently encode change-of-state. This
point will be taken up further in the next chapter when the Visibility Hypothesis is
evaluated.

5.3   Description of ASL Resultatives

The results presented so far show that ASL does have resultative constructions, though it does not determine if they are of the SVC or the AP variety. Based on the initial analysis of the data, the account of resultatives given under Beavers (2008) does not hold. Ramchand (2008) better accounts for the morpho-phonological patterns and semantic variety observed. Additionally, items not predicted on either account contain resultant predicates that do not transparently encode change-of-state. Also, there is a gap in the data for causing predicates that have a durative/telic form. Given the size and selectional biases of the data sample, it is difficult to say without further research whether this is an accidental gap in the data or represents a larger trend. These issues as well as further investigation into the application of the Visibility Hypothesis and homomorphism are the subjects of subsequent chapters.

6. EVALUATING THE VH

Before further discussing how the two different approaches fair in handling the data, it is critical to evaluate the Visibility Hypothesis by examining what exactly, the relationship between the morpho-phonological form and the semantic scale structure of the resultant predicates is. In order to do this, it is important to remember that the central claim of the Visibility Hypothesis is that sign languages express the ends of semantic scales via the phonology (Wilbur et al., 2012). In ASL, it is the rapid deceleration at the end of a sign that is associated with the end of a scale (Wilbur, 2003, 2009; Wilbur et al., 2012). Another point that will become important is that at least for verbs, the default interpretation of movement in ASL is the passage of time (Wilbur, 2010). In order to better understand how the Visibility Hypothesis applied to the data, it will also be necessary to examine the uses of end-marking found in the data and the alternations that were observed between property denoting predicates and their change-of-state/activity counterparts.

6.1   End-Marking

End-Marking among items that were found as resultant predicates was used in at least two distinct ways. One was to indicate change-of-state. The other was to provide intensification. The following chart indicates which signs were observed with which kind of end-marking. Based on inquiries about potential phonological variations of the signs, two of the items, DEAD and *'wall-collapse'*, do not appear to have a non-change-of-state morpho-phonological form.

This is a very small data-set and the goal here is not to provide a definitive, detailed analysis of these two uses of end-marking. Rather, the main goal is to provide a preliminary evaluation of whether or not these two forms of end-marking are con-

Table 6.1
Occurrence and Interpretation of End-Marking

Sign	Interpretation
RED	Both
CLEAN	Intensification
DIRTY	Intensification
HURT	Intensification
'wall-collapse'	Change-of-State
'bend-over'	Change-of-State
SWELL	Change-of-State
EXT/CL:DEFLATE	Change-of-State
DEAD	Change-of-State

sistent with the Event Hypothesis, and if so, what impact that fact has on evaluating Beavers (2008) and Ramchand (2008)'s accounts of resultatives. Toward that end, there are two observations to be made. The first observation is that end-marking to indicate change-of-state was, with the exception of RED, only seen in the data with items that had a scale that was at least partially bounded. The second observation is that end-marking used to indicate intensification appears in this data set to prefer items with tracing specifications in the morpho-phonology. Unlike the change-of-state end-marking, this form of intensification may be available to those signs with unbounded scales such as CLEAN and DIRTY, possibly because the endpoints of those scales are normally excluded from reference. End-marking in these cases forces the endpoints of the scale to become available for reference, suggesting that the use of end-marking to indicate intensification may function somewhat like a superlative morpheme. While the exact restrictions on the occurrence and interpretation of the two

kinds of end-marking are not entirely clear, it is apparent that it does correspond to end-of-scale marking and hence supports the Visibility Hypothesis.

The nature of the relationship between the change-of-state interpretation and the scale structure of the predicate is particularly interesting because it provides insight into the relationship between morpho-phonological forms and semantic meaning as well as providing further insight into scale structures.

6.2 Additional Morpho-Phonological Correlates with Scale Structure

At the onset of this project, the default assumption was that if the central claim of Beavers (2008) is correct and gradability is correlated with durativity in the semantics, then the morpho-phonological features associated with durative signs in ASL, namely delimited movement, would also be associated with gradability and that furthermore, the morpho-phonological features associated with punctuality, namely local movements such as [Δ aperture], would be associated with lack of gradability or at least with reference to the end of the scale.

However, what is seen is a complex interaction between the representation of time and scale structure. The key semantic feature represented by the morpho-phonology of atelic events appears not to be duration per say, but duration without change. This default interpretation of movement as the passage of time and of delimited movement in particular as the passage of time without change results in property denoting predicates having morpho-phonological features associated with durative, atelic events. Furthermore, the key semantic feature of telic verbs expressed by the morpho-phonology with changes in aperture, orientation, or setting is change over time. This results in the association of telic morpho-phonological features with change across continuously gradable, bounded scales. These correlations become more apparent if the relationship between a property denoting predicate and its corresponding change-of-state or activity form is considered.

6.3 Similarities with English De-Adjectival Verbs & De-Verbal Adjectives

The dependency that the morpho-phonological form of signs indicating change-of-state have on the underlying scale structure of their property denoting form displays key similarities that Hay et al. (1999) and Kennedy and McNally (2005) note between de-adjectival verbs and their adjective counterparts in English. The main observation was that the verbal counterparts of adjectives with unbounded scale structures have default atelic readings while those with bounded scale structures have default telic readings. This is the same kind of alternation seen between property denoting predicates and their corresponding change-of-state/activity predicates in the ASL data collected. These alternations provide more insight into how the Visibility Hypothesis applies across different semantic categories, what the relationship between event and scale structure is, and what the interaction between these scales and the objects they describe are.

6.3.1 Alternations of an Unbounded-Scale Item

CLEAN appeared to behave as an unbounded scale item in the data collected. The expected activity form, then would have a default atelic reading. Morpho-phonologically speaking, that is exactly what is observed. The activity of cleaning is signed with repeated tracing movements. Under a homomorphic account of telicity, a telic reading would be expected to arise if a bounded affected object is specified, for example if it is made clear that a particular room or table is being cleaned. Ramchand (2008) places such items in the rhematic position, as shown in figure 6.1.

This example will appear again in the discussion of how to evaluate the various homomorphic accounts.

Figure 6.1. Ramchandian Structure of Activity CLEAN
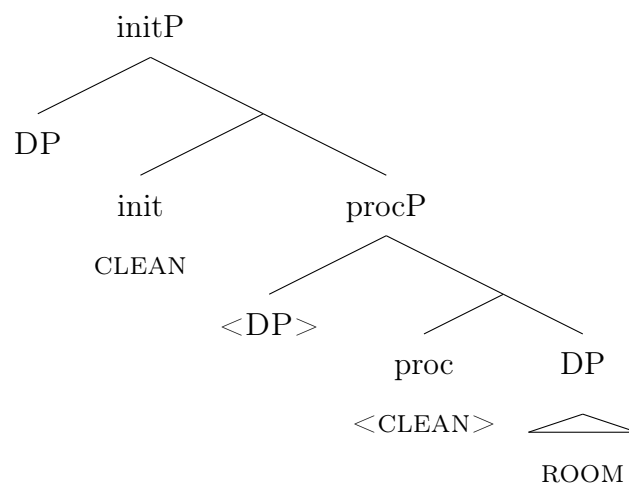
6.3.2 Alternations of a Bounded-Scale Item

When dealing instead with a property denoting predicate that has a bounded scale, it is found that the property denoting predicate exhibits atelic features, while the change-of-property form exhibits telic features. In other words, features associated with continuing through time without change are used with the property denoting predicate and features corresponding to change over time are used to indicate the existence of the scale.

Consider the different but related classifiers present in example 6.1, which were elicited in the context of discussing how a sword is made.

(6.1) *#MARY   METAL   EXT/CL:G-EXTEND   HAMMER*
      Mary   metal   bar.exists   hammer
      EXT/CL:G-DEFLATE   EXT/CL:CLOSE-G-EXTEND
      change.in.volume   thin.bar.exists
      'Mary hammered the metal flat.'

The first classifier, EXT/CL:G-EXTEND, has the handshape depicted in figure 6.2, but instead uses both hands with one moving along the saggital rather than the ventral plane. That is one hand is moving away from the signer and towards someone standing in front of them. The second classifier has the same handshape as the first, but has the movement depicted in 6.3.

Figure 6.2. EXT/CL:G-EXTEND
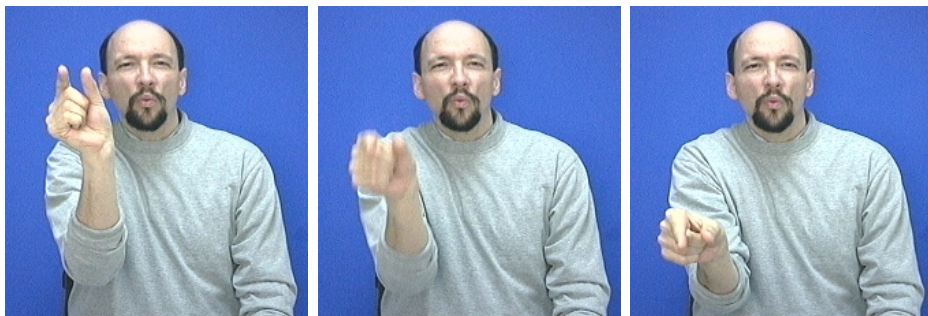
(Used by permission of Dr. Bill Vicars)

Figure 6.3. DEFLATE

(Used by permission of Dr. Bill Vicars)

The difference between the EXTEND and the DEFLATE classifiers is that one indicates the existence and overall shape and volume of the object while the other indicates the change-of-state the object undergoes. Note that the semantic boundary of this sign is supplied by the object being described, which also selects the handshape of the sign. Also, the crucial morpho-phonological distinction between the two signs is within the prosodic features branch and is a difference between [direction> ||] without end-marking and [Δaperture] respectively. Additionally, the change in aperture for the change-of-state form can be modified by the selection of different hand joints in order to convey different degrees of change. It can also take [TM] while changing aperture, with the apparent meaning that the change is happening degree by degree. These potential modifications suggest that the change in aperture is treated like movement through the path of the scale. This means that, like telic activities, it is possible to emphasize either the movement through the scale or the arrival at the end-point.

6.4   Validity of Utilizing the VH to Analyze the Data

Now that the application of the Visibility Hypothesis has been evaluated, the question of whether it was appropriately utilized in analyzing the data and evaluating the claims about resultatives laid forth in Beavers (2008) and Ramchand (2008) should be considered. While items with a bounded scale may surface with a durative/atelic form, they also have a corresponding change-of-state item that has a telic form and

shows the movement through the scale to its boundary. Since these items may be modified to have either durative or punctual morpho-phonology, and hence focus on either the gradability or the boundary of the scale, and since the majority of the resultant predicates in the data involved change-of-state forms, the scoring system used should have accurately captured the relevant properties under consideration.

6.5 Summary

Overall, the Visibility Hypothesis applies to the data acquired during the course of this project. The ends of scales were marked via phonological mapping with end-marking having a different effect depending on the underlying scale structure of the predicate. Additionally, items show alternations between property denoting and change-of-state forms that provide more information about the interaction of event and property scales and how they interact with the items they describe. Finally, these observations justify the continued extension of the Visibility Hypothesis and its use in this study to evaluate the different approaches presented in Beavers (2008) and Ramchand (2008) to resultatives.

7. EVALUATING HOMOMORPHIC APPROACHES TO RESULTATIVES

What was seen in the initial analysis of the data is that that the purely homomorphic account of resultatives in Beavers (2008) does not fully account for all of the data as analyzed under the Visibility Hypothesis. Durativity is not always correlated with gradability in resultative constructions. What is seen instead is that the path of the causing event and resultant state may co-occur with each other along the path of time through which the object of the complex event moves or they may be viewed as adjacent to each other but jointly co-occuring with the path of time. This distinction is better captured by the mixed compositional/homomorphic account of resultatives in Ramchand (2008). Here those differences will be discussed in further detail.

7.1 Cases Demonstrating Correlation

There were a few cases that appeared to visibly demonstrate homomorphism of the event and scale and were analyzable under either account of resultatives. In such cases, gradability is correlated with durativity, but only when these two paths were also seen as co-occurring along the path of overall time of the complex event. Only one case will be discussed in detail here.

7.1.1 Hammering the Metal Flat

Hammering the metal flat is a case where there was a clear relationship between how the hammering event affected the shape of the metal and where the duration of hammering could be seen to effect the gradability of the resultant state. The example under question is as follows:

(7.1) #*MARY   HAMMER   METAL   EXT/CL:G-DEFLATE*
   Mary hammer metal change-in-volume
   'Mary hammered the metal flat.'

In this case, when the causing event was durative, there was an extended change of aperture with end-marking and it was visually clear that the event ended when the end of the scale was reached. When the same object underwent a punctual event of hammering, the sign of the resultant state was modified by selecting a more distal finger joint and hence preventing full movement through the scale to the endpoint. This difference points to the overarching path of time that girds the complex event as being vital for mediating the durativity of the causing event and the gradability of the resultant state and hence giving rise to a homomorphic path where gradability is correlated with durativity and bounded by the scale of the resultant state. An appropriate representation in a Ramchandian framework based on the semantics of the event is depicted in figure 7.1.[1]

While this event is analyzable under either account, under Beavers (2008) the difference between the durative and punctual reading is assumed to be related to underspecification of the lexical items, while under Ramchand (2008), this difference is related to a difference in composition.

7.2   Cases Requiring Another Approach

While some items appeared to correlate durativity with gradability, several items did not. For those items that did not, it appeared that the scale of the causing event and the scale of the resultant state were treated as adjacent and that the new scale was correlated with the time scale of the complex event. The advantage of the Ramchandian system is that the events can be decomposed in such a way as to

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[1] Ramchand (2008)[p. 127] depicts the English *'Karena hammered the metal flat.'* as having a result phrase, but elsewhere lists it as a 'path' resultative, meaning it should only have a process phrase. Here it is depicted as having a result phrase for two reasons. One, to capture the punctual form as well as the durative form being discussed. Two, it seems based on the behavior of items like RED and SICK that change-of-state end-marking in ASL may, under the framework of Ramchand (2008), be associated with the *res* head in general.

Figure 7.1. Representation of HAMMER METAL DEFLATE

*init*P

#MARY

init

HAMMER

*proc*P

METAL

proc

<HAMMER>

*res*P

<METAL>

res

<END-

MARKING>

DEFLATE
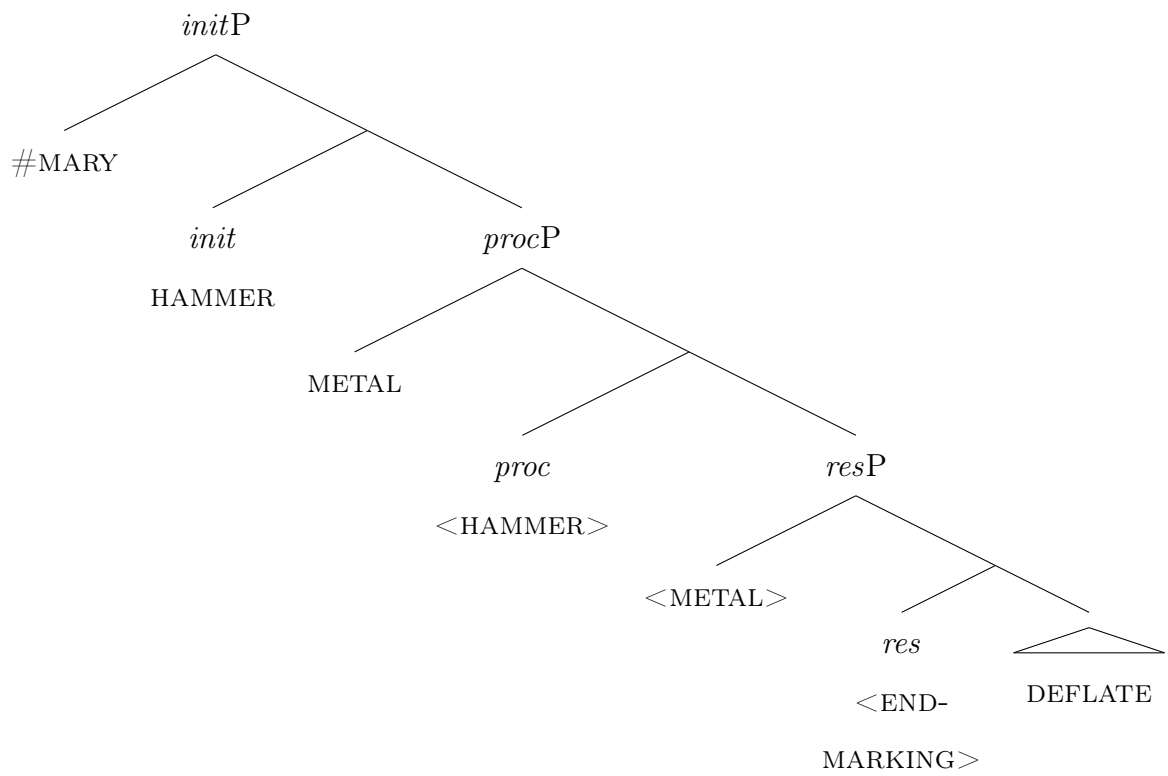
account for this distinction in the resultatives. The former cases should occur in those cases where the scale is rhematic material or doubly associated with a *res* head while also taking up the rhematic position while the latter cases should indicate distinct lexical material occupying the *proc* and *res* heads.

7.2.1   Licking the Envelope Close

There is one event in particular from the data where it was quite evident that the resultant state was not providing a path bounding the event. This was

(7.2) *#JAYLIN   ENVELOPE   HANDL-CL:B-LICK   HANDL-CL:B-CLOSE*
      Jaylin   envelope   lick   close
      'Jaylin licked the envelope closed.'

.

The act of licking the envelope does not continue until the envelope is closed in the way that punching a wall down will continue until the wall is down. Yet if only a homomorphic account of resultatives is available, that is the semantic interpretation one would expect. Ramchand (2008), however, provides another option for the semantic composition of the resultative where different lexical content saturates the *proc* and *res* heads. The change-of-state end-marking found on CLOSE indicates the representation depicted in figure 7.2.

Again, so long as underassociation of features is not involved, e_2 and e_3 may not overlap if they are not unified by the same lexical content but must instead be understood as sequential. This is exactly the interpretation that seems to best express the resultative construction under consideration.

7.2.2   Painting the Chair Red

RED was unique among the result states observed in that while it is gradable and therefore does have some kind of scale structure, the affected object is not required to travel through other degrees contained within the scale in order to arrive at the

Figure 7.2. Representation of ENVELOPE LICK CLOSE
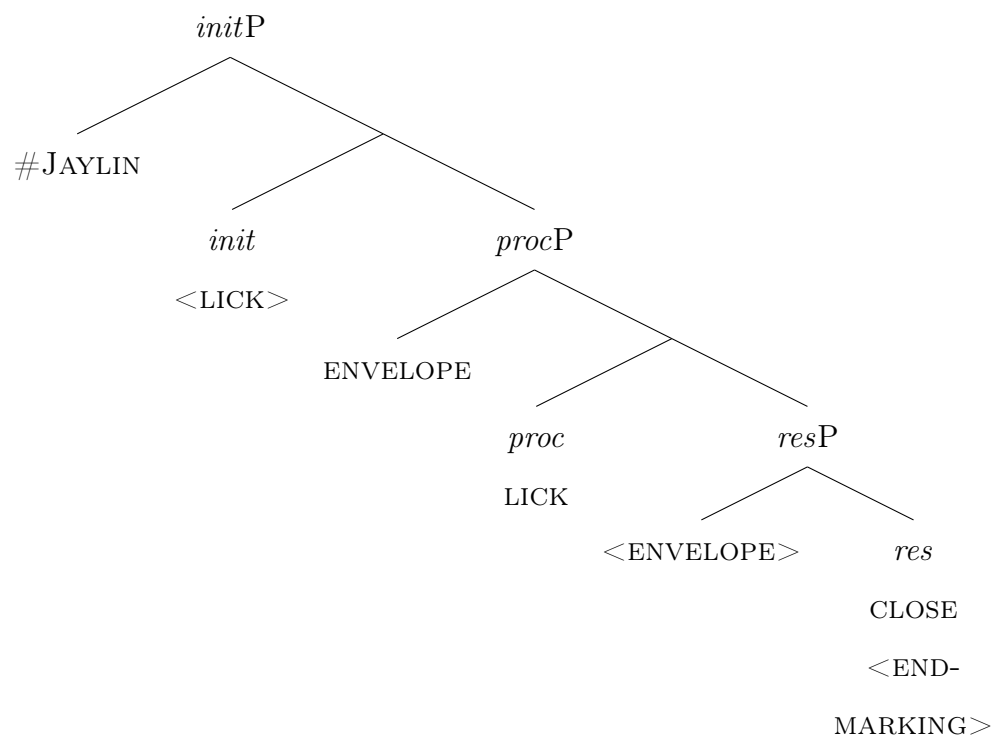
new state. For instance, an item that is blue does not need to go backwards through the rainbow and become green, then yellow, and then orange before becoming red. Likewise for a person who becomes sick, it is possible to become suddenly very ill and just as suddenly to feel better without undergoing any intermediary state. A salient feature of this scale is that it is non-monotonic. This is in contrast with other scales seen in the study, like the scale of thickness, which are monotonic and where the affected object must become thinner by degrees before achieving its new endpoint. This difference in the scale of RED might explain why it is able to take both intensification and change-of-state end-marking.

Because of this difference in scale structure, and hence the semantic interpretation available, I would like to suggest that the change-of-state end-marking is able to independently license a *res* head in the Ramchandian framework and that the representation of

(7.3) *JOHN PAINT CHAIR RED*
John   paint   chair   red
'*John painted the chair red.*'

in which RED is change-of state end-marked is that seen in figure 7.3.

Again, the appropriate interpretation is not that the chair is becoming more and more red, but rather that more and more of the chair is becoming red. The Ramchandian system requires that if e_2 and e_3, that is the *proc* and *res* heads, are not filled by the same lexical content, then they may not overlap in duration, though they may share a transition point. I would argue that this is actually the case here since RED is not seen as applying to the chair until after the event of painting is finished. Another possibility is RED is only in the *res* head and that CHAIR is additionally in the rhematic position below RED. This might provide a better explanation of how the chair serves as a path for the complex-event.

Figure 7.3. Representation of PAINT CHAIR RED
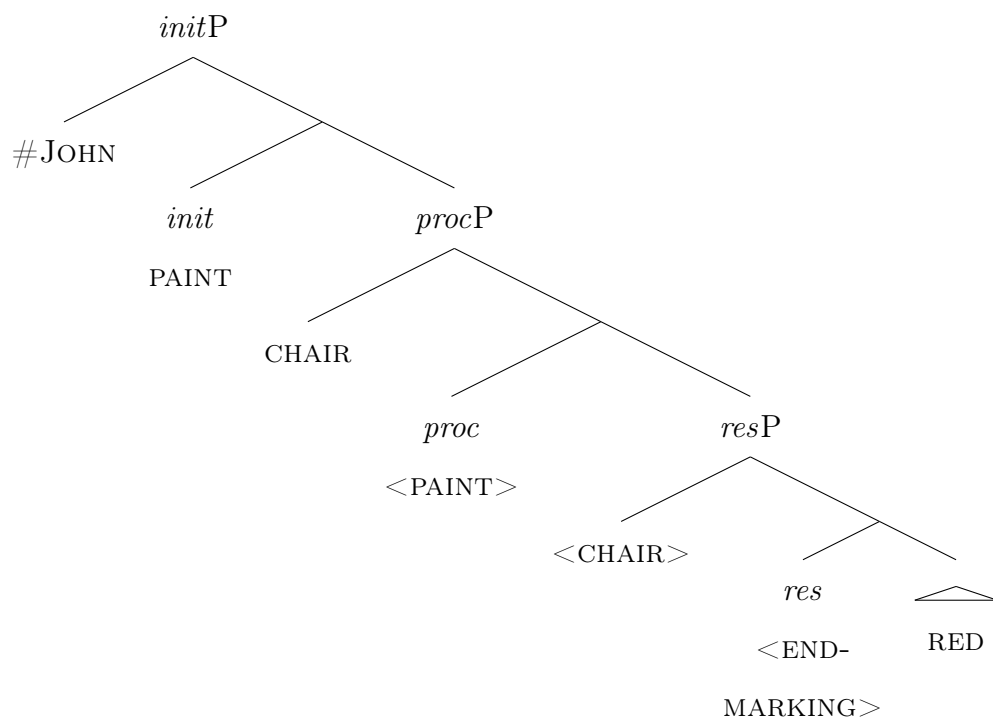
7.3 Difficulties for Homomorphic Approaches

7.3.1 The Problem with Washing the Clothes Clean

There was one set of resultative constructions that posed difficulties for both accounts. These were items containing the result state CLEAN. Under both accounts, and assuming a telic interpretation for the whole event, CLEAN is expected to be marked with rapid deceleration in at least one condition under a VH analysis because it is the bounded scale of CLEAN that would be expected to provide any telicity effects. Additionally, under Beavers (2008)'s account, CLEAN is expected to exhibit morpho-phonological characteristics associated with punctuality if the preceding causing event is punctual. However, none of the expectations set up by these accounts are met.

Two constructions were elicited, one with a durative and one with a punctual form of the causing predicate.

(7.4) #JAN-*i* IX-3-*i* CLOTHES MACHINE-WASH CLEAN

Jan washed the clothes clean.

The durative form involved a contemporary washing machine while the punctual form involved a hypothetical context where a washing machine is invented in the future that can clean clothes instantaneously. The two forms of the causing predicates did not use the same lexical item, but did show the expected contrasts of both durativity and telicity in their morpho-phonological features; however, the sign CLEAN showed no contrast, nor was it replaced by a lexical item that did provide the contrast.

Under Beavers (2008) this is unexpected because the morpho-phonological forms of both the causing predicate and the resultant predicate are expected to match in terms of durativity/punctuality, and yet they do not. These results are additionally unexpected under both accounts because CLEAN does not demonstrate the expected properties of a bounded scale. Instead, it demonstrates behavior associated with an unbounded, absolute scale.

Figure 7.4. Representation of WASH TABLE CLEAN
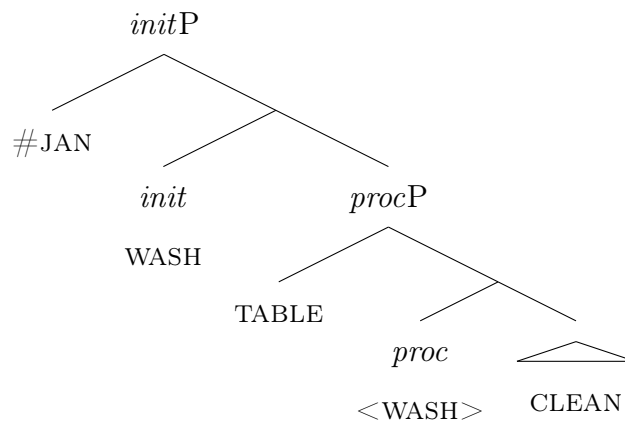
Both Beavers (2008) and Ramchand (2008)'s accounts would predict a bounded scale in this case in order to provide a limit for the act of cleaning. While Ramchand (2008)'s account could allow for an analysis such as that given to example 7.3, there is nothing in this example to suggest the presence of a *res* head. The durative/atelic form of the sign MACHINE-WASH does not inherently carry *res* features, and unlike RED, there is no additional marking on CLEAN to suggest that a *res* head is present. Therefore, even on an account following Ramchand (2008), any telicity effects that may arise are predicted to come from CLEAN having a bound scale and the appropriate representation is that shown in figure 7.4.

As far as the scale structure of the non-activity form of CLEAN is concerned, questions about how to express *completely clean* were consistently responded to with explanations that CLEAN means CLEAN. Additionally, as discussed in the previous section, the activity form of CLEAN shows clear morpho-phonological characteristics associated with atelicity, again an indication of an unbounded scale. Also, when asked how to express that something is only a *little clean* or *kinda clean*, signers consistently responded that objects cannot be only a *little-bit* or *kinda clean* and that furthermore, if an item is not CLEAN, then it is DIRTY. This indicates an absolute

scale. These responses correspond with analyses of English *clean*'s scale structure being absolute and involving a maximum standard, but differs in treatment as an unbounded rather than an upper-bounded scale (Wechsler, 2005; Ramchand, 2008; Beavers, 2008). Again, this is not what is expected under any of the homomorphic accounts being considered.

7.3.2   Potential Solutions

What options are then available for analyzing this item? One could argue that the fact that questions about how to express the concept of *completely clean* were met with responses that CLEAN means CLEAN and that if something is CLEAN it cannot be DIRTY at all is actually evidence that the scale is bounded on one end. One is then left, however, with the difficulty of explaining why the activity form of CLEAN shows atelic morpho-phonology.

While this solution would resolve the issues this item presents to the homomorphic accounts of resultative constructions, it creates different problems for explaining the morpho-phonological relationship between the property denoting predicate and the activity version of the predicate CLEAN. If Hay et al. (1999)'s account of the relationship between scalar structures and activities is correct, then this item poses a difficulty for the Visibility Hypothesis (Wilbur, 2009). On the other hand, if the Visibility Hypothesis of Wilbur et al. (2012) is correct, then this item poses a difficulty for Hay et al. (1999).

Recall that under Hay et al. (1999) and in the follow-up work of Kennedy and McNally (2005), the relationship between scale structures and events is such that if the scale structure of the state CLEAN is bounded, then the activity form is expected to have a telic reading by default (that is a bound naturally available provided no other considerations force it to not be reached), while if the scale structure of the state CLEAN is unbounded, then the activity form is expected to have a default atelic reading.

If both the proposed solution, that the stative CLEAN is actually bounded on one end, and the claims in Hay et al. (1999) and subsequent work are correct, then this item presents a challenge for the VH in Wilbur et al. (2012) because, under this account and contrary to fact, the morpho-phonological form of the activity CLEAN should be telic.

On the other hand, if both the previously preposed solution and the VH are correct, then the item poses a challenge to Hay et al. (1999) and subsequent work along those lines because it would present a case where a bounded scale structure has an actiity counterpart that receives an atelic morpho-phonological form, and supposedly reading, by default.

There are two possible ways to reconcile these issues. One is to interpret Hay et al. (1999) the way Ramchand (2008) does, though that still leaves a few unanswered questions in terms of how to interpret the morpho-phonological distribution seen in the data. The other is to examine the nature of absolute scales for a potential explanation to the current conundrum. The goal here will not be to choose between them, but to present both in order to indicate future research directions.

Ramchand (2008) follows Hay et al. (1999)'s explanation that the mixed telicity effects of de-adjectival verbs are due to the scale structure of the adjective to indicate that there is an underlying XP serving as complement to the *proc*P of the de-adjectival verb and that this XP provides the path and the bound that gives rise to the observed telicity effects. This relationship is depicted in figure 7.5. If this is the case, then what would be predicted for the activity form of CLEAN in ASL is that it have an atelic form, which is the case. Also, as has already been discussed, the signs of property denoting predicates tend not to indicate their scale structure on their own but must be taken together with change-of-state forms, so the fact that CLEAN is bounded but does not have any overt morpho-phonological marking would not necessarily be problematic. What is problematic is explaining why a property denoting predicate, like EXT/CL:G-EXTEND, appears to have a corresponding change of state predicate, DEFLATE, that indicates the scale of the property denoting predicate while CLEAN does not. This

Figure 7.5. Relationship Between $Clean_V$ and $Clean_A$ under Ramchand (2008)

```
                        proc
                       /    \
                      /      \
              UNDERGOER        \
                        proc    AP
                      <clean>   / \
                               /   \
                        (scale of cleanliness)
```
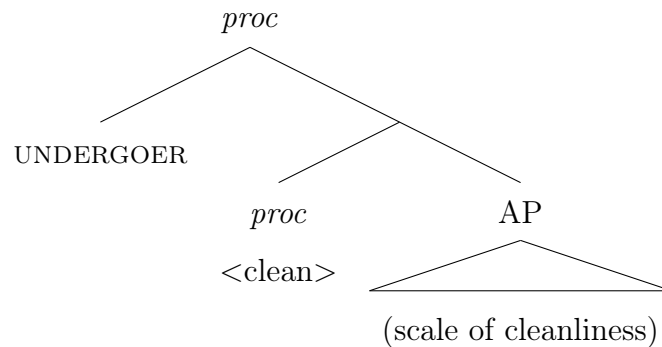
(cf. the representation of the de-adjectival verb *dry* in (Ramchand, 2008)[p. 90])

may be related to CLEAN being only upper-bounded and EXT/CL:G-EXTEND having both an upper- and lower-bound determined by the object it is describing. It also complicates explaining the distribution of the intensification form of end-marking since elsewhere it was seen with unbounded but not bounded items.

Another potential answer lies in considering whether absolute scales with maximal standard elements on one end and minimal standard elements on the other may not be required to be bounded on the end with a maximal standard and may instead have an unbounded scale. This may seem counter-intuitive at first, but it may also help explain why these kinds of items are particularly prone to "imprecise" usage. The "imprecise" usage is actually the default and the "precise" usage requires forcing reference of a normally unreferenceable end-point of the scale. It may be that in the case of a completely unbounded absolute scale that also has items in a maximum/minimum standards relationship that the contextual standards of the *pos* morpheme interact with the scale to adjust the boundary between the two items on the scale.

Consider that when a teenager is arguing with a parent over whether or not their room is clean, they are not arguing over the cleanliness of the room, per se, but over

what the contextually appropriate standards for the acceptable level of dirtiness of the room are.

The nature of the absolute scale relationship existing between a minimal and maximal standards element may still be able to supply a semantic boundary, however. Whether there is further specification of that boundary in the semantic representation of the lexical items that makes the boundary between pairs like *dirty* and *clean* explicit or it is inferred due to their relationship is not of importance here. That the relationship between the two items supplies the boundary for the resultative construction is definitely plausible and not limited to providing an explanation for this pair's behavior.

Consider the completely bounded absolute scale items from English, *open* and *closed*, which are also a minimal/maximum standard relational pair. While the verbal counterparts of both items receive telic readings, notice that when *open* is used as a verb, it does not require that the end of the adjectival scale be reached in order to receive its telic reading, only that the boundary between *closed* and *open* be crossed. It is also not the case that the default reading is that the door reached that boundary the way it is for other bounded items, like *flatten*.

If it is the case that a relevant boundary can be supplied due to the minimum/maximum relationship between the two items, it could account for the data seen here. DIRTY and CLEAN can both receive intensification end-marking because they are both unbounded. CLEAN behaves differently than EXT/CL:G-EXTEND because CLEAN is unbounded while EXT/CL:G-EXTEND is bounded. CLEAN still provides a relevant end-point for the resultative construction (and for interpretations of its activity form) because the boundary is supplied by its contrast with DIRTY.

It is not possible with the data at hand to decide here whether either of these approaches can satisfactorily resolve the issue. What is possible, though, is to consider what information would be necessary to decide between them and determine if either is applicable. More research is required on the distribution and semantics of the intensification form of end-marking as well as on the relationship between the scale

structure of property denoting predicates and their morpho-phonological variations in ASL. Additionally, it may be that issues of lexical category are obscuring the facts at hand and there are useful distinctions that could be made when more information is known about how ASL categorizes lexical items in the syntax.

7.4   Validity of Applying Beavers (2008) to ASL

One potential argument that could be made at this point is that the reason the account of resultatives provided under Ramchand (2008) provides a better account of the data is that Beavers (2008)'s account is only meant to apply to situations like that in English where the item following the verb is some non-verbal element. ASL, on the other hand, being an SVC language, does not have the same set of constraints if the second element is verbal. If this was the case, however, the example of 7.2 should not have an acceptable counterpart resultative construction in English. However, it does and the item receives the same interpretation, which is not one of homomorphism. This suggests that the fact that ASL is an SVC language is not the only reason why the mixed compositional approach to resultatives in Ramchand (2008) works better for the data.

7.5   Summary

Examination of those cases which do not adhere to the predictions made by Beavers (2008) as analyzed under the Visibility Hypothesis (Wilbur et al., 2012) show that the framework of Ramchand (2008) may be better able to model the results obtained in this study. Furthermore, the change-of-state end-marking in ASL appears to correspond to the *res* head in the Ramchandian framework. While it is possible for there to be significant structural differences that determine when a resultative should or should not be interpreted as homomorphic, the differences rely on the composition of the event rather than underspecification of features of the lexi-

cal items involved. Homomorphic constraints do not always apply to selected object resultative constructions.

8. LIMITATIONS OF THE CURRENT STUDY

The current study was limited in three obvious ways. First, only a small set of causing and resultant predicates was used. Second, the syntactic analysis was limited to the use of wh-cleft constructions. Last, the phonetic/phonological analysis was limited to visually-salient properties of manual signs. Each limitation suggests areas where further research is needed.

8.1 Limited Sample-Set

The first limitation of this study is the number of types of resultatives examined through elicitation. This method always runs the risk of unintended bias. Ideally, a systematic corpus search such as that done in Boas (2003) for English and German could be conducted in the future in order to supplement this study. Even more ideally, it would not be limited to resultatives that occur frequently in the literature on the topic, but would be able to catch all resultatives that exist in that corpus. Such a study, however, would require a comprehensive corpus tagged in a manner that would facilitate such a search. As far as I know, such a corpus does not exist even for the more extensively studied and documented language of English. The more reasonable next step would be to develop a larger list of potential resultative constructions to investigate, including non-selected object resultatives, which this study largely did not treat.

8.2 Limited Syntactic Analysis

The second obvious limitation was the extent of the syntactic analysis. Because the current study was focused on the semantics of the resultative constructions, the

only syntactic analysis that was carried out was for the purpose of determining to as great a degree of certainty as possible that the causing predicate and resultant predicate fell within the same CP. Additional investigations into the syntax of the constructions used in this study may reveal significant differences between items that could require revisiting the current semantic analysis.

8.3   Limited Phonetic/Phonological Analysis

Finally, the current study was also limited in the detail of its phonetic analysis, both since no motion capture data was used and also since little attention was paid to the nonmanuals. It was obvious, however, that mouth gestures were contributing valuable information, such as the size of objects described with extension classifiers, and the intensity of an activity or state. Their exact role and contribution however, were not analyzed in this study.

9. FUTURE RESEARCH

Besides those areas outlined above, the study highlighted additional questions and issues that call for further research including the distribution and semantic behavior of manual intensifiers, the structure of comparatives, the syntactic category of lexical items, the scale structure of property denoting predicates and the semantics of resultative constructions. Each of these provides an opportunity to further examine interface issues between the morpho-phonology, semantics, and syntax, particularly in ASL.

9.1 Distribution of Manual Intensifiers

During the course of the study, one unexpected outcome unrelated to the resultative constructions was the distribution and behavior of the manual signs TRUE, WOW and Y-OO that were used to acquire evidence as to the gradability of the resultant states. While it was clear that when the interviewer used or asked about TRUE in connection with a predicate that the interviewees understood it to be a question about intensification, responses frequently offered a different modifying sign or involved changes to the predicate in question. Responses also tended to indicate that the sign may function more as an affirmative than as an intensifier. Additionally, the distribution of WOW was rather restricted, though the exact rules governing that restriction were unclear. It could be related to the polarity of the item or to signer evaluation or some other cause. Of the three, Y-OO was the least restricted. So while the use of these items did fulfill their intended purpose for this study, it was also apparent that further examination of their uses and distributional patterns may contribute to a better understanding of the effects of scale structure in ASL.

9.2 Comparatives

Related to the question of the scale structure of property denoting predicates in ASL, further work needs to be done on the structure of comparatives in ASL. In particular, whether the language does express the concept through conjoined comparatives of the type laid out in Stassen (1985) should be determined. In addition to providing additional contexts, finding out how an explicit, quantified difference would be expressed may be one way to help in such an endeavour.

9.3 Lexical Categories & Syntactic Structure

Another question this study has raised is what, if any, effect distinctions in lexical category may have on the interpretation of these results. Further studies comparing the patterns of distribution and restrictions on resultative constructions in other attested SVC languages that are reported to have a clear distinction between the lexical categories of verbs and adjectives would be helpful towards that aim. (Though it may turn out that lack of clear distinctions between verbs and adjectives is itself a hallmark of SVC languages, particularly as distinctions between various kinds of SVC's become more fine-grained and the definition continues to take on a more focused, narrow meaning.)

Additionally, more consideration needs to be given to the underlying syntactic construction of these items. Tests involving negation, aspect, time adverbials, and scope would be particularly useful in this endeavor.

9.4 Scale Structure of Property Denoting Predicates

This study also raised several issues concerning the scale structure of property denoting predicates in general and in ASL in particular. For ASL, there is no good linguistic description of comparative and superlative formation, information that would go a long ways towards supplying a bigger picture of the scale structure of particular

items in the language as well as how the Visibility Hypothesis works across semantic scales.

Another issue noted in the data is that many property denoting predicates do not come in readily identifiable antonym pairs. How the scale structure of such items should be determined and what predictions that would make about their compatibility with resultative constructions is unclear. In particular, the effect of whether or not a scale is monotonic needs further investigation.

One general area of semantic analysis that was discussed at length is how the relationship between items may still be able to provide relevant boundaries along a scale even if the items do not have a completely bounded scale structure. In particular, the relationship between maximal and minimal requirement pairs was suggested to contain an inherent boundary along the scale.

9.5 Semantics of Resultative Constructions

In terms of future research directly related to the semantic restrictions on resultative constructions, this study limited itself to selected object resultatives. Further studies investigating whether ASL consistently allows for unselected object resultatives and whether those contain overtly marked res features would also help with further testing the Ramchandian account of resultatives and of refining the Visibility Hypothesis. Additionally, determining the appropriate representation of deadjectival verbs and deverbal adjectives under a Ramchandian framework is another area for future research and one that could further illuminate syntax-semantic interface issues.

10. CONCLUSION

This study showed that resultative constructions, understood broadly, do exist in ASL and provided a first approximation of their morpho-phonologcial forms. This characterization contributes to further refining the Visibility Hypothesis for sign languages, and to a more accurate model of the semantic constraints applied to resultative constructions. All of these findings contribute to a better understanding of the relationship between scale and event structure.

The first outcome of this study was a descriptive account of what resultative constructions look like in ASL. The constructions presented here contained two distinct predicates describing the same object, one predicate indicating an event done to the object that caused the object to become the second predicate. These constructions passed a wh-cleft test indicating that both predicates formed a single constituent at the CP level. The most common morpho-phonological form found in the data set was for both the causing and resultant predicate to be punctual/telic. The most common form of the resultant predicate was for it to transparently show change-of-state and involve a bounded scale, which may suggest that many of the constructions were SVCs.

Another outcome of this study was the finding of additional evidence to support the Visibility Hypothesis of Wilbur et al. (2012). For those items occurring as resultant predicates, morpho-phonological end-marking did consistently mark the end of a scale, and more importantly, the ends of scales were consistently marked. Morpho-phonological end-marking was found with two distinct meanings, one corresponding to intensification and one to change-of-state. Both of these forms have been previously reported in the literature as early as Klima and Bellugi (1979). However, here such forms were compared with information gathered about the scale structure of the items. The preliminary observation provided here is that it appears that the change-

of-state form requires either a non-monotonic scale, or for a bound on a monotonic scale to be available, while the intensification form requires an open scale. Finally, it was seen that property denoting predicates have a largely predictable change-of-state or activity alternation that depends on the scale structure of the property denoting predicate and that these alternations both support the VH and accounts relating event and scale structure, such as Hay et al. (1999) and Kennedy and McNally (2005).

Finally, this study provided a way to evaluate two different sets of claims about the semantic restrictions placed on resultative constructions. The first set of claims, laid out in Beavers (2008), is a strictly homomorphic account that correlates gradability with durativity and where the scale of the resultant predicate serves as a way of measuring out the length of the causing event. The second set of claims, laid out in Ramchand (2008)'s account of resultatives, also supposes a homomorphic approach to resultatives in some cases, but allows for a more complex set of interactions and semantic interpretations. One of the different semantic interpretations available under Ramchand (2008) is that of two different sequential sub-events rather than only one event that carries on until the end of a scale provided by the resultant predicate is reached. It was seen that while there are occasions where the causing event and the resultant state illustrate homomorphism and where the scale of the resultant state behaves like a path, there are also cases that could not be accounted for on a purely homomorphic approach. There were some items that were not predicted under either approach, but these formed a coherent sub-group of items that have resultant predicates with unbounded scales but where there may be boundaries within the scale that fulfill the appropriate semantic requirements. Overall, Ramchand (2008) fared the best in handling the data.

APPENDICES

A. INITIAL RESULTS

Table A.1: Results by Causing Predicate

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
BRUSH	SUIT	CLEAN	durative/atelic x durative/atelic
CUT	APPLE	'pieces'	
CUT	APPLE	'pieces'	
DUST	TABLE	CLEAN	durative/atelic x durative/atelic
DYE	SHIRT	RED	durative/atelic x durative/telic
DIP	SHIRT	RED	punctual/telic x durative/telic
HAMMER	DUCK	DEAD	durative/atelic x punctual/telic
HAMMER	DUCK	DEAD	punctual/telic x punctual/telic
HAMMER	METAL	DEFLATE	durative/atelic x durative/telic
HAMMER	METAL	DEFLATE	punctual/telic x punctual/telic
HAMMER	FOOT	SWELL	punctual/telic x punctual/telic
HAMMER	FOOT	RED-SWELL	
HAMMER	THUMB	(#)HURT[2]	punctual/telic x durative/atelic
HAMMER	TIRE	DEFLATE	durative/atelic x durative/telic
HAMMER	TIRE	DEFLATE	punctual/telic x punctual/telic
HAMMER	WALL	'wall-collapse'	durative/atelic x durative/telic

Table A.1: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
HAMMER	WALL	'wall-collapse'	punctual/telic x punctual/telic [3]
HIT	DUCK	DEAD	durative/atelic x punctual/telic
HIT	DUCK	DEAD	punctual/telic x punctual/telic
HIT	FOOT	RED-SWELL	
HIT	FOOT	SWELL	durative/atelic x punctual/telic
HIT	FOOT	SWELL	punctual/telic x punctual/telic
HIT	THUMB	(#)HURT[2]	durative/atelic x punctual/telic
HIT	THUMB	(#)HURT[2]	punctual/telic x punctual/telic
HIT	TIRE	DEFLATE	durative/atelic x punctual/telic
HIT	TIRE	DEFLATE	punctual/telic x punctual/telic
HIT	WALL	'wall-collapse'	durative/atelic x durative/telic
HIT	WALL	'wall-collapse'	punctual/telic x punctual/telic[3]
LICK	ENVELOPE	CLOSE	durative/atelic x punctual/telic
PAINT	CHAIR	RED	durative/atelic x durative/telic
SCRAPE	TABLE	CLEAN	durative/atelic x durative/atelic
SHOOT	DUCK	DEAD	durative/atelic x punctual/telic

Table A.1: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
SHOOT	DUCK	DEAD	punctual/telic x punctual/telic
SHOOT	FOOT	RED-SWELL	
SHOOT	FOOT	SWELL	punctual/telic x punctual/telic
SHOOT	THUMB	(#)HURT[2]	punctual/telic x durative/atelic
SHOOT	TIRE	DEFLATE	durative/atelic x punctual/telic
SHOOT	TIRE	DEFLATE	punctual/telic x punctual/telic
SHOOT	WALL	HOLE	
SHOOT'machine-gun'	WALL	'wall-collapse'	durative/atelic x durative/telic
SHOOT'cannon'	WALL	'wall-collapse'	punctual/telic x punctual/telic
STOMP	FLOWER	'bend-over'	durative/atelic x durative/telic
STOMP	FLOWER	'bend-over'	punctual/telic x punctual/telic
VACUUM	#CARPET	CLEAN	
WASH'by-machine'	CLOTHES	CLEAN	durative/atelic x durative/atelic
WASH'by-machine'	CLOTHES	CLEAN	punctual/telic x durative/atelic[4]
WASH'by-hand'	DISH	CLEAN	durative/atelic x durative/atelic
WASH	TABLE	CLEAN	durative/atelic x durative/atelic

Table A.2: Results by Resultant Predicate

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
STOMP	FLOWER	'bend-over'	durative/atelic x durative/telic
STOMP	FLOWER	'bend-over'	punctual/telic x punctual/telic
VACUUM	#CARPET	CLEAN	
WASH'by-machine'	CLOTHES	CLEAN	durative/atelic x durative/atelic
WASH'by-machine'	CLOTHES	CLEAN	punctual/telic x durative/atelic[4]
WASH'by-hand'	DISH	CLEAN	durative/atelic x durative/atelic
BRUSH	SUIT	CLEAN	durative/atelic x durative/atelic
DUST	TABLE	CLEAN	durative/atelic x durative/atelic
SCRAPE	TABLE	CLEAN	durative/atelic x durative/atelic
WASH	TABLE	CLEAN	durative/atelic x durative/atelic
LICK	ENVELOPE	CLOSE	durative/atelic x punctual/telic
HAMMER	DUCK	DEAD	durative/atelic x punctual/telic
HAMMER	DUCK	DEAD	punctual/telic x punctual/telic
HIT	DUCK	DEAD	durative/atelic x punctual/telic
HIT	DUCK	DEAD	punctual/telic x punctual/telic
SHOOT	DUCK	DEAD	durative/atelic x punctual/telic

Table A.2: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
SHOOT	DUCK	DEAD	punctual/telic x punctual/telic
HAMMER	METAL	DEFLATE	durative/atelic x durative/telic
HAMMER	METAL	DEFLATE	punctual/telic x punctual/telic
HAMMER	TIRE	DEFLATE	durative/atelic x durative/telic
HAMMER	TIRE	DEFLATE	punctual/telic x punctual/telic
HIT	TIRE	DEFLATE	durative/atelic x punctual/telic
HIT	TIRE	DEFLATE	punctual/telic x punctual/telic
SHOOT	TIRE	DEFLATE	durative/atelic x punctual/telic
SHOOT	TIRE	DEFLATE	punctual/telic x punctual/telic
HAMMER	WALL	'wall-collapse'	durative/atelic x durative/telic
HAMMER	WALL	'wall-collapse'	punctual/telic x punctual/telic [3]
HIT	WALL	'wall-collapse'	durative/atelic x durative/telic
HIT	WALL	'wall-collapse'	punctual/telic x punctual/telic[3]
SHOOT'machine-gun'	WALL	'wall-collapse'	durative/atelic x durative/telic
SHOOT'cannon'	WALL	'wall-collapse'	punctual/telic x punctual/telic
HAMMER	THUMB	(#)HURT[2]	punctual/telic x durative/atelic

Table A.2: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms[1]
HIT	THUMB	(#)HURT[2]	durative/atelic x punctual/telic
HIT	THUMB	(#)HURT[2]	punctual/telic x punctual/telic
SHOOT	THUMB	(#)HURT[2]	punctual/telic x durative/atelic
CUT	APPLE	'pieces'	
CUT	APPLE	'pieces'	
PAINT	CHAIR	RED	durative/atelic x durative/telic
DYE	SHIRT	RED	durative/atelic x durative/telic
DIP	SHIRT	RED	punctual/telic x durative/telic
HAMMER	FOOT	RED-SWELL	
HIT	FOOT	RED-SWELL	
SHOOT	FOOT	RED-SWELL	
HAMMER	FOOT	SWELL	punctual/telic x punctual/telic
HIT	FOOT	SWELL	durative/atelic x punctual/telic
HIT	FOOT	SWELL	punctual/telic x punctual/telic
SHOOT	FOOT	SWELL	punctual/telic x punctual/telic

Table A.3: Results by Forms

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms
BRUSH	SUIT	CLEAN	durative/atelic x durative/atelic
DUST	TABLE	CLEAN	durative/atelic x durative/atelic
SCRAPE	TABLE	CLEAN	durative/atelic x durative/atelic
WASH'by-machine'	CLOTHES	CLEAN	durative/atelic x durative/atelic
WASH'by-hand'	DISH	CLEAN	durative/atelic x durative/atelic
WASH	TABLE	CLEAN	durative/atelic x durative/atelic
DYE	SHIRT	RED	durative/atelic x durative/telic
HAMMER	METAL	DEFLATE	durative/atelic x durative/telic
HAMMER	TIRE	DEFLATE	durative/atelic x durative/telic
HAMMER	WALL	'wall-collapse'	durative/atelic x durative/telic
HIT	WALL	'wall-collapse'	durative/atelic x durative/telic
SHOOT'machine-gun'	WALL	'wall-collapse'	durative/atelic x durative/telic
PAINT	CHAIR	RED	durative/atelic x durative/telic
STOMP	FLOWER	'bend-over'	durative/atelic x durative/telic
HAMMER	DUCK	DEAD	durative/atelic x punctual/telic
HIT	DUCK	DEAD	durative/atelic x punctual/telic

Table A.3: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms
HIT	FOOT	SWELL	durative/atelic x punctual/telic
HIT	THUMB	(#)HURT[2]	durative/atelic x punctual/telic
HIT	TIRE	DEFLATE	durative/atelic x punctual/telic
LICK	ENVELOPE	CLOSE	durative/atelic x punctual/telic
SHOOT	DUCK	DEAD	durative/atelic x punctual/telic
SHOOT	TIRE	DEFLATE	durative/atelic x punctual/telic
HAMMER	THUMB	(#)HURT[2]	punctual/telic x durative/atelic
SHOOT	THUMB	(#)HURT[2]	punctual/telic x durative/atelic
WASH'by-machine'	CLOTHES	CLEAN	punctual/telic x durative/atelic[4]
DIP	SHIRT	RED	punctual/telic x durative/telic
SHOOT'cannon'	WALL	'wall-collapse'	punctual/telic x punctual/telic
HAMMER	DUCK	DEAD	punctual/telic x punctual/telic
HAMMER	FOOT	SWELL	punctual/telic x punctual/telic
HAMMER	METAL	DEFLATE	punctual/telic x punctual/telic
HAMMER	TIRE	DEFLATE	punctual/telic x punctual/telic
HAMMER	WALL	'wall-collapse'	punctual/telic x punctual/telic[3]

Table A.3: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms
HIT	DUCK	DEAD	punctual/telic x punctual/telic
HIT	FOOT	SWELL	punctual/telic x punctual/telic
HIT	THUMB	(#)HURT[2]	punctual/telic x punctual/telic
HIT	TIRE	DEFLATE	punctual/telic x punctual/telic
HIT	WALL	'wall-collapse'	punctual/telic x punctual/telic[3]
SHOOT	DUCK	DEAD	punctual/telic x punctual/telic
SHOOT	FOOT	SWELL	punctual/telic x punctual/telic
SHOOT	TIRE	DEFLATE	punctual/telic x punctual/telic
STOMP	FLOWER	'bend-over'	punctual/telic x punctual/telic
CUT	APPLE	'pieces'	
CUT	APPLE	'pieces'	
HAMMER	FOOT	RED-SWELL	
HIT	FOOT	RED-SWELL	
SHOOT	FOOT	RED-SWELL	
SHOOT	WALL	HOLE	

[1]Lack of forms indicates item was not included in Morpho-phonological Scoring. See Ch. 5 for details.

[2]Signers varied in their preference. The morpho-phonological form indicates the results for HURT. #HURT was not scored.

[3]These forms required a scenario where a superhero, such as Superman, was performing the action.

[4]These forms involved a hypothetical machine in the future that can clean clothes instantly.

B. ANALYSIS OF DURATIVE/PUNCTUAL PAIRS

Table B.1: Individual Scores on Hypotheses 3.2

Causing Pred.	Object	Resultant Pred.	Morpho-Phonological Forms	Predicted?
DYE	SHIRT	RED	durative/atelic x durative/telic	Yes
HAMMER	DUCK	DEAD	durative/atelic x punctual/telic	No
HAMMER	METAL	DEFLATE	durative/atelic x durative/telic	Yes
HAMMER	TIRE	DEFLATE	durative/atelic x durative/telic	Yes
HAMMER	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
HIT	DUCK	DEAD	durative/atelic x punctual/telic	No
HIT	FOOT	SWELL	durative/atelic x punctual/telic	No
HIT	THUMB	HURT	durative/atelic x punctual/telic	No
HIT	TIRE	DEFLATE	durative/atelic x punctual/telic	No
HIT	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
SHOOT	DUCK	DEAD	durative/atelic x punctual/telic	No
SHOOT	TIRE	DEFLATE	durative/atelic x punctual/telic	No
SHOOT'machine-gun'	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
STOMP	FLOWER	'bend-over'	durative/atelic x durative/telic	Yes
WASH'by-machine'	CLOTHES	CLEAN	durative/atelic x durative/atelic	Yes

Table B.2: Individual Scores on Hypotheses 3.3

Causing Pred.	Object	Resultant Pred.	Morpho-Phonological Forms	Predicted?
DIP	SHIRT	RED	punctual/telic x durative/telic	No
HAMMER	DUCK	DEAD	punctual/telic x punctual/telic	Yes
HAMMER	METAL	DEFLATE	punctual/telic x punctual/telic	Yes
HAMMER	TIRE	DEFLATE	punctual/telic x punctual/telic	Yes
HAMMER	WALL	'wall-collapse'	punctual/telic x punctual/telic	Yes
HIT	DUCK	DEAD	punctual/telic x punctual/telic	Yes
HIT	FOOT	SWELL	punctual/telic x punctual/telic	Yes
HIT	THUMB	HURT	punctual/telic x punctual/telic	Yes
HIT	TIRE	DEFLATE	punctual/telic x punctual/telic	Yes
HIT	WALL	'wall-collapse'	punctual/telic x punctual/telic	Yes
SHOOT	DUCK	DEAD	punctual/telic x punctual/telic	Yes
SHOOT	TIRE	DEFLATE	punctual/telic x punctual/telic	Yes
SHOOT'cannon'	WALL	'wall-collapse'	punctual/telic x punctual/telic	Yes
STOMP	FLOWER	'bend-over'	punctual/telic x punctual/telic	Yes
WASH'by-machine'	CLOTHES	CLEAN	punctual/telic x durative/atelic	No

Table B.3: Pair-Wise Scores on Hypothesis 3.4

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms	Predicted?
DYE	SHIRT	RED	durative/atelic x durative/telic	No
DIP	SHIRT	RED	punctual/telic x durative/telic	
HAMMER	DUCK	DEAD	durative/atelic x punctual/telic	No
HAMMER	DUCK	DEAD	punctual/telic x punctual/telic	
HAMMER	METAL	DEFLATE	durative/atelic x durative/telic	Yes
HAMMER	METAL	DEFLATE	punctual/telic x durative/telic	
HAMMER	TIRE	DEFLATE	durative/atelic x durative/telic	Yes
HAMMER	TIRE	DEFLATE	punctual/telic x punctual/telic	
HAMMER	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
HAMMER	WALL	'wall-collapse'	punctual/telic x punctual/telic	
HIT	DUCK	DEAD	durative/atelic x punctual/telic	No
HIT	DUCK	DEAD	punctual/telic x punctual/telic	
HIT	FOOT	SWELL	durative/atelic x punctual/telic	No
HIT	FOOT	SWELL	punctual/telic x punctual/telic	
HIT	THUMB	HURT	durative/atelic x punctual/telic	No
HIT	THUMB	HURT	punctual/telic x punctual/telic	

Table B.3: *continued*

Causing Predicate	Object	Resultant Predicate	Morpho-Phonological Forms	Predicted?
HIT	TIRE	DEFLATE	durative/atelic x punctual/telic	No
HIT	TIRE	DEFLATE	punctual/telic x punctual/telic	
HIT	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
HIT	WALL	'wall-collapse'	punctual/telic x punctual/telic	
SHOOT	DUCK	DEAD	durative/atelic x punctual/telic	No
SHOOT	DUCK	DEAD	punctual/telic x punctual/telic	
SHOOT	TIRE	DEFLATE	durative/atelic x punctual/telic	No
SHOOT	TIRE	DEFLATE	punctual/telic x punctual/telic	
SHOOT'machine-gun'	WALL	'wall-collapse'	durative/atelic x durative/telic	Yes
SHOOT'cannon'	WALL	'wall-collapse'	punctual/telic x punctual/telic	
STOMP	FLOWER	'bend-over'	durative/atelic x durative/telic	Yes
STOMP	FLOWER	'bend-over'	punctual/telic x punctual/telic	
WASH'by-machine'	CLOTHES	CLEAN	durative/atelic x durative/atelic	No
WASH'by-machine'	CLOTHES	CLEAN	punctual/telic x durative/atelic	

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