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From meaning to form and back in American Sign Language verbal classifier morphemes

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Abstract

In a seminal paper, Benedicto & Brentari (2004) present a theoretical proposal in which they analyze American Sign Language (ASL) classifier morphemes as instantiations of functional heads F1 and F2 that determine the external or internal position of the argument that lands in their specifier through a structural agreement relation. It has served as a ground for several follow-up studies investigating argument structure in sign language classifier constructions. However, their proposal requires both theoretical amendment and empirical corroboration. In this paper, I will critically assess the proposal by Benedicto & Brentari (2004) and provide empirical support for its modified version.

1. Sign language classifiers

1.1 Sign linguistics

Half a century of research in sign linguistics has established that, like spoken languages, sign languages are naturally acquired, rich languages with autonomic, modular grammars and complex structures (Stokoe 1960; Klima & Bellugi 1979; Sandler & Lillo-Martin 2006). The sub field of sign language morphology, too, has exposed many similarities between the spoken and signed modality (Meir 2012). Both modalities use conventions of form-meaning correspondences (spoken languages use words, sign languages use signs) and both display duality of patterning: a limited set of formational units making up a limitless set of meaningful utterances (Stokoe 1960). In spoken languages, the formational units – phonemes- can be said to be arbitrary and mostly devoid of meaning. In sign languages, on the other hand, many basic, formational units are not arbitrary and in fact tend to bear meaning (see Brentari (1998) and Van der Kooij (2002) for an analogy between the two modalities). This iconicity obscures the traditional division between phonemes and morphemes (Johnston & Schembri 1999). As for word formation, the two modalities have the same processes and phenomena at their disposal but show different preferences.[1] Sequential morphology in the visuo-spatial modality is rare and exclusively derivational; simultaneity is ubiquitous and applies to both inflectional and derivational processes (Aronoff et al. 2005). In general, signs are much more simultaneously organized (Stokoe 1960) and iconically motivated (Taub 2001) than words. These two characteristics can be well observed in classifier constructions.

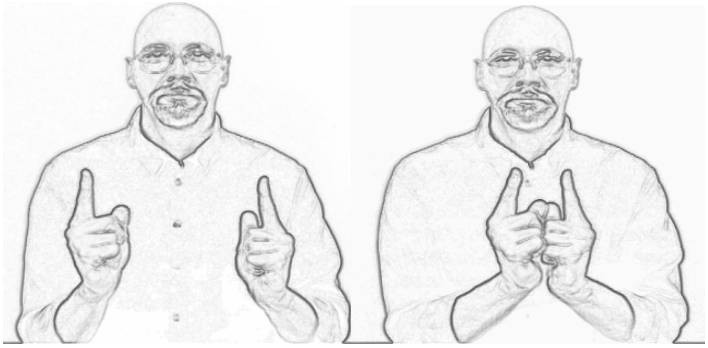
1.2 Classifier constructions

Classifier constructions seem to be a typical sign language phenomenon (Zwitserlood 2012). In this type of construction, handshapes represent referents according to their real-world properties and movement and location represent the real-world movement and location of the referent by analogue mappings of

[1] Certain morphological operations are only found in sign languages: see, for instance, Pfau & Steinbach (2005) for some unique reduplication types.

event space onto sign space (Emmorey 2002). Lexical signs have four phonological parameters: handshape, orientation, location and movement.[2] The particular handshape, orientation, location and movement of a lexical sign are themselves meaningless. Together they form a unit and changing one of the parameters of a lexical sign changes the meaning of it altogether. The 'S' (✊) handshapes of the American Sign Language (ASL) sign CAR, for example, distinguish it from the sign WHICH (made with 'A' (👍) handshapes in the same orientation and location with the same movement).[3] On the contrary, in classifier constructions, the phonological parameter settings take on morphological status. The two '1' (☝) handshapes of the ASL classifier construction in (1) contribute separate morphemes to the linguistic utterance: each hand here refers to a separate entity and identifies that entity as an upright-being. Using a '3' (🤟) handshape or 'bent V' (🤞) handshape would change the meaning of the classifier construction partially: it would refer to two vehicles or animals, respectively, but it would still mean they are approaching each other face-to-face (or front-to-front). Likewise, reversing the movement of this sign while keeping the other parameter settings the same, would yield only a partial change in meaning and would result in something like this: 'two_upright_beings_walking_backwards_while_facing_each_other'.

(1) Classifier construction in ASL (used by permission from www.Lifeprint.com)



CL:up-right-being-CL:up-right-being
"two_upright_beings_approach_each other_face_to_face"

Sign language classifier constructions are commonly analyzed as verbal (Supalla 1986; Glück & Pfau 1997; Aikhenvald 2003; Zwitserlood 2003, 2012; Sandler & Lillo-Martin 2006). Verbal classifiers occur inside the verb form: classifier morphemes attach to verbs as affixes and classify one of the nominal arguments of the verb (2). In sign language classifier constructions, it is the handshapes that fulfill this role.

(2) Verbal classifier example from spoken language Waris (Brown 1981: p.96)

sa *ka-m* *put-ra-ho-o*

coconut 1sg-to CL:round-get-benefact-imperative

"Give me a coconut"

[2] For simplicity's sake, I am leaving out the non-manual component.

[3] As is standard in sign linguistics, I use English words that approximate the meaning of a lexical sign, in small capitals, to represent any given sign. To represent classifier handshapes, I use the symbols common in sign linguistics literature (letters and numbers, such as '1', '3', 'A', 'S', 'bent V'), followed by a small drawing of the handshape that they denote in between parentheses (for example (👍), (✊), (🤞)).

1.3 Handshape morphemes

Although categorizations and terminology have varied over the past (Supalla 1982, 1986; Lidell & Johnson 1987; Schick 1987, 1990; Engberg-Pedersen 1993; Schembri 2001, 2003), several studies relating classifier handshapes to the argument structure of the verbal constructions they take part in, distinguish at least three types (Benedicto & Brentari 2004; Benedicto et al. 2007; Pavlic 2016; de Lint 2018).

The first type is the body part classifier (BPCL), where the handshape represents a limb or other body part of an animate entity. The example in (3) shows an upside-down wiggling '3' (🤟) handshape, here referring to a person's legs, to illustrate this type of classifier.

(3) Body part classifier in ASL (used by permission from www.Lifeprint.com)

BPCL:a_pair_of_legs+GO_BY
"he/she_walks_by"

The second type is the whole entity classifier (WECL), where the handshape refers to a whole entity. This type includes semantic classifiers, which represent classes of objects (such as the '3' (🤟) handshape for vehicles), descriptive instrumental classifiers, which refer to a whole instrument (such as the '1' (☝) handshape as used for a toothbrush), and descriptive classifiers, which refer to a whole object defined primarily by their shape (such as the 'B' (🖐) handshape referring to a book/sheet of paper). An example of a WECL is given in (4). The '1' (☝) handshape here is used as a descriptive classifier and refers to a pencil.

(4) Whole entity classifier in ASL (reprinted with permission from de Lint 2010)

WECL(1-handshape)+WECL(1-handshape)+BREAK

WECL:long_thin_object-WECL:long_thin_object+BREAK

“the pencil_breaks”

The third type is the handling classifier (HdlgCL), where the handshape represents the manipulation of an object or instrument. This type then includes both direct handling of an object, such as the ‘money’ (🤌) handshape when it represents the hands breaking a pencil (see an example of this type in (5) below), or indirect handling of an object mediated by an instrument, such as the ‘S’ (✊) handshape when it refers to a person holding a saw.

(5) Handling classifier in ASL (reprinted with permission from de Lint 2010)

HdlgCL(money-handshape)+HdlgCL(money-handshape)+BREAK

HdlgCL:a_hand_manipulating_a_long_thin_object-HdlgCL:a_hand_manipulating_a_long_thin_object+BREAK

“he/she_breaks_the_pencil”

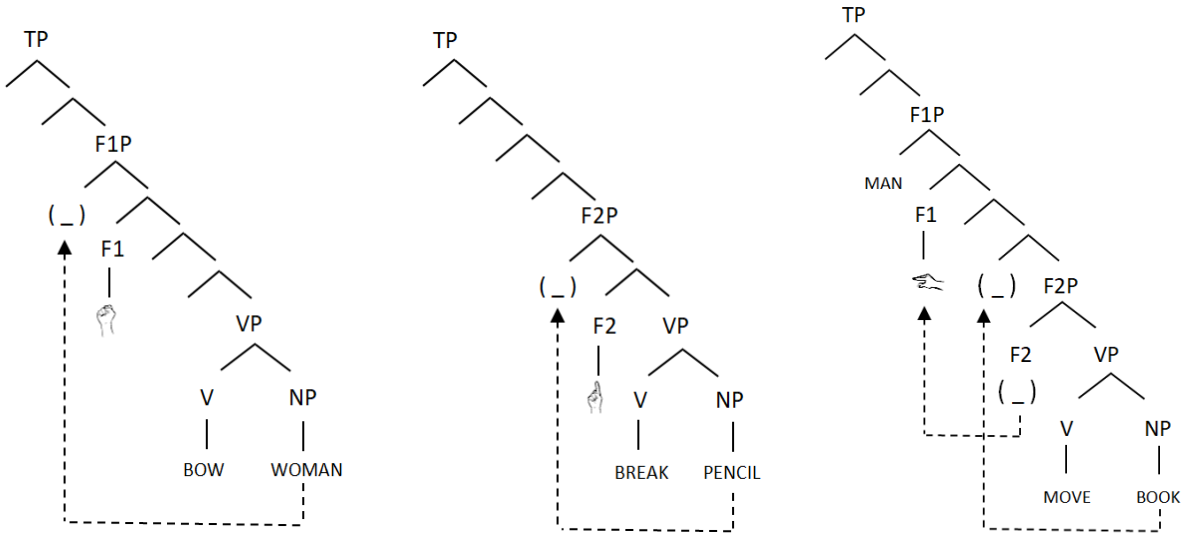
This paper focuses on classifier handshape morphemes in American Sign Language (ASL) and their interaction with argument structure. In the next section, I will present the influential analysis of Benedicto & Brentari (2004), point out some of its problems and propose a modification. In section 3, I will describe the experiment designed to find empirical evidence for the modified hypothesis. I will present the results in section 4. Finally, in section 5, I will discuss the findings and present my conclusion.

2. Classifiers & argument structure

2.1 Theoretical background

In their 2004 paper, Benedicto & Brentari show that ASL appears to have overt morphological marking of argument structure in its classifier constructions: the classifier *type* seems to determine the argument structure of the verbal construction the classifier appears in. In the minimal pair (4) and (5) above, the same movement root combines with a WECL (1-handshape, ☝) classifying long thin objects in (4) and with a HdlgCL (money-handshape, 🤌) classifying people handling long thin objects in (5). While (4) yields an intransitive/unaccusative structure, (5) yields a transitive structure.

According to Benedicto & Brentari, each of these three classifier types expresses a different argument structure. Benedicto & Brentari propose that classifier handshapes are instantiations of functional heads F1 and F2 (part of UG) that determine the external or internal position of the argument that lands in their specifier through a structural agreement relation (Figure 1).



a. BPCL b. WECL c. HdlgCL

Figure 1. Syntactic structures proposed for BPCL (a), WECL (b) and HdlgCL (c) by Benedicto & Brentari (2004).

BPCLs (a) are instances of F1 heads: the arguments associated with them exhibit the behavior of *external* arguments, in particular that of agents. WECLs (b) are instances of F2 heads: the arguments associated with them exhibit the behavior of *internal* arguments. Finally, HdlgCLs (c) are a combination of an F1 and an F2 head and are thus associated with both an external and an internal argument. In other words, BPCLs give rise to unergatives, WECLs give rise to unaccusatives and HdlgCLs give rise to transitives. Table 1 gives an overview of the associations between classifier type and syntactic structure that Benedicto & Brentari describe.

Table 1. Associations between classifier type and syntactic structure reported by Benedicto & Brentari (2004).

Classifier Type	Functional Head	Argument Status	Syntactic Structure
BPCL	F1	External Argument	Unergative
WECL	F2	Internal Argument	Unaccusative
HdlgCL	F1 + F2	Internal Argument + External Argument	Transitive

Having established this trichotomy, Benedicto & Brentari go on to say that ASL classifier constructions appear in two systematic argument structure alternations: one is the alternation between unergative BPCL constructions and unaccusative WECL constructions, the other one is the alternation between transitive HdlgCL constructions and intransitive, unaccusative WECL constructions (Table 2). The minimal pair (4) and (5) in the previous section illustrates the second alternation.

Table 2. Systematic classifier construction alternations as claimed by Benedicto & Brentari (2004).

Alternation 1	BPCL (F1) -> Unergatives	WECL (F2) -> Unaccusatives
Alternation 2	HdlgCL (F1+F2) -> Transitives	WECL (F2) -> Intransitives (specifically: unaccusatives)

2.2 Implications

While Benedicto & Brentari put forward a highly interesting theoretical account, and have served as a basis for many follow-up studies (Benedicto et al. 2007; Grose et al. 2007; Mathur & Rathmann 2007; de Lint 2010, 2018; Pavlic 2016; Kimmelman et al. 2019; Abner 2017) some of its implications raise questions about the empirical adequacy. In the next section, I will expose some of the problems I found and set out the hypothesis for my experiment, which I will describe in section 4.

2.2.1 Agents versus human causers

Benedicto & Brentari speak of a system of two argument structure alternations, arising from the exploitation of F1 and F2 by ASL classifier constructions. The first one is known as split intransitivity: the verb alternates between an unergative version and an unaccusative version. A spoken language example of this kind can be seen in Dutch (6), where the verb form itself stays the same but the syntactic change is evidenced by the change in auxiliary (Hoekstra 1984, 1999; Hoekstra & Mulder 1990).

(6)

a) Jan heeft (in de sloot) gesprongen.
Jan has (in the ditch) jumped(unerg)
"Jan has been jumping (in the ditch)"

b) Jan is (in de sloot) gesprongen.
Jan is (in the ditch) jumped(unacc)
"Jan has jumped (into the ditch)"

Dutch

The second alternation looks like the well-known causative-inchoative alternation exemplified for English in (7), with a transitive version and an unaccusative, intransitive version. The ASL alternation, however, is crucially different in that the transitive alternate is specifically agentive and cannot be merely causative: the HdlgCL construction does not allow for an instrument or a natural cause as subject (8).

(7) Peter/the hammer/lightning broke the pencil <-> The pencil broke.

English

(8) PETER/*HAMMER/*LIGHTNING PENCIL HdlgCL+BREAK <-> PENCIL WECL+BREAK

ASL

This constitutes an important difference between ASL and other (spoken) languages. If it were true that the functional heads associated with argument structure are part of Universal Grammar and in principle available to all languages, we would expect to find agentive-inchoative alternations in other languages, too. This is not the case: there are several transitive-intransitive alternations cross-linguistically, but none of them alternates in the way that Benedicto & Brentari (2004) describe for ASL. Let us have a more

detailed look at the alternation in question. In (9) we see several types of transitive-intransitive alternations. What characterizes verbs partaking in the causative-inchoative alternation is the combination of an external causal argument (that can take the form of either an agent, an instrument or a natural cause) and an internal theme argument that can alternatively surface as subject to form an unaccusative. This is true for the English verb *open* in a). The verb *worry* in b) has an external causal argument but, unlike *open*, an internal experiencer argument. Although verbs like *worry* can have intransitive alternates (*Lucie worries*), these alternates are unergative rather than unaccusative (Reinhart 2002). Finally, the verb *eat* in c) has an internal theme argument but exclusively allows for agentive subjects. Although such agentive verbs may also have intransitive alternates (*The baby ate*), they do not allow for the internal theme argument to surface externally and form an unaccusative alternate (**The soup ate*).

(9)

a) Max /the key/the wind opened the door.
b) Max /the noise /the gun worries Lucie.
c) The baby/*the spoon/*the hunger ate the soup.

Independent of the assumed direction of derivation (from intransitive to transitive or vice versa), the fact that the transitive verbs in Benedicto & Brentari's ASL data only take agents as external arguments predicts alternations that are not attested cross-linguistically. If we assume that the intransitive is derived from the transitive (Reinhart 2000, 2002, a.o.), we would predict agentive verbs like "eat" to partake in the same alternation as verbs like "open" and we would predict sentences like "the soup ate" to be grammatical, in one language or another. This prediction is not borne out (e.g. *SOUP EAT for ASL, and see just above (9) for English and generally).[4] On the other hand, if we assume that the transitive is derived from the intransitive (as Benedicto & Brentari do), we would not only predict agentive-inchoative alternations but also unergative-inchoative alternations. Benedicto & Brentari argue that the verbal root selects the number of the arguments. Therefore, they must assume that inchoative alternates of verbs like "break" only select one argument, which could then combine with either a HdlgCL (in which case F1 would add the agent of the transitive alternate) or a BPCL (in which case F1 would transform the internal status of the theme argument into an external, agentive one). We would thus predict to find both unergative and unaccusative alternates of "the door opened" (alongside the transitive alternate "Max opened the door"). This prediction is not borne out either (e.g. *DOOR BPCL+OPEN for ASL). It is more likely in the face of empirical generalizations that the transitive alternates described by Benedicto & Brentari select for the broader role of causer (as in the causative-inchoative alternations of spoken languages), but that – for whatever reason – this role is restricted to [+animate] or maybe even [+human] causers.

2.2.2 Empirical adequacy

[4] At first sight, middle constructions ("This soup eats like a meal", "This book reads easily") may seem like a counterexample, but, crucially, middle constructions do contain agents (semantically, though not syntactically), contrary to unaccusative structures, and therefore do not present unaccusative alternates of agentive verbs. So "John eats the soup" -> "The soup eats (like a meal)" does not present an analogy to "John opens the door" -> "The door opens". Their semantic and syntactic properties, their marginality and the very specific conditions such constructions require (for example, they need to have a modifier -adverbial, negation, contrastive stress or environment) set them aside from the discussion here. See Marelj (2004) for details about middle constructions.

After having pointed out how exceptional it would be to have the role of agent participate in a transitive-inchoative alternation, I want to make explicit a point that I have made implicitly in the previous paragraphs: it is unclear from Benedicto & Brentari's proposal what determines whether a verb partakes in the unergative-unaccusative alternation or in the transitive-intransitive alternation. It seems like nothing prohibits the verbal root to partake in both. In fact, since both alternations have at least one intransitive alternate and all alternates are derived in the syntax, Benedicto & Brentari seem to assume that all verbal roots to which classifier morphemes attach are underlyingly one-place and can freely alternate between unergative, unaccusative and agentive transitive. Such a system would wildly overgenerate. This cannot be Benedicto & Brentari's intention, but I do not see how their proposal as presented in their paper steers clear of this problem.
Contradicting the predicted abundance just mentioned, there are issues with respect to the productivity of the phenomena. Whether due to dialectal differences, inapplicability of tests, or (unjustified) assumptions on inter-linguistic transfer of unaccusativity, informants have had difficulty replicating data reported by Benedicto & Brentari and/or generating new data (see de Lint 2010 for details). If there exists a *syntactic* system in ASL such as described by Benedicto & Brentari, one would expect it to be a productive process and thus examples should be plenty. For the unergative-unaccusative alternation particularly, the scarcity of examples casts doubt on the existence of a syntactic derivation process.

2.2.3 Manner Verbs

Where my informants were able to extrapolate from the paper with reasonable ease was within the reported transitive-intransitive alternation. My claim is that hidden within this second alternation lies a third alternation. Benedicto & Brentari included both verbs like BREAK and MOVE that describe actions that may or may not be initiated by an agent (the classical causative verb type), and verbs like SAW and CUT that describe actions involving some instrument that necessarily involve the mediation of an agent (the manner verb type). Classifier pairs of the SAW type elicited less robust patterns of acceptance among my informants than those of the MOVE type and seemed to yield slightly different interpretations than Benedicto & Brentari's proposal would predict. A split between classifiers that refer to (handling of) an object and classifiers that refer to (handling of) an instrument became apparent. In the remainder of this paper I will label the HdlgCL and WECL forms according to this split in meaning as "HdlgCL$_o$"/"WECL$_o$" and "HdlgCL$_i$"/"WECL$_i$" respectively. When I use the labels "HdlgCL"/"WECL", without subscript, I mean to refer to HdlgCL$_o$ and/or HdlgCL$_i$, and WECL$_o$ and/or WECL$_i$ respectively. Based on Reinhart (2000, 2002), I will now provide an analysis of manner verbs (SAW, CUT) that emphasizes the link between the presence of an instrument and the presence of an agent in the verb semantics and which is in conflict with an unaccusative analysis of the WECL$_i$ alternate of verbs of this type.
In her work on argument structure, Reinhart captures the different thematic roles that arguments may fulfil in terms of varying combinations of two binary features: one for causality (referred to as "c") and one for mental involvement (referred to as "m"). Allowing for underspecification, the system has a total of nine clusters, which are computationally (more) plausible replacements of the traditional labels "agent", "theme", "goal" and so on (see 10 below). In her view, the set of feature clusters a given verb is associated with, together with a limited set of derivation operations and mapping rules, determines what possible argument structure alternates this verb can have.

(10)

a) [+c+m] - agent
b) [+c-m] - instrument
c) [-c+m] - experiencer
d) [-c-m] - theme / patient

e) [+c] - cause
f) [+m] - sentient
g) [-m] - subject matter /locative source (Typically Oblique)
h) [-c] - goal / benefactor (Typically Dative (or PP))
i) [ ] - Arb(itrary)

Notation:
[α] = Feature cluster α.
/α = Feature (and value) α.
(E.g. the feature /+m occurs in the clusters [+c+m], [-c+m] and [+m].)
[/α] = A cluster one of whose features is /α.
(E.g. [/-c] clusters are [-c+m], [-c-m] and [-c].)
[+] = A cluster ALL of whose features have the value +.
(E.g. [-] clusters are [-c-m], [-c], [-m].)

(Reinhart, 2002: p.10. Table 1.)

Reinhart assumes a difference in (lexically specified) theta grids between causative verbs ([+c], [-c -m]) and agentive verbs ([+c +m], [-c -m]) to explain the variable interpretation of the external argument in the first (agents [+c +m], instruments [+c –m] or unspecified causes [+c]) as opposed to the fixed interpretation of agent in the latter (as shown in (9a) vs. (9c)). This difference also allows her to explain the availability of an unaccusative alternate for the first as opposed to the latter, through selective application of a decausativization rule: it only applies to verbs with a [+c] cluster. Manner verbs, unlike causative verbs or agentive verbs, are argued to have two [/+c] clusters as part of their given grid, namely [+c +m] and [+c –m] (in addition to a [-c -m] cluster). This explains three facts. First, that manner verbs, like causative verbs and unlike agentive verbs, allow for instruments as subjects (compare (11)b to (9a) and (9c) above). Second, that manner verbs, unlike causative verbs and like agentive verbs, do not allow for natural causes to serve as subjects (compare (11c) below to (9a) and (9c) above). Third, that manner verbs, unlike causative verbs and like agentive verbs, do not have unaccusative alternates (11d).

(11)
(a) Max peeled the apple (with the knife).
(b) The knife peeled the apple.
(c) *The heat peeled the apple.
(d) *The apple peeled.

Reinhart shows that when a verb has two [/+c] clusters only one of them is obligatorily realized syntactically, the other one may be present in the semantics only. The mapping generalizations she formulates further determine that one of the two must be the external argument and that the agent takes precedence over the instrument. This can be seen in (11a) and (11b). Note that agentive verbs like *eat* allow for the addition of an instrument, optionally (as in *The baby ate the soup (with a spoon)*), but they do not take instruments as part of their theta grid and hence they do not have alternates with instruments as subjects (**The spoon ate the soup*).
Regardless of the status of any instrument role, its presence is contingent on the presence of an agent. This is stated in the Instrument Generalization below (see Marelj 2004 for references and discussion).

(12) Instrument Generalization:
an instrument requires the explicit (syntactic) or implicit (semantic) presence of an agent in order to be realized syntactically.

We can illustrate this for the causative verb *break* in (13). In (a-b), the presence of an agent allows for the optional addition of an instrument. In the unaccusative alternate in (c-d), decausativization has eliminated the [+c] cluster from both syntax and semantics and the addition of an instrument yields an ungrammatical sentence. The passive in (e-f), however, is derived through an operation that saturates the external role, making it unavailable for syntactic purposes yet leaving it semantically present. Here, the optional addition of an instrument is fine.

(13)

(a) Max broke the window (with a hammer).
(b) (∃e) [breaking (e) & Agent (e, Max) & Theme (e, the window)]

(c) The window broke (*with a hammer).
(d) (∃e) [breaking (e) &Theme (e, the window)]

(e) The window was broken (with a hammer).
(f) ∃e ∃x [breaking (e) & Agent (e, x) & [-c-m] (e, the window)]

(Marelj, 2004)

Thus, although both passives ("The window was broken") and inchoatives ("The window broke") are unaccusative in that both have derived subjects (their single, syntactic argument is internal), their semantics are crucially different: whereas passives have an implicit agent, inchoatives lack agents completely.
Instruments are inherent to the semantics of manner verbs: the action denoted by the verb simply cannot take place without it. Since instruments are dependent on agents, an agent is present in all alternations available for manner verbs, either syntactically or semantically. This can be seen in (14) below: the agent is syntactically present in the transitive in (14a) and both the instrument in the manner verb reduction (14b) and the agent-oriented adverb in the passive (14c) are licensed by the semantic presence of an agent.

(14) Manner verb alternations

a) Peter sawed the planks.
b) The saw sawed/cut the planks.
c) The planks were sawed voluntarily.

Reinhart's analysis shows that causative verbs and manner verbs have different semantics and that this has consequences for the possible argument structure alternations of the two verb types. By collapsing causative verbs like BREAK and manner verbs like SAW into one group, Benedicto & Brentari unjustly propose the same argument structure alternates for their classifier predicates. In the above, we have seen that manner verbs do not have unaccusative alternates: due to the defining role of the instrument, an agent is always present. Therefore, the $WECL_i$ construction of ASL verbs like SAW cannot represent an unaccusative alternate of a transitive-intransitive alternation, but rather represents a transitive alternate

of a manner verb. The class of $WECL_i$ morphemes thus must be distinguished from that of $WECL_o$ morphemes.

2.3 Goals & predictions

2.3.1 Modified hypothesis

The general goal of this experiment was to empirically test for associations between classifier type and argument structure in ASL, by collecting responses from a larger group of participants than one-to-one consulting would allow. To motivate my claim that a third alternation is hidden within Benedicto & Brentari's second alternation, the specific goal of this experiment was to provide evidence for the hypothesis that the $WECL_i$ morpheme correlates with a transitive manner verb alternate, by showing that $WECL_i$ constructions, as opposed to $WECL_o$ constructions, do not function as unaccusatives.

Hypothesis: The $WECL_i$ morpheme correlates with a transitive alternate of a manner verb, rather than an unaccusative alternate of a transitive-intransitive alternation.

Table 3. Modified proposal for associations between classifier types and argument structure.

Alternation 1: unergative-unaccusative alternation	BPCL (F1) ➔ Unergative	WECL (F2) ➔ Unaccusative
Alternation 2: transitive-unaccusative alternation	$HdlgCL_o$ (F1 +F2) ➔ Transitive	$WECL_o$ (F2) ➔ Unaccusative
Alternation 3: manner verb alternation	$HdlgCL_i$ (F1 + F2) ➔ Transitive	$WECL_i$ (F2) ➔ Transitive (¬Unaccusative)

To prove that any classifier construction is not an unaccusative, we need to show the presence of an agent. The semantic presence of an agent does not guarantee its syntactic presence (e.g. passives), so it is impossible to prove the active transitive nature of $WECL_i$ classifier constructions in this manner. It is however possible to rule out an unaccusative nature of these constructions this way, since the presence of an agent –be it syntactically or semantically- does rule out unaccusativity for these verbs.

2.3.2 Predicted association pairs

Based in part on the analysis put forward by Benedicto & Brentari (2004), but with the modification for manner verbs based on Reinhart (2002), I have the following predictions regarding the semantic presence of an agent for the classifier alternation pairs (Table 4).

Table 4. Predictions for this experiment.

VERB TYPE 1: motion verbs	BPCL	agent

e.g. BOW	WECL	no agent
VERB TYPE 2: causative verbs e.g. BREAK	$HdlgCL_o$	agent
	$WECL_o$	no agent
VERB TYPE 3: manner verbs e.g. SAW	$HdlgCL_i$	agent
	$WECL_i$	<u>agent</u>

3. Methodology

3.1 Stimuli

Predicted associations were tested in a novel computer-based experiment, in which participants' preferred matches between classifier constructions and visualized interpretations (and vice versa) were recorded. Due to the lack of success and the problems associated with the only tests known for this language to detect syntactically internal or external arguments (i.e. the tests presented by Benedicto & Brentari), the task was designed to directly test for the presence or absence of an agent in the interpretation of a classifier construction.

On the one hand, videos of signed classifier constructions (henceforth: signs) were created for the pairs of alternating classifier types. The following four motion verbs, given in pairs of BPCLs vs. WECLs, were tested for the unergative-unaccusative alternation (15). The classifiers are represented by the names of the handshapes they use ('S' (🤛); '1' (☝); 'money' (🤌)) for the dominant hand[5].

(15) VERB TYPE 1: motion verbs

		BPCL		WECL
1.	GO-UP+	'Vupside-down, bent, wiggle' (🤛)	vs.	'Vupside-down, bent' (🤛)
2.	BOW+	'S' (🤛)	vs.	'1' (☝)
3.	TURN+	'S' (🤛)	vs.	'1' (☝)
4.	GO-BY+	'Vupside-down,wiggle' (🤞)	vs.	'1' (☝)

For verbs of verb type 2, the transitive-intransitive alternation, the following six pairs of causative verbs were tested (16). The $HdlgCL_o$s are presented on the left, the $WECL_o$s on the right.

(16) VERB TYPE 2: causative verbs

[5] The utterance of some of these signs involves the non-dominant hand. The non-dominant handshape, however, has been disregarded for analysis and is therefore not mentioned here. For the full forms of the stimuli, see the videos in the appendix.

		HdlgCL$_o$		WECL$_o$
1.	OPEN (DOOR)+	'S' ()	vs.	'B' ()
2.	CLOSE (WINDOW)+	'S' ()	vs.	'B' ()
3.	MOVE (BOOK)+	'C' ()	vs.	'B' ()
4.	MOVE (HOCKEY PUCK)+	'claw' ()	vs.	'Cbaby' ()
5.	BREAK (PENCIL)+	'S' ()	vs.	'1' ()
6.	FLAP (PAPER)+	'Oflat' ()	vs.	'B5' ()

For the third verb type, composed of manner verbs, the following six pairs of WECL$_i$s vs. HdlgCL$_i$s were tested (17).

(17) VERB TYPE 3: manner verbs

		HdlgCL$_i$		WECL$_i$
1.	SWEEP (FLOOR)+	'S' ()	vs.	'B5' ()
2.	SAW (PLANKS)+	'S' ()	vs.	'B' ()
3.	BRUSH (TEETH)+	'Money' ()	vs.	'1' ()
4.	SLICE/CUT (POTATO)+	'Money' ()	vs.	'1' ()
5.	SCREW (A SCREW)+	'Money' ()	vs.	'U' ()

6.	SPOON-FEED S/O (YOGHURT)+	'Money' ()	vs.	'U' ()

On the other hand, videos of action scenes (henceforth: scenes) were created to match each sign pair. The scenes consist of the action expressed by the verb of the sign, occurring with either the presence or absence of an external entity that brings about this action. These will be referred to as +EXTERNAL and -EXTERNAL scenes. This was the same for all three verb types. The implications for agency, however, are reversed for motion verbs (verb type 1) as compared to causative and manner verbs (verb types 2 and 3) due to the difference in argument structure (motion verbs having two intransitive alternates, the causative and manner verbs having at least one transitive alternate). In the following paragraphs, I will therefore start with causative and manner verb scenes and then explain the difference with the motion verb scenes.

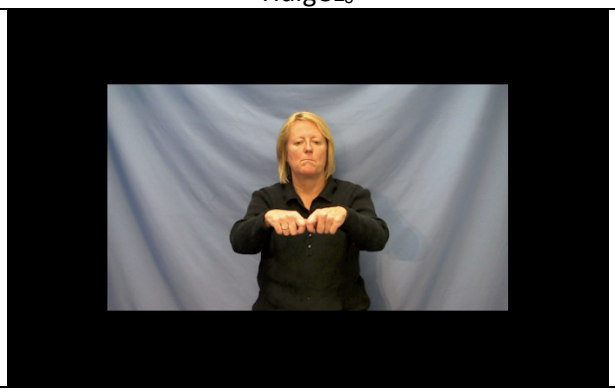
In the scene stimuli for causative and manner verbs, the external entity is a person, who takes up the role of agent in an action involving an object. Taking the first causative verb of the list as an example, this amounts to the following. There is a +EXTERNAL scene of a door being opened by a person (agent), and there is a -EXTERNAL scene of a door opening by itself (no agent). Hence, the +EXTERNAL and -EXTERNAL scenes straightforwardly correspond with the presence and absence of an agent, respectively.

Note that for the manner verbs this leads to rather implausible scenes. In the +EXTERNAL scene of the verb SAW, for example, a person is sawing planks with a saw. In the -EXTERNAL scene of this verb however, there is no agent doing the sawing: the saw is cutting the planks by itself. Making the scene truly unaccusative/intransitive as proposed by Benedicto & Brentari would mean leaving out the instrument as well so that there would be one sole argument (in this case: the planks), analogue to the true unaccusative case of a door opening by itself. That, however, would no longer depict the action of sawing at all. The stimuli in this experiment were based on their simple claim that WECLs –as opposed to HdlgCLs– correlate with structures with crucially NO AGENT.

In sum, for both causative and manner verbs an agentive interpretation is visualized by an external entity bringing about the action (the +EXTERNAL scene); a non-agentive interpretation is visualized by the action taking place without such an external entity (the -EXTERNAL scene).

So there are 4 stimuli for each verb, as illustrated for the causative verb BREAK and for the manner verb BRUSH in Tables 5 and 6 respectively.

Table 5. Screen shots of stimuli for BREAK (causative verb).

Signs	
$HdlgCL_o$	$WECL_o$
	

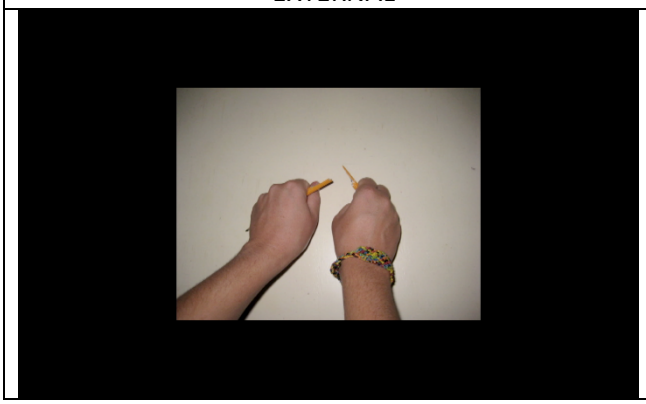
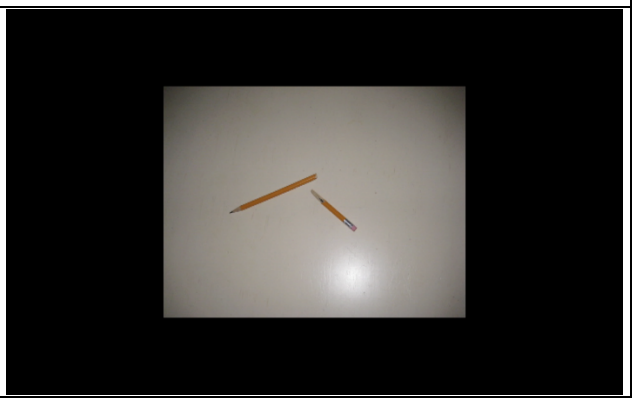
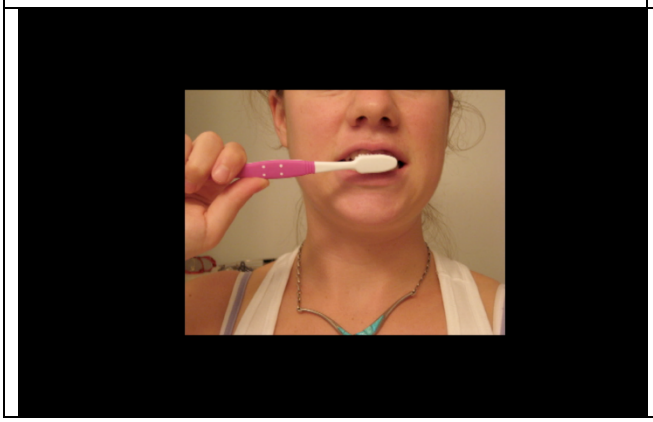
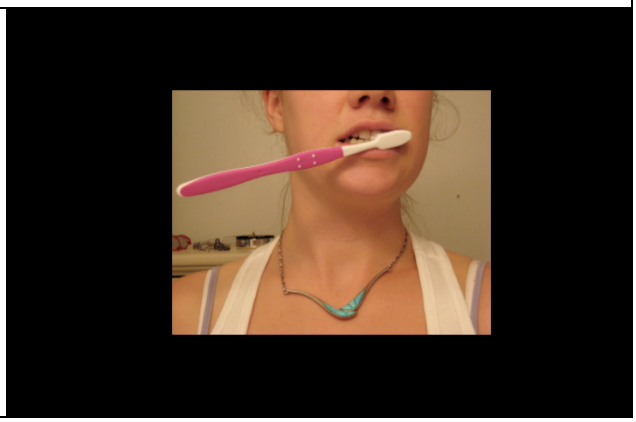
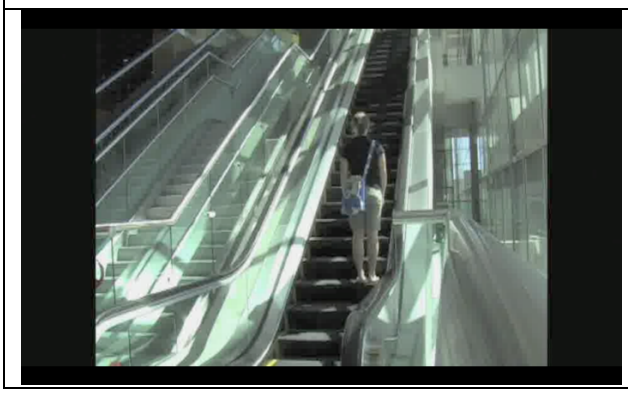
Scenes	
+EXTERNAL	-EXTERNAL
	

Table 6. Screen shots of stimuli for BRUSH (manner verb).

Signs	
HdlgCL	WECL
	
Scenes	
+EXTERNAL	-EXTERNAL
	

In the scene stimuli for the motion verbs, the external entity is a person or machine bringing about motion involving a person. Due to the motion verbs' intransitivity, the presence of the external entity makes the referent for the single argument of the sign undergo the motion as a mere theme; the same motion taking place without such an external entity lends agency to the verb's subject. Taking the first verb of the list (GO_UP) as an example, this amounts to the following. There is a +EXTERNAL scene of a person being moved up by an escalator (no agency), and there is a -EXTERNAL scene of a person walking up a staircase by themselves (agency). The +EXTERNAL and -EXTERNAL scenes for motion verbs thus have reversed correspondences: the +EXTERNAL scene visualizes a non-agentive interpretation of the corresponding sign, while the -EXTERNAL scene visualizes an agentive interpretation.
So, here too, there are 4 stimuli for each verb, as illustrated for the verb GO-UP in Table 7.

Table 7. Screen shots of stimuli for GO-UP (motion verb).

Signs	
WECL	BPCL
	
Scenes	
+EXTERNAL	-EXTERNAL
	

3.2 Procedure
In order to test the hypotheses about the argument structure of the alternating verbal classifier pairs in ASL, participants' preferred interpretations of such constructions were recorded in a computer-based matching experiment. Since the literature provides no example of such a comprehension study on a

signed language, the experiment was designed de novo.[6] Due to the modality of spoken languages, linguistic stimuli in experimental matching tasks can be presented to the participant in a different format than the stimuli used to act as matches and mismatches: the linguistic stimuli can be presented aurally and the non-linguistic ones in the visual mode. This is different from signed languages, where the linguistic stimuli cannot be presented aurally. In sign language experiments, both the linguistic and the non-linguistic stimuli are of a visual nature. Rather than this being a shortcoming, it can be used as an advantage. It offers the opportunity to easily present the stimuli both ways: either put a linguistic one as the target and have non-linguistic ones be the alternative choices; or the other way around: have a non-linguistic one as the target and make the linguistic ones act as the alternative answers. In a spoken language experiment, you cannot easily present multiple linguistic stimuli at the same time: it would be very hard for participants to disentangle the sounds of the simultaneous utterances.[7] In my experiment, I presented participants with stimuli in both of these ways: participants were asked to both match signs to scenes and vice versa.

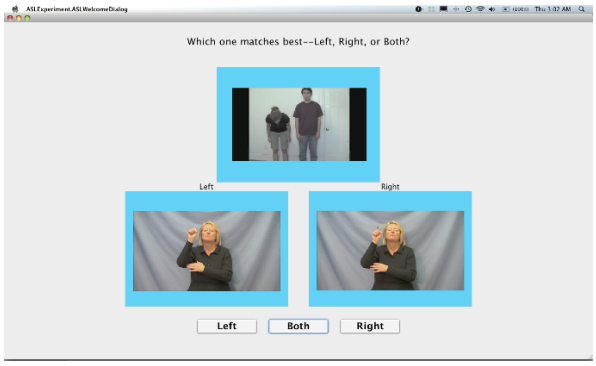
In the scene-matching task, participants were presented with a scene displayed at the top of the screen and two signs below. Participants' task was then to assign signs to scenes. They were forced to choose one out of three different responses: they could choose the target sign, the alternative sign, or both as the best match to the scene presented at the top.

In the sign-matching task, participants would be presented with a sign displayed on top and two scenes below. They then had the task to assign scenes to signs and were again forced to choose between three options: they could choose the target scene, the alternative scene, or both, as the best match to the sign at the top of the computer screen.

I refer to these different tasks as the two modes of presentation. When the participant is asked to give their preferred sign in response to a scene, this is referred to as SCENE-mode. When the participant is asked to choose the best scene to match a sign, this is referred to as SIGN-mode. This is illustrated below with a diagram and screen shot example for each mode (18 and 19).

(18) Diagram and screen shot example of SET-UP for SCENE-mode

	SCENE -EXTERNAL	
SIGN BPCL		SIGN WECL
RESPONSE "BPCL"	RESPONSE "BOTH"	RESPONSE "WECL"

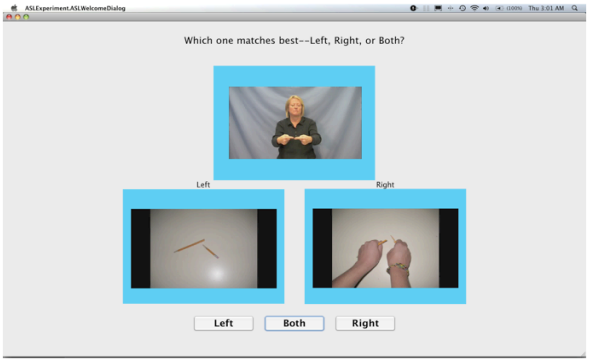


[6] Of course, plenty of work has been done on sign language classifier constructions, experimental studies included. Padden and colleagues, for instance, have done (cross-linguistic) experiments on $WECL_iS$ vs. $HdlgCL_iS$ classifier constructions ("instrumental" vs. "handling" in their terminology). Their work concentrates on the comparison of iconic strategies of gesturers and signers. This does not relate to the present study in that it concerns elicitation of signs (i.e. production, not comprehension) for hand-held tools (i.e. nouns, not verbs) (see for example Padden et al. 2013). In Padden et al. 2015 they do look at $WECL_iS$ and $HdlgCL_iS$ used for nouns *and* verbs. It is, however, not related to argument structure (alternations), nor does it compare $WECL_iS$ and $HdlgCL_iS$ to $WECL_oS$ and $HdlgCL_oS$, around which the present study revolves. Crucially, the experimental *task* was new.

[7] Admittedly, experiments with written language stimuli (as is common practice in psycholinguistic research) do offer the same possibility as sign language.

(19) Diagram and screen shot example of SET-UP for SIGN-mode

	SIGN $WECL_o$	
SCENE -EXTERNAL		SCENE +EXTERNAL
RESPONSE "-EXTERNAL"	RESPONSE "BOTH"	RESPONSE "+EXTERNAL"



A priori it was not clear which mode was the most appropriate one for this study. Presenting the stimuli in both modes was therefore the safest bet to capture any correlations between classifier types and argument structure. This feature of the experiment enables us to see whether the different classifier types are interpreted in a consistent manner across modes. Any noted differences between modes, or the lack thereof, will be important for the methodology of future experimental research on signed languages.

All verbs appeared in 4 conditions: per verb each member of the stimuli set was presented on top of the screen once. Per verb type, trials were replicated by testing the different conditions on a number of verbs. For verb type 1 we had 4 verbs, for verb type 2 we had 6 verbs and for verb type 3 we had 6 verbs, which makes 16 verbs. In total, then, there were 16 verbs x 4 conditions = 64 items. There was no counterbalancing of verbs and conditions within or across participants; all 64 items were simply randomized for each participant. Choice options were also randomized with respect to their left/right location on the screen.

Fourteen native signers, all of whom are deaf, were recruited in Washington, D.C. on Gallaudet University campus. If there was even the slightest uncertainty about their status as a native signer (due to missing or contradicting answers to a survey taken prior to starting the task) or about their ability to perform the task (due to diminished vision for example) they were excluded from analysis at this point.

3.3 Coding and analysis

The two modes of presentation were looked at separately. All participants' responses to the stimuli were coded as 0, 1 or 2 as schematized in (20). In scene mode, a BPCL or HdlgCL response (hypothesized to include agents) was coded as a 1; a WECL response (hypothesized to either include an agent or not, depending on the verb type) was coded as a 0. In sign mode, a "+EXTERNAL" scene (where an external entity brings about the action) response was coded as a 1, and a "-EXTERNAL" scene (where the action takes place without the intervention of an external entity) response was coded as a 0. A "BOTH"-response (where participants did not have a preference for either the target or non-target response) was coded as a 2.

(20) Schematization of coding of responses

SCENE MODE	WECL	BPCL/HdlgCL	BOTH
	0	1	2

SIGN MODE	-EXTERNAL	+EXTERNAL	BOTH
	0	1	2

3.3.1 Preference analyses

Based on the clear dichotomy proposed between classifier morpheme and syntactic structure, a one-to-one mapping by participants between signs and scenes could be expected. Therefore, I first did an analysis of participants' preference. To this end, I focused on responses where participants had selected either the target or the non-target as the best match, and excluded all "BOTH"-responses from analysis. Averages were computed for each participant over all non-"BOTH" answers per verb category per sign/scene type. For SCENE-mode this resulted in percentages BPCL- or HdlgCL-response per verb category per scene type. For SIGN-mode this resulted in percentages "+EXTERNAL"-response per verb category per classifier type. Per mode an ANOVA was run using these percentages as the dependent factor.

3.3.2 Analyses of uncertainty

In the experiment, participants were given the option to select "BOTH" (i.e. both target *and* non-target) as best-matching the prompt at the top, instead of giving a preference for one or the other. This was done to accommodate ambiguous and neutral interpretations as well as indecision or total rejection. As mentioned above, the "BOTH"-responses were initially excluded from analysis so as to get an idea of what the preferences were. In addition to those preference analyses, two ANOVAs were run on the percentages of "BOTH"-responses counted over all responses (0's, 1's and 2's together). These uncertainty analyses (of the percentages of responses where participants had no preference) are used to give us an indication of the interpretability of those preferences analyzed in the preference analyses. Again, the two modes of representation were analyzed separately.

4. Results

4.1 Results from SCENE mode

Here are the results for SCENE mode (where participants are asked to choose between two signs as the best match to a scene presented at the top of the screen), first preference analysis (Figure 2), then uncertainty analysis (Figure 3).

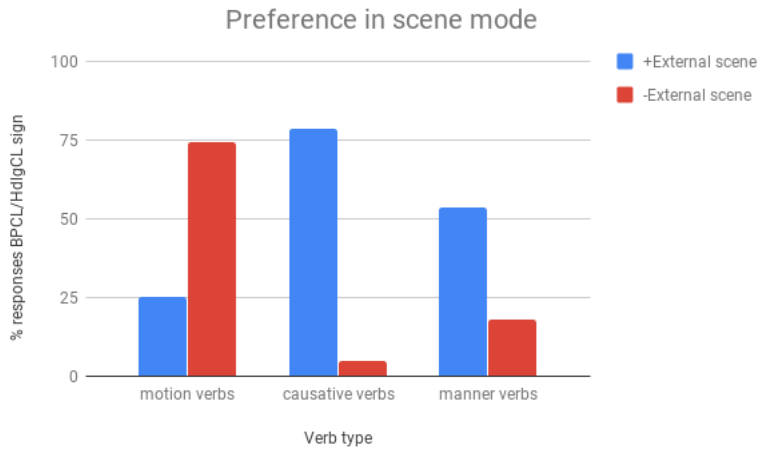


Figure 2. Preference analysis of responses obtained in SCENE mode.

The graph in Figure 2 represents the percentages of responses (on the y-axis) where participants selected a sign with a BPCL/HdlgCL as the best match to the scene prompt. Signs with a BPCL (motion verbs) or HdlgCL (causative verbs and manner verbs) are hypothesized to include agents. The percentages are presented per verb type (on the x-axis) and split up into prompts with a +EXTERNAL scene (where an external entity is bringing about the action) and prompts with a -EXTERNAL scene (where no such external entity is added).

The preference analysis reveals a significant interaction of verb type (motion/causative/manner) and scene type (+/-EXTERNAL) (Greenhouse-Geisser $F(2,78)=104.8$, $p<0.001$). Post-hoc results reveal that this interaction effect holds in all directions: all three verb types have different effects no matter the scene type (motion verbs ≠ causative verbs ($p<0.001$), motion verbs ≠ manner verbs ($p<0.001$) and causative verbs ≠ manner verbs ($p=0.045$) for +EXTERNAL scenes; motion verbs ≠ causative verbs, motion verbs ≠ manner verbs and causative verbs ≠ manner verbs ($p<0.001$ in all three cases) for -EXTERNAL scenes) and there is an effect of scene type in all three verb types (+EXTERNAL ≠ -EXTERNAL ($p<0.001$) for motion verbs, causative verbs and manner verbs). The -EXTERNAL scenes of motion verbs get more BPCL responses than WECL responses; this pattern is reversed for the +EXTERNAL scenes. For causative verbs, the +EXTERNAL scenes get more $HdlgCL_o$ responses than $WECL_o$ responses and for the -EXTERNAL scenes we see a very small percentage of $HdlgCL_o$ responses and thus most responses here were $WECL_o$s. The +EXTERNAL scenes of manner verbs get almost as many $WECL_i$ responses as $HdlgCL_i$ responses; the -EXTERNAL scenes get fewer $HdlgCL_i$ responses than $WECL_i$ responses.

The uncertainty analysis is visualized in Figure 3 below. The graph represents the percentages of responses where participants selected both signs (the one with a BPCL/HdlgCL and the one with a WECL) as best matching the scene prompt. Here too, the results show a significant interaction effect of verb type and scene (Greenhouse-Geisser $F(2,78)=3.5$, $p=0.041$). There is a significant difference between causative verbs and manner verbs in both +EXTERNAL and -EXTERNAL scenes ($p<0.001$ and $p=0.013$ respectively) and an additional one between motion verbs and causative verbs ($p<0.001$) in -EXTERNAL scenes. The other way around, for motion verbs there is no difference between the amounts of BOTH responses in the two scene types. The +EXTERNAL scenes for causative verbs and manner verbs, however, get significantly more BOTH responses than their -EXTERNAL alternatives ($p=0.047$ and $p=0.003$ respectively).

The effect of verb type (Greenhouse-Geisser $F(2,78)=12.8$, $p<0.001$) on the "BOTH"-responses in scene mode shows as a significant difference between motion verbs and causative verbs ($p=0.001$) and

between causative verbs and manner verbs ($p<0.001$). Overall, as we can see in the graph, causatives provoke the least amount of BOTH responses from participants.

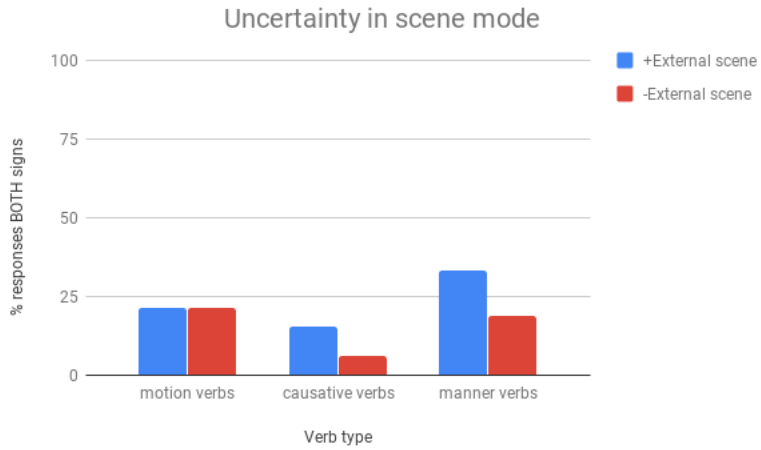


Figure 3. Uncertainty analysis of responses obtained in SCENE mode.

4.2 Results from SIGN mode

In the graph below (Figure 4), I present the results from the preference analysis in SIGN mode (where participants are asked to choose between two scenes as the best match to a sign presented at the top of the screen).

The graph represents the percentages of responses (on the y-axis) where participants selected a +EXTERNAL scene (where an external entity is bringing about the action) as the best match to the sign prompt. The percentages are presented per verb type (on the x-axis) and split up into prompts with a BPCL/HdlgCL sign and prompts with a WECL sign. Signs with a BPCL (motion verbs) or HdlgCL (causative verbs and manner verbs) are hypothesized to include agents. Signs with a WECL have been hypothesized to *not* include agents, but in this paper the alternative hypothesis is put forward that in the case of $WECL_i$s (manner verbs) these signs *do* include an agent.

The interaction effect of verb type and sign (Greenhouse-Geisser $F(2,78)=147.6$, $p<0.001$) is similar to that between verb type and scene (in SCENE mode). The effect of sign (i.e. the effect of classifier type) is robustly significant for each of the three verb types ($p<0.001$ in all cases). As for the effect of verb type per sign (classifier type), post-hoc comparisons confirm what is obvious from the graph: that the results for BPCLs in motion verbs differ significantly from both those for $HdlgCL_o$s in causatives ($p<0.001$) and from those for $HdlgCL_i$ s in manner verbs ($p<0.001$), but that the results for $HdlgCL_o$s in causatives do not differ significantly from those for $HdlgCL_i$s in manner verbs ($p=1.000$). Results for $WECL_o$s in causatives however, differ significantly from those for WECLs in motion verbs ($p<0.001$) as well as from the results for $WECL_i$s in manner verbs ($p<0.001$), but the results for WECLs in motion verbs and those for $WECL_i$s in manner verbs are similar ($p=1.000$).

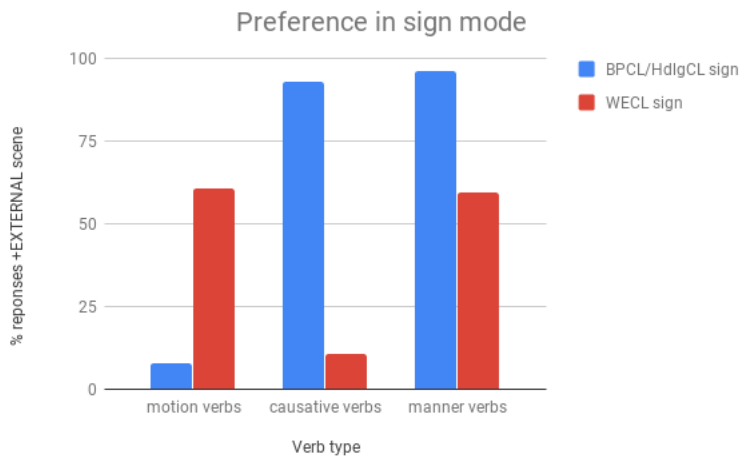


Figure 4. Preference analysis of responses obtained in SIGN mode.

The results from the uncertainty analysis in Figure 5 show that, as for BOTH responses, there is not much difference between patterns in SIGN and SCENE mode. There was a main effect of verb type (Greenhouse-Geisser $F(2,78)=4.9$, $p=0.010$) and of sign (classifier type) (Greenhouse-Geisser $F(1,39)=25.2$, $p<0.001$). The effect of verb type found in the ANOVA lies in a difference between causatives and manner verbs ($p=0.005$) and a difference between motion verbs and causatives ($p=0.053$).

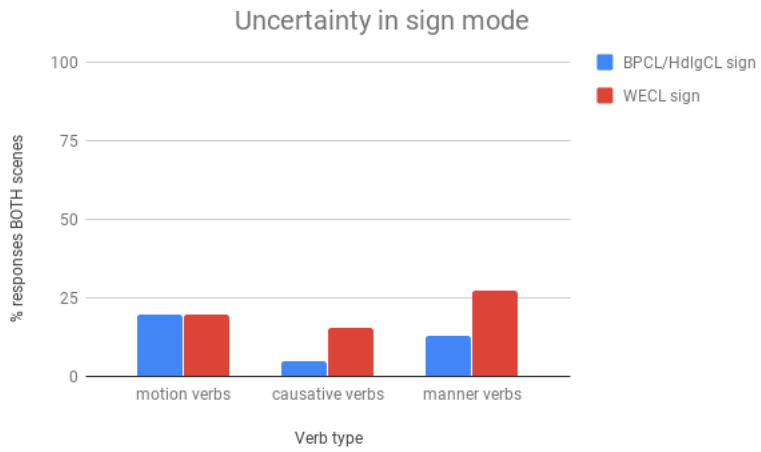


Figure 5. Uncertainty analysis of responses obtained in SIGN mode.

5. Discussion & conclusion

5.1 Agentive morphemes

To a large extent, the results of the experiment confirm the systematic associations between classifier morphemes and argument structure as reported by Benedicto & Brentari (2004): BPCLs/HdlgCLs and WECLs display a contrast in agentive interpretation. BPCLs (in motion verbs) and HdlgCLs (in causative and manner verbs) receive more responses with scenes visualizing an agentive interpretation than

WECLS (in all three verb types). Similarly, scenes visualizing an agentive interpretation receive more responses with BP and Hdlg classifiers than scenes visualizing a non-agentive interpretation. This supports the hypothesis that both BPCL (motion verb) and HdlgCL (causative and manner verb) constructions include an agentive morpheme.
An important question to be answered in future research is whether the external arguments under consideration are true agents or rather animate/human causers (see section 2.2.1). Of interest is to see whether this phenomenon is limited to classifier constructions or applies more generally, to verbs of all classes (plain verbs, agreement verbs and spatial verbs) and/or other sign languages. The particular restriction of /+m (in Reinhart's terms) on the causer role, unseen in spoken languages, may be a modality specific issue, if it proves to be a common feature of sign languages.
Having confirmed a clear dichotomy between agentive and non-agentive morphemes, this study shows that the pattern is not equally robust throughout all three verb types: while the results for causatives seem categorical, motion verbs and manner verbs receive mixed responses from participants. The specific question in this paper concerns the splitting of meaning in one form: is the WECL morpheme consistently associated with non-agentive interpretation? We will look at the results per verb type first, then I will compare the two modes of presentation, and finally, I will make my concluding remarks.

5.2 The three verb types

5.2.1 Confirming Benedicto & Brentari (2004) – causatives

Of all verb types, the results for causative verbs come closest to predictions and give the best support for the hypothesized correlations between classifier types and argument structure. In SCENE mode, the preferred matches to -EXTERNAL scenes are undoubtedly the $WECL_o$ constructions; this is confirmed by a low percentage of BOTH responses. For +EXTERNAL scenes, participants clearly prefer $HdlgCL_o$ responses to $WECL_o$ responses, but they still allow $WECL_o$ responses part of the time. This can be explained in the following way. For causatives, the +EXTERNAL scene shows an agent performing an action, for example: a person opens a door. It is possible that some participants will accept both "he/she opens the door" and "the door opened" to apply in such a case. The -EXTERNAL scene in this example shows a door opening by itself. It is not likely that participants accept "he/she opens the door" in that case. This also follows under Reinhart's assumption that in the cases of decausativization, the external role is completely reduced and thus absent from syntax and semantics of unaccusatives (see section 2.2.3): in the absence of an agent in the scene (visualizing the intended semantics), these scenes are certainly not expected to correlate with a sign that contains an explicit (syntactic) agent. Compare in this respect the percentage of BOTH responses for +EXTERNAL scenes with that for -EXTERNAL scenes. The results from the uncertainty analysis may also shed some light on the reliability of the response patterns observed for causatives as compared to motion verbs and manner verbs. Although the +EXTERNAL scenes for causatives get significantly more BOTH responses than their -EXTERNAL alternatives, it is remarkable that both scene types get significantly less BOTH responses compared to motion verbs and manner verbs.
In SIGN mode, causative verbs stand out as confirming our predictions for the WECL constructions. Here, too, the uncertainty analyses show that participants seem to allow both +EXTERNAL and -EXTERNAL scenes to some extent (i.e. participants allow both a scene where a person opens a door and one where a door opens by itself to match the utterance "the door opened"). That does not, however, contradict our hypothesis for this verb type, since the truth conditions for the unaccusative are met by both visualizations.

5.2.2 Explaining the behavior of motion verbs

My predictions for motion verbs and causative verbs were the same as those of Benedicto & Brentari (2004), because I have no alternative hypothesis for the argument structure of the classifiers involved. However, taking my experiences with informants prior to the experiment into account, I was not surprised to find that the expected dichotomy did not flourish throughout. In particular for motion verbs, the informants consulted prior to the experiment gave no indication of a systematical interpretation of the two classifier types within this verb category. The results in SCENE mode show a pattern compatible with the interpretations implied by Benedicto and Brentari's hypothesis, but they also show participants' allowance for both classifier types to match both non-agentive and agentive scenes to a certain extent. This may indicate that participants differ from one another with respect to their judgment as to the appropriateness of a sign for the verbal interpretation visualized in the scene, or each participant individually may hold various interpretations. The high percentages of "BOTH" responses in the uncertainty analysis for motion verb scenes provide support for the latter case. This does not exclude the additional possibility of the former case. In addition, given the verbs tested for this verb type, the results may hide a split between the stimuli: the +EXTERNAL scenes for GO-UP and GO-BY contain non-human entities making a human undergo motion, while those for BOW and TURN-AROUND involve a second human to make the first one undergo motion. Compare +EXTERNAL and -EXTERNAL scenes for BOW below (Table 8) with those for GO-UP (as exemplified in section 3.1).

Table 8. Screen shots of scenes for BOW

+EXTERNAL	-EXTERNAL
	

There is a -EXTERNAL scene of a girl bowing by herself (without the intervention of an external entity) and there is a +EXTERNAL scene of a girl "being bowed" –i.e. forced/made to bow- (here the bowing takes place with the intervention of an external entity). Please note that, since we are testing the presence of an agent in the interpretation of the classifier construction and since the girl bowing is the only entity associated with the action denoted by the classifier construction, the agentivity of the other person in the scene is irrelevant on its own. It is only used to affect the agentivity of the girl bowing. However, this can be confusing.

Perhaps the GO-UP and GO-BY stimuli are better than those for BOW and TURN in representing (the lack of) agentivity of the subject of the verb, because the participation of the second individual in the action may confuse participants in the +EXTERNAL scenes for BOW and TURN. On the other hand, the addition of the second person (as opposed to a machine) is paralleling the addition of a human being in all the other +EXTERNAL scenes of the experiment (for causative verbs and manner verbs). Due to practical limitations

on the making of the stimuli as well as to the apparent lack of productivity of the phenomenon (leading to the limited number of verbs tested for this verb type), this experiment did not control for the influence of the second individual. This may be taken into account in future experimental design.
The high percentage of "BOTH" responses in the +EXTERNAL scenes of motion verbs could have an alternative explanation. Namely, this could be the result of an interpretative effect such as the one present in another argument structure alternation, the one derived by the so-called Lexical Causativization or Agentivization (see Marelj (2004) for references and discussion). This operation derives sentences like "Peter walked the dog" from one like "The dog walked". In these cases, though the original agent ("dog" in "The dog walked") is demoted in that it is no longer the cause of the event, it is still in a way responsible for the event of walking (simply put: in "Peter walked the dog", the dog is still doing the walking). Consequently, the correlation between a structurally unaccusative classifier construction and an agentive interpretation may simply be normal of the way we code such events in language, be it sign or spoken.

When participants are asked to match scenes to motion verb signs involving WECLs, they give mixed responses as well. Adding to the explanation provided above, reconsider the Dutch example in (6) (section 2.2.1), where both the unergative and the unaccusative would match scenes where the subject of the verb carries out the action voluntarily, on his/her own initiative. In (6a) "springen" ("to jump") is used with a locative PP and the interpretation is that Jan jumps at a specific location, which is in the ditch; in (6b) "springen" is used with a directional PP and the interpretation is that Jan jumps into a specific location, which is the ditch. Though the argument may be in a different syntactic position, in both alternates does the jumper (Jan) maintain some thematical agentivity/volitionality. Transposing this to the ASL verbs that were tested for verb type 1 in this experiment, particularly the '1' (☝) handshapes in the WECLs in GO-BY and TURN seem likely to allow an agentive interpretation even if the subject of the verb is a derived one.
The distinction between the directional and locative alternation in the Dutch example goes back to the hypothesis that unaccusativity can be determined in terms of the aspectual properties of the predicates. Namely, whereas the directional "jump" is aspectually an event, the locational "jump" is aspectually a state (it is still an activity, not a stative).[8] The prediction then is that all unaccusative predicates are events. Reinhart (2000), following Bennet & Partee (1972) and Vendler (1967), where the crucial property distinguishing states and events is homogeneity, rejects this on the basis of so-called gradual completion verbs (increase, decrease, etc.), which are not events but states (activities).[9]
Furthermore, Neeleman (1994) and Ackema (1995) explain why an unergative verb in combination with a directional PP (like run to the park) may show the syntactic behavior of the unaccusative. They argue that the thematic (predicative) properties of directional PPs enforce complex predicate formation, requiring that the PP subject must be identical to the matrix subject. This requirement then can best be satisfied if the subject is merged (generated) in the internal position and a chain is formed. The result is an interpretation effect along the lines of that of the demoted agent in "Peter walked the dog" as discussed earlier. All in all, the results for motion verbs are compatible with the hypothesized associations, but additional research is required (with more stimuli) in order to make a strong case.

5.2.3 Contradicting Benedicto & Brentari (2004) – manner verbs

[8] This goes back to Borer (1994) and van Hout (1995).

[9] See Dowty (1986), Reinhart (1986), Hatav (1989, 1993), Hay et al. 1999, Bobaljik (2012) and Alexiadou et al. 2015 for discussion on the nature of unaccusatives and telicity, causative components and degree achievements.

Both the results from the preference analysis and those from the uncertainty analysis in SCENE mode provide evidence that a distinction should be made not only between motion verbs on the one hand and causatives and manner verbs on the other, but also between causatives and manner verbs themselves. The bars in the graphs are not near the extremes, as we would expect on the basis of Benedicto & Brentari (2004). Neither are they both around 50% like I alternatively predicted, but very relevant to our discussion is that one of them is (Figure 2, second column from the right). For the +EXTERNAL scenes participants give both $HdlgCL_i$ responses and $WECL_i$ responses, which confirms my hypothesis that both classifier types include an agent in their interpretation. Participants give the highest percentage of BOTH-responses for these scenes, which can be interpreted as an indication of the equal applicability of both classifier types. This is very different from what would be expected on the account of Benedicto & Brentari.

As we can see in the graph, the percentage of BOTH-responses for the -EXTERNAL scenes is also pretty high, which can be interpreted as a confirmation of the hypothesis that both classifier constructions include an agent and are therefore equally inapplicable to the scene. However, being at the same level as for both motion verb scenes, this percentage may also be interpreted as uncertainty on the part of the participants about the interpretation of the sign. If the $WECL_i$ construction represents a manner verb reduction like we hypothesized, the semantic but not syntactic presence of an agent in such a construction may cause participants to doubt. This would also explain that when participants make a choice between the two signs, they seem to prefer the $WECL_i$ to the $HdlgCL_i$, contrary to predictions. Participants can be expected to prefer the $WECL_i$ construction, if the agent in this construction is merely implied rather than syntactically present as in the $HdlgCL_i$ and therefore less in contradiction with the scene depicted. It may be unclear at this point what the correct analysis of the $WECL_i$ constructions is, but the results from the preference analysis show significantly different behavior from participants with respect to manner verbs as compared to causatives. The results from the uncertainty analysis show the same: while causatives provoke the least amount of uncertainty from the participants or ambiguity of the stimuli, manner verbs provoke the most. This is yet more confirmation that native signers treat classifier constructions of causatives and classifier constructions of manner verbs differently.

In this light, Abner (2017) presents a very interesting paper. Her elaboration of the idea of iconicity in representation of event and argument structure includes a classifier projection lower than Benedicto & Brentari's F1 and F2: F3, or $Classifier_3$ in her terms. Her paper is about nominalization reduplication, and the $Classifier_3P$ she proposes explains the availability of a certain type of noun as an outcome of this process.[10] She motivates the existence of this third classifier projection with properties of the predicates it occurs in, such as the fact that "the nominals associated with the classifiers in these predicates function as locative or instrumental arguments" (p.340), and the insensitivity of this argumental role to classifier type. An analysis of the manner verbs in my experiment as containing a $Classifier_3P$ could help to set them aside from the other two verb classes: under such an analysis both $Hdlg_i$s and $WECL_i$s would not introduce agent and/or theme arguments at all (p.340: "the classifiers present in the predicates that undergo nominalization reduplication do not, however, correspond to either an internal object or external argument…"). However, Abner (2017) leaves unexplained the observed difference between $Hdlg_i$s and $WECL_i$s, within the class of manner verbs, in my experiment (the sentence on p.340 quoted above continues as follows: "…, nor do they exhibit argumental alternations of the type observed by Benedicto & Brentari"). Further research would have to address the interaction of $Classifier_3P$ with $Classifier_1P$ and $Classifier_2P$ (footnote 18, p.340: "just as the detailed interaction of $Classifier_1P$ and

[10] The main claim is, that, because the verbal classifier system plays a role in the argument structure of verbal predicates (in ASL and in other sign languages), "the potential availability of result- and concrete object-denoting interpretations correlates with whether or not verbal classifier structure is present" (p.333-334).

Classifier$_2$P with verbal event structure is outside the scope of the present research, so too is the interaction of these classifier structures with the lower projection, Classifier$_3$P, proposed here").[11]
Back to the experiment, SIGN mode confirms the crucial finding that the WECL$_i$ type is certainly not interpreted as lacking an agent per se (Figure 4, rightmost column). It is mostly associated with an agentive interpretation, but contrary to predictions it is sometimes associated with the -EXTERNAL scene or with both scenes. Perhaps this is due to the fact that the WECL$_i$s seem susceptible to a process of lexicalization, where they become "frozen" forms: the classifier construction is no longer analyzed as containing multiple morphemes but instead gets a fixed interpretation. Interestingly, this is also one of the characteristics Abner (2017) describes for Classifier$_3$ predicates. The WECL$_i$s for SAW, SWEEP, BRUSH-TEETH, for example may then become associated with a generic meaning of "sawing", "sweeping" or "brushing one's teeth" respectively. Clearly, additional research is needed in this direction.

5.3 From meaning to form and back – modes of presentation

In psycholinguistic research multiple sources of information are preferred to reassure that the pattern found in one domain is also found in another domain. In comprehension studies, for example, potential ambiguities are often overlooked because participants are biased toward the interpretation that fits the context.[12] Perhaps the two modes of presentation in this experiment can be compared to the difference between production and comprehension: you are either going from meaning to form, or the other way around. Because this was a pioneer study, there was no experience to inform us about any difference between the two modes. To maximize the chance of revealing any ambiguity allowed by the participants for the stimuli presented, I used a "BOTH" response option in both SCENE mode and SIGN mode. This way I created an opportunity not only to reveal multiple interpretations participants may have, but also to compare their interpretations across the two modes.
Compared to the results in SCENE mode, the results in SIGN mode present a more robust pattern of classifier-argument structure correlations. This indicates that mode of presentation may affect results in sign language experiments. In this pioneer study, the two modes were analyzed separately and the factor as such can therefore not be assessed directly. Further research into the methodology is needed.
The overall percentages of BOTH responses show that participants aren't just guessing: there is an indication of a certain reliability of the preference analysis. We see, though, that, where participants don't follow the paradigm, they give more BOTH responses: motion verbs and manner verbs provoke less pronounced preferences from our participants than causative verbs do, and especially the WECLs and WECL$_i$s prove problematic for motion and manner verbs respectively. Instead of offering two alternatives and a BOTH button, the participant could be presented with a NONE button in addition. This would address the ambiguity of how to interpret the BOTH responses for this experiment. Or, the participant could be presented with just one possible match and be asked to approve or disapprove. This

[11] Abner suggests that the interaction of Classifier$_3$P with Classifier$_1$P and Classifier$_2$P is minimal, because of the handshape variability, among other things. While Abner's account of nominalization reduplication revolves around the telicity of Classifier$_3$P, she does not describe the relationship between event structure and Classifier$_1$P and Classifier$_2$P (corresponding to F1 and F2 in Benedicto & Brentari (2004). She formulates her assumptions about the structural position of Classifier$_1$P and Classifier$_2$P, but states that "Benedicto & Brentari do not address the interaction of classifier structure with event structure" and that "A detailed investigation of these issues is outside the scope of the present project" (p.339). It would be highly interesting to continue this line of research in future work.

[12] See for example Hendriks (2014) for work on the difference between production and comprehension in spoken language research.

would enable us to study the finesses of interpretation in further detail, because the participant may then not be biased to respond contrastively by the simultaneous presence of both alternatives. Other methodological improvements may be adding a time constraint on participants' responses: this would possibly reveal bigger differences between modes.

5.4 Conclusion

The current experiment studies correlations between argument structure and classifier type for three verb types in ASL. The results for causative verbs confirm the paradigm predicted by the hypotheses made by Bendicto & Brentari (2004). It becomes apparent, though, that these cannot explain the full range of data. Particularly, this study shows that $WECL_i$ constructions of manner verbs do not lack an agent the way $WECL_o$ constructions of causatives do. Combined, theory and experiment argue against an analysis of WECL morphemes as constituting one class.

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