Argument Structure in Classifier Constructions in ASL: an experimental approach.

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1. INTRODUCTION

1.1. Classifiers

1.1.1. Sign Language particulars

Sign languages differ radically from spoken languages in their abundant use of so-called *classifier* constructions, where handshapes represent referents according to their properties (e.g. size, shape, object category, manipulability) and the locations of the hands encode referent locations by analogue mappings of event space onto sign space (Emmorey, 2002) [1]. These constructions are used in all of the established, natural sign languages studied so far (Emmorey, 2003; Sandler & Lillo-Martin, 2006). They express spatial relations, motion events and objects' shape and size specifications.

> "There is a rich and complex morphological system in all sign languages we know of that is used for the purpose of denoting spatial relations and motion events and for characterizing shapes and dimensions of objects. The system utilizes forms representing different classes of nominals in combination with other elements. The noun class forms are represented by a set of handshapes, and it is these handshape units that are commonly called "classifiers" in sign language literature" (from: *Sign Language and Linguistic Universals*, Sandler & Lillo-Martin, 2006: p.76).

In (1), an example from German Sign Language (DGS), the signer locates an inverted V-handshape in sign space (1b), where the two fingers represent the legs of a human figure, referring to the man introduced in (1a), to express the man's location to the right of the sign space.

(1)

| (1a) MAN | (1b) (MAN)CL+locR |
| GLOSS: man | GLOSS: stand-there |

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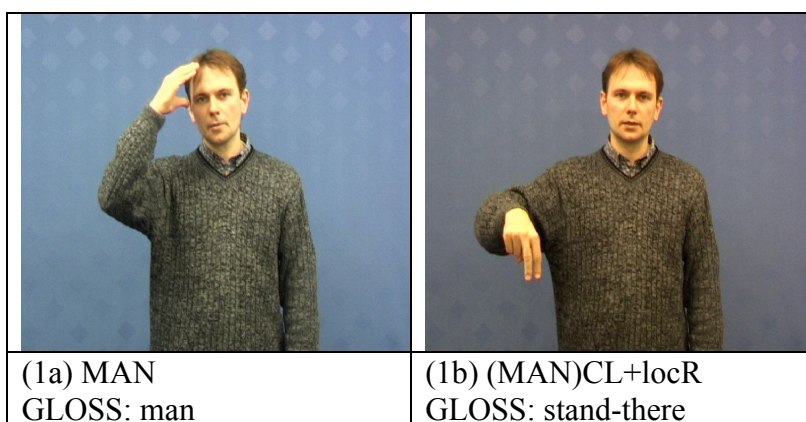
[1] There is some evidence suggesting that not all sign languages may make as much use of classifier constructions as others: Indo-Pakistani sign language (Zeshan, 2003), Bali Sign Language (Branson et al., 1996) and Adomorobe Sign language (Nyst, 2007).

In (2), using DGS classifier predicates, the signer first establishes the relative locations of both the man and the roof in sign space in (2a) and then describes the trajectory of falling motion of the man from the top of the previously located roof downward as in (2b).

(2)

(2a) (MAN)CL)+locON (ROOF)CL GLOSS: Man–on-roof	(2b) (MAN)CL+FALL-DOWN+locFROM (ROOF)CL GLOSS: Man-fall-down-from-roof

DGS (used by permission from Asli Ozyurek)

Classifiers form part of a pervasive yet somewhat anomalous subsystem of sign language grammars. The constructions they appear in are morphologically complex, but in a different way than complex lexical items. For example, in classifier constructions the handshapes have morphological status instead of phonological only. I will explain this with an example. In (3) the two pictures represent two subsequent states of one sign in American Sign Language (ASL). This sign can be either the lexical sign MEET or it can be a classifier construction meaning 'two_upright_beings_approach_each other_face_to_face'.[2] Lexical signs have four phonological parameters: handshape, orientation, location and movement. Minimal pairs can be found by keeping all but one of the parameters constant. The '1' (☝) handshapes of MEET for example distinguish MEET from another lexical sign WITH (made with 'A' (✊) handshapes in the same orientation and location with the same movement). The handshapes themselves are meaningless and do not refer to part of the 'meeting' or 'with' concepts. Together with the particular orientation, location and movement of the sign they form a unit and changing the handshapes of a lexical sign changes the meaning of it altogether.

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[2] As is standard in sign linguistics literature, I use capital English glosses to represent an approximation of the lexical meaning of signs. 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 (☝), (✊) and (✌)).

The handshapes of the classifier construction in (3) are the same as those of the lexical sign, but their status is morphological instead of phonological. Unlike two-handed lexical items, which are mono-morphemic, the two '1' (✋) handshapes of the classifier construction contribute separate morphemes to the linguistic utterance: each hand here refers to a separate entity and identifies that entity as an upright-being. In other words, these handshapes bear meaning. 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'.

(3)
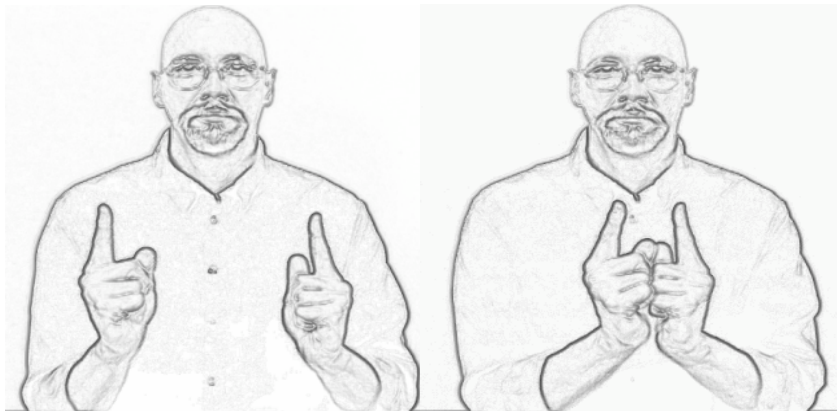
MEET   *or*   CL:up-right-being-CL:up-right-being
"to meet"   *or*   "two_upright_beings_approach_each other_face_to_face"

1.1.2. Signed versus spoken classifiers

Classifier constructions in sign languages are phonologically, morphologically and syntactically complex. Naturally, there exists a fair amount of variation, confusion and discussion about the categorization and terminology used for them. Researchers have referred to them as a.o. verbs of motion and location (Supalla, 1982, 1986), classifier predicates (Schick, 1990), polymorphemic verbs (Engberg-Pedersen, 1993), polysynthetic verbs (Wallin, 1994), polycomponential verbs (Schembri, 2003) and classifier expressions (Talmy, 2003). Each denomination really is a claim about the nature of these constructions. Thus far it remains unclear whether they have equivalents in spoken languages and their iconic forms even lead some researchers to question their linguistic status (Liddell, 1995; Cogill-Koez, 1999). However, in order to be called 'classifier' an item must have (a) status as a morpheme (contributing semantic or grammatical meaning), and (b) the function of grouping, subcategorizing and classifying nouns. And although many have questioned the appropriateness of the term "classifier"

for the widespread phenomenon seen in sign languages (Engberg-Pedersen, 1993; Sutton-Spence & Woll, 1999; Cogill-Koez, 2002; Schembri, 2003), the handshape forms of the constructions under consideration conform to the above criteria and hence the term seems adequate.

In spoken language typology, researchers throughout the years have distinguished between, among others, numeral, genitive, nominal and verbal classifiers. The numeral type – illustrated with Japanese data in (4) below – is the most common type.

(4)

      a)   *nasu*   *nana-ko*
                 eggplant   seven-CL:equidimensional
                 "seven eggplants"

      b)   *kyuuri*   *hachi-hon*
                 cucumber   eight-CL:elongated
                 "eight cucumbers"

      c)   *hamu*   *juu-mai*
                 ham   ten-CL:sheetlike
                 "ten slices of ham"

      d)   *enpitsu*   *ni-hon*
                 pencil   two-CL:elongated
                 "two pencils"

                             Japanese (adapted from Aikhenvald, 2000 and Grinevald, 2000)

Unlike numeral, genitive and nominal classifiers, the fourth major type does not occur within the NP structure but is found inside the verb form. It does not classify the verb itself but rather one of the nominal arguments of the verb. An example of the verbal classifier type from a spoken language is the following (5).

(5) *sa*   *ka-m*   *put-ra-ho-o*
     coconut 1sg-to   CL:round-get-benefact-imperative
     "Give me a coconut"

                             Waris (Brown 1981: p.96)

The verbal type is "one more complex in its expression and relatively less well known" (Grinevald, 2000 in Senft, 2000: p.63). It is one that nevertheless seems to best compare to what we find in sign languages (Supalla, 1986; Aikhenvald, 2003; Zwitserlood, 2003; Sandler & Lillo-Martin, 2006).

This thesis is about the argument structure of verbs that appear in classifier constructions in American Sign Language. Important for our understanding of this is the way in which these constructions pattern. That is what this study is looking at.

1.2. American Sign Language

1.2.1. B&B 2004

In American Sign Language (henceforth ASL), just as in most other documented sign languages, classifiers are commonly said to be of the verbal kind[3]. Padden (1988) identified three types of verbs for ASL that must be distinguished morphosyntactically: *plain* verbs, *agreement* verbs and *spatial* verbs. Plain verbs are verbs that do not take any agreement morphology. Examples are the ASL verbs glossed as CELEBRATE, KNOW and LIKE. Agreement verbs are verbs that can take agreement morphology for referent arguments: for example, they may inflect for person and number marking. Examples of this type include GIVE, ASK and HATE. Spatial verbs are verbs that agree with locative arguments or adjuncts: they make use of the signing space in front of the signer's body to represent the spatial location of the event described. Examples include the verbs MOVE and PUT. Classifiers are argued only to apply to spatial verbs; the other two verb types do not allow classifier handshapes to attach to them (which was one of the morpho-syntactic traits Padden based her identification on). The classifier morphemes attach to spatial verbs as affixes, classifying (one of) the nominal arguments of the verb. They form complex predicates in the sense of Alsina et al. (1997), i.e. they form "predicates which are composed of more than one grammatical element (morpheme or word) each of which contributes a non-trivial part of the information of the complex predicate".

Apart from Benedicto & Brentari (2004), very few works have addressed the syntactic representation of the resulting predicates. In what follows I briefly present the core of their proposal.

1.2.1.1. Different classifier types

Benedicto & Brentari (henceforth also: B&B) analyze classifier morphemes as functional heads that affect the argument structure of the verb to which they attach. They propose two different types of heads: F1 and F2 heads. While F2 heads merge directly above the VP and have properties associated with internal arguments, F1 heads merge higher up in the tree and have properties associated with external arguments (specifically: agents). An argument that lands in the specifier of an F1 or an F2 head will share morphological and syntactic properties with it and thus exhibit the behavior of an external or internal argument respectively. According to Benedicto & Brentari, this works as follows. They claim that the verbal root of the predicate contains information about the number of arguments it selects but not about the status of an
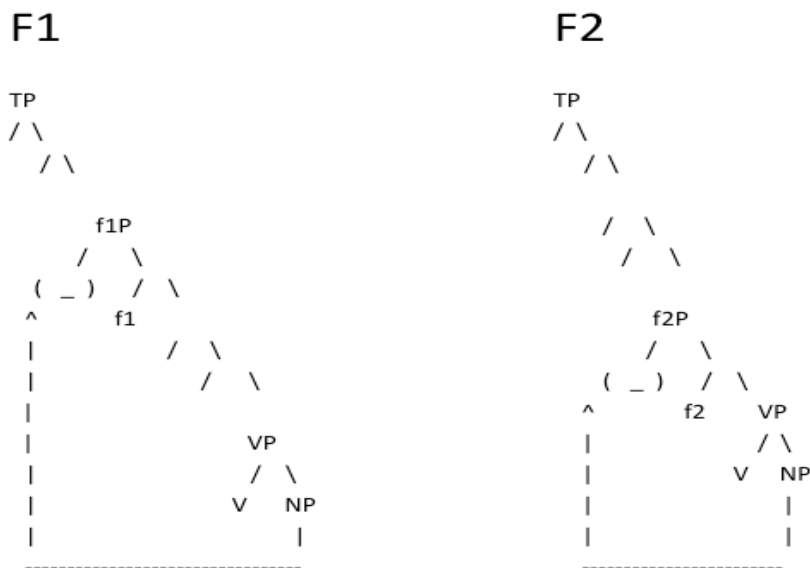
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[3] Shay (2002) has found some evidence for nominal classifiers too.

argument as internal or external. That status "is derived from the structural configuration in which it finds itself after the various merge and move operations apply" (p.765). The merge and move operations Benedicto & Brentari refer to are the following. "If VP then merges with a head of type F2, the argument selected by V will move to Spec-F2 and will thus assume the properties of an internal argument. If, on the contrary, VP merges with a head of type F1, V's argument will move to Spec-F1 and will thus assume the properties of an external argument and its agentive interpretation" (p.766-767). A rough sketch of the proposed positions of F1 and F2 and the movement of a verb's argument to their respective specifiers is shown below in (6).

(6) The proposed syntactic structures for classifier predicates

```
F1                                      F2

TP                                      TP
/ \                                     / \
  / \                                     / \

      f1P                                   / \
     /   \                                 /   \
   ( _ )  / \                            f2P
    ^      f1                           /   \
    |      / \                        ( _ )  / \
    |        / \                       ^      f2   VP
    |                                  |           / \
    |          VP                      |          V   NP
    |         / \                      |          |
    |        V   NP                    |          |
    |            |                     |          |
    |            |                     ------------------------
    ----------------------------------
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The starting point of their analysis is the very interesting observation that the classifier handshapes can be grouped into types which correlate with the argument structure (the theta-grid in the sense of Williams (1981): an unordered list of theta-roles with an indication of their status as being external or internal roles) of the constructions they appear in. Different categorizations of the classifier handshapes have been made in the past (Supalla (1982, 1986), Schick (1987, 1990)). Benedicto & Brentari (2004) distinguish between four types (based on Engberg-Pedersen, 1993), but with respect to the argument-changing properties they describe, only three types are important.

The first type is the whole entity classifier, 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 whole entity classifier is given in (7) (we've seen this handshape before in example (3), where it was used for a semantic classifier). In this case the '1' (☝) handshape is used as a descriptive classifier and refers to a pencil.

(7) Whole entity classifier

   CL:long_thin_object-CL:long_thin_object+BREAK
   "a_pencil_breaking_in_two"

The second type is the body part classifier, where the handshape represents a limb or other body part of an animate entity. The example in (8) shows an upside-down wiggling '3' (🤚) handshape, here referring to a person's legs, to illustrate this type of classifier.

(8) Body part classifier

   CL:a_pair_of_legs+GO_BY
   "a_person's_legs_walking_by"

                                        (used by permission from www.Lifeprint.com)

The third type is the handling classifier, 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 (9) 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.

(9) Handling classifier

CL:a_hand_manipulating_a_long_thin_object-
CL:a_hand_manipulating_a_long_thin_object+BREAK
"a_person_breaking_a_pencil"

1.2.1.2.　　Correlations with argument structure

According to Benedicto & Brentari, each of these three classifier types expresses a different argument structure. Whole entity classifiers are said to be instances of F2 heads: the arguments associated with them exhibit the behavior of *internal* arguments. Body part classifiers are instances of F1 heads: the arguments associated with them exhibit the behavior of *external* arguments, in particular that of agents. Finally, handling classifiers are a combination of an F1 and an F2 head and are thus associated with both an external and an internal argument. The table in (10) gives an overview of the correlations of classifier type and syntactic structure that Benedicto & Brentari describe.

(10)

Whole Entity F2	Internal Argument
Body Part F1	External Argument
Handling F1 + F2	Internal Argument and External Argument

In other words, whole entity classifiers give rise to unaccusatives, body part classifiers give rise to unergatives and handling classifiers give rise to transitives. Having established the types of syntactic configuration that the different classifiers appear in, Benedicto & Brentari then go on to say that ASL classifier constructions enter into two systematic argument structure alternations:

1) Unergatives - Unaccusatives
2) Transitives – Intransitives (specifically: unaccusatives)

The first type is known as split intransitivity. An example of this phenomenon in a spoken language is given in (11).

(11)

a) *Janneke heeft gerend.*
Janneke has run(unerg)
"Janneke has run"

b) *Janneke is naar huis gerend.*
Janneke is to home run(unacc)
"Janneke has run home"

Dutch

Auxiliary selection is one of the typical diagnostic measures for unaccusativity: this Dutch example shows that the verb "rennen" ('to run') takes the default auxiliary "hebben" ("to have") in (11a), but in (11b) – with a directional PP – it takes the auxiliary "zijn" ("to be"). This difference is one of the arguments used to demonstrate that the verb "rennen" in (11a) is unergative and that the verb in (11b) is an unaccusative version of it.
The second type is a transitive-intransitive alternation. This is exemplified for Dutch in (12).

(12)

a) *Jip breekt de vaas.* b) *De vaas breekt.*
    Jip breaks(trans) the vase   The vase breaks(intrans:unacc)
    "Jip breaks the vase"   "The vase breaks"

Dutch

Although the role of the external argument of the transitive alternation in (12) is a causer (Jip can be the agent as well as the mere cause of the breaking of the vase, the latter being the case for example if someone pushes him and he falls on it), the role of the external argument in the transitive version of the alternation described by Benedicto & Brentari for ASL is restricted to that of agent. This makes the transitive-intransitive alternation in ASL notably different from the causative-inchoative alternation seen in spoken languages (of which (12) is an example) to which it resembles. We will return to this point in section 1.3.2.

Benedicto & Brentari (2004) argue that the functional heads associated with the argument structure changes in ASL are a property of Universal Grammar and as such in principle available to all languages, depending on parameterization. Although in other (spoken) languages these heads may not be visible through overt morphology (as in the two Dutch examples above), the classifier constructions in ASL, B&B argue, provide direct evidence for them. The choice of classifier type determines the argument structure of the verbal predicate. Crucially, they provide examples where the same verbal root, combining with different handshape types, results in different argument structure.

The verbal root, which is represented by the movement component of the sign, has to be of the *spatial* verb class (and can not be an *agreement* verb like GIVE, ASK or HATE and not a *plain* verb either like KNOW or LIKE, etc.) in order for classifiers to be able to attach to it.[4] Then, if the verb falls within the first alternation type the root may combine with either a body part (abbreviated as BP) classifier and produce an unergative structure, or it may combine with a whole entity (abbreviated as WE) classifier and produce an unaccusative structure. The following example (13) is quoted from B&B (their example 10, p.751).[5]

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[4] Verb classes as identified by Padden (1988), see section 1.2.1.

[5] In their article, Benedicto & Brentari do not provide any illustrations of their data examples but instead use number and letter symbols only. Although certain conventions exist in the sign language literature, there is no uniform use of a writing or representation system and hence my interpretations of the symbols B&B used may deviate from the signs they intended to represent. As a consequence, it is possible that we are not discussing the same data. This is a serious hazard typical of the field. In an attempt to not only accommodate the reader unfamiliar with sign languages but also prevent sign linguists from being at cross-purposes, I have inserted small handshape drawings in between parentheses.

(13)

    a)   ROSIE S(✊)+BOW
                Rosie CL(BP):head+BOW
                "Rosie bowed(*unergative*)".

    b)   ROSIE 1(☝)+BOW
                Rosie CL(WE):upright_being+BOW
                "Rosie bowed(*unaccusative*)".

If the root predicate lies within the second verb alternation type, it may combine with either a handling (abbreviated as Hdlg) classifier and yield a transitive structure or it may combine with a whole entity (WE) classifier and the structure becomes unaccusative. Example (14) illustrates this alternation (quoted freely from B&B: example 12, p.752).

(14)

    a)   Ø BOOK C(✊)+MOVE
                Pron.3sg book CL(Hdlg):a_hand_manipul._a_grabable_object+MOVE
                "S/he moved(*transitive*) the book".

    b)   BOOK B(✋)+MOVE
                Book CL(WE):2D_flat_object+MOVE
                "The book moved(*unaccusative*)".

1.2.1.3.   Tests

B&B use four tests to show the argument structures corresponding to the different classifier types. They use two tests that target the INTERNAL argument and two tests that target the EXTERNAL argument. For the INTERNAL argument they use the so-called [distributive] morpheme test and the NOTHING test. For the EXTERNAL argument they use the Negative Imperative test and the WILLINGLY test. They start by independently demonstrating that the tests they employ indeed target the said arguments.

1.2.1.3.1.   *INTERNAL arguments*

In the [distributive] morpheme test, the morpheme in question is co-articulated with the verb and can only be grammatically constructed with the internal argument, not with the external argument. B&B show that in the case of a non-classifier transitive verb, such as BUY (example (15)), the expected result is obtained: the [distributive] morpheme can only be grammatically interpreted with the internal argument, SHIRT, and not with the external argument, GIRL.

(15)   GIRL SHIRT BUY+[distr]
            girl shirt buy+[distributive]

    a)   "The girl bought each of the shirts".
    b)   #"Each of the girls bought a shirt".

                                    (B&B 2004, p.757, example 17)

They apply this test to the ASL verb MELT, as an example of a non-classifier unaccusative verb (shown below as example (16)), which yields a grammatical result, and to LAUGH, as an example of a non-classifier unergative verb (shown below as example (17)), which yields an ungrammatical result.

(16)

    a)   ICE-CREAM MELT
            ice cream melt
            "The ice cream melted".

    b)   ICE-CREAM MELT+[distr]
            ice cream melt+[distributive]
            "Each of those ice creams melted".

                                    (B&B 2004, p.756, example 15)

(17)

    a)   WOMAN LAUGH
            woman laugh
            "The women laughed".

    b)   *WOMAN LAUGH+[distr]
            woman laugh+[distributive]
            #"Each woman laughed"

                                    (B&B 2004, p.757, example 16)

For the NOTHING test, B&B show that the negator sign NOTHING –just like the [distributive] morpheme- has scope only over the internal argument and not over the external argument of a transitive predicate.[6] In example (18) NOTHING can negate only the object, STUDENT, not the subject, TEACHER, of the sentence.

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[6] The NOTHING test was based on work by Wood (1999).

(18)   TEACHER SEE STUDENT NOTHING
            teacher see student NEG-nothing

       a)   "The teacher didn't see any of the students".
       b)   #"None of the teachers saw the students".

<div align="right">(B&B 2004, p.759, example 22)</div>

Using the same non-classifier, one-place verbs as with the [distributive] morpheme test, B&B show that the sign NOTHING in combination with an unergative verb produces an ungrammatical result, whereas with an unaccusative verb it produces a grammatical result ((19) and (20) respectively).

(19)

       a)   WOMAN LAUGH
               woman laugh
               "The women laughed".

       b)   *WOMAN LAUGH NOTHING
               woman laugh NEG-nothing
               #"No woman laughed".

<div align="right">(B&B 2004, p.759, example 20)</div>

(20)

       a)   BUTTER MELT
               butter melt
               "The butter melted".

       b)   BUTTER MELT NOTHING
               butter melt NEG-nothing
               "None of the butter melted".

<div align="right">(B&B 2004, p.759, example 21)</div>

1.2.1.3.2.   *EXTERNAL arguments*

Both tests to detect external arguments are based on the premise that external agentive arguments show sensitivity to agentivity tests. Certainly not all external arguments are agents, but agents are universally realized as external arguments. Hence, verbs with agents form a subset of verbs with external arguments. Thus, any test targeting agents will undergenerate with respect to the entire set of verbs with external arguments, but whatever set it picks out is uncontroversially going to be a set of verbs with external,

agentive arguments. Recall that Benedicto & Brentari explicitly argue that the external arguments in both the unergative and the transitive alternations of ASL classifier constructions are agents. In this case then, agentivity tests correctly serve the purpose of detecting the external arguments in the constructions under discussion.

The Negative Imperative test is based on the assumption that imperatives can only be formed grammatically from verbal predicates with an external AGENTIVE argument. Because ASL has no clear positive imperative with a manual sign, Benedicto & Brentari use negative imperatives, which are formed with the manual sign FINISH. For non-classifier verbs, example (21) shows that this results in a grammatical structure with an agentive verb (LAUGH) and in an ungrammatical structure with a non-agentive verb (SWEAT).

(21)

     a)   LAUGH FINISH!
               laugh STOP_Imperative
               "Stop laughing!"

     b)   *SWEAT FINISH!
               sweat STOP_Imperative
               "Stop sweating!"

                                 (B&B 2004, p.761, example 25)

In the WILLING test, the agent-oriented adverb WILLING (a sign meaning "willingly" or "voluntarily") is added to a verbal predicate to detect the presence of an AGENTIVE argument. Just like in the Negative Imperative test, B&B show that for the non-classifier verbs, the result is grammatical with agentive verbs and ungrammatical with non-agentive verbs. This is illustrated for the unergative predicate LAUGH and the unaccusative predicate FALL in (22) below.

(22)

   a)   WOMAN WILLING LAUGH
               woman willingly laugh
               "The woman laughed willingly".

     b)   *WOMAN WILLING FALL
               woman willingly fall
               "The woman fell willingly".

                                   (B&B 2004, p.763, example 28)

1.2.1.3.3.   *TESTING CLASSIFIERS*

They then apply the tests to the classifier constructions. Based on their proposal, the outcomes of the [distributive] morpheme test and NOTHING test are expected to be ungrammatical for BP classifiers but grammatical for WE classifiers. Benedicto & Brentari take the data in (23) to mean that the single argument associated with a WE classifier is internal in contrast with that of a BP classifier. On the other hand, the outcomes of the Negative Imperative test and the WILLING test are grammatical for BP classifiers and ungrammatical for WE classifiers (24), as expected by Benedicto & Brentari, and this is taken to mean that the single argument associated with a BP classifier is external in contrast to that of a WE classifier. They conclude that body part (BP) classifiers form intransitive predicates of the unergative type and whole entity (WE) classifiers form intransitive predicates of the unaccusative type and that the two types alternate.

(23)

      a)   *ACTOR S(✊)+BOW+[distr]
             actor CL(BP):head+BOW+[distributive]
             "Each actor bowed".

      b)   ACTOR 1(☝)+BOW+[distr]
             actor CL(WE):upright_being+BOW+[distributive]
             "Each actor bowed".

      c)   *ACTOR S(✊)+BOW NOTHING
             actor CL(BP):head+BOW NEG-nothing
             #"None of the actors bowed".

      d)   ACTOR 1(☝)+BOW NOTHING
             actor CL(WE):upright_being+BOW NEG-nothing
             "None of the actors bowed".

                          (based on examples 18, 19, 23, 24 from B&B 2004)

(24)

      a)   REMEMBER S(✊)+BOW FINISH!
             remember CL(BP):head+BOW STOP_Imperative
             "Remember, stop bowing!"

      b)   *REMEMBER 1(☝)+BOW FINISH!
             remember CL(WE):upright_being+BOW STOP_Imperative
             "Remember, stop bowing!"

      c)   ROSIE WILLING S(✊)+BOW
             Rosie willingly CL(BP):head+BOW
             "Rosie bowed willingly".

d)   *ROSIE WILLING 1(✌)+BOW
              Rosie willingly CL(WE):upright_being+BOW
              "Rosie bowed willingly".

(based on examples 26, 27, 29, 30 from B&B 2004)

Secondly, they give examples where the expected behavior for the transitive-intransitive alternation is borne out: whereas the WE classifiers, again, produce positive results for the [distributive] morpheme and NOTHING tests and negative results for the Negative Imperative and WILLING tests, the same verbal roots with Hdlg classifiers produce positive results for all tests, but the [distributive] morpheme and NOTHING can only scope over the internal argument. This is illustrated in (25) and (26) below. They take this to mean that handling (Hdlg) classifiers form transitive predicates and that they alternate with whole entity (WE) classifiers to form unaccusative predicates.

(25)

       a)   BOOK B(✋)+MOVE+[distr]
              book CL(WE):2D_flat_object+MOVE+[distributive]
              "Each of the books moved/fell".

       b)   Ø BOOK C(✊)+MOVE+[distr]
              pro book CL(Hdlg):a_hand_manip._grab._obj.+MOVE+[distribut.]

              "S/he moved each of the books".
              #"Each of them moved the book".

       c)   BOOK B(✋)+MOVE NOTHING
              book CL(WE):2D_flat_object+MOVE NEG-nothing
              "None of the books moved/fell".

       d)   Ø BOOK C(✊)+MOVE NOTHING
              pro book CL(Hdlg):a_hand_manip._grab._obj.+MOVE NEG-nothing

              "S/he didn't move any of the books".
              #"Nobody moved the book".

(26)

       a)   *BOOK WILLING B(✋)+MOVE
              book willingly CL(WE):2D_flat_object+MOVE
              "The book moved/fell willingly".

       b)   Ø BOOK WILLING C(✊)+MOVE
              pro book willingly CL(Hdlg):a_hand_manip._grab._obj.+MOVE
              "S/he moved the book willingly".

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c)   *BOOK B(✋)+MOVE FINISH!
      book CL(WE):2D_flat_object+MOVE STOP_Imperative
      "Book, stop moving/falling!"

d)   Ø BOOK C(✍)+MOVE FINISH!
      pro book CL(Hdlg):a_hand_manip._grab._obj.+MOVE STOP_Imperat.
      "Stop moving the book!"

Benedicto & Brentari conclude that BP classifiers are unergative, having a single, agentive argument; WE classifiers are unaccusative, having a single, internal argument; and Hdlg classifiers are transitive, having both an internal and an external, agentive argument; and that ASL exploits this to enter into a system of argument structure alternations.

1.3. Research questions

1.3.1. Other proposals

Although the account of Benedicto & Brentari provides a very interesting explanation for the syntactic behavior of classifiers in ASL, many questions remain open. The few other works that have addressed the morpho-syntactic representation of ASL classifiers raise some of these questions. For instance, Grose et al. (2007) provide an extension of Benedicto & Brentari (2004)'s model in order to include event structure. They accept most of B&B's proposal, but object to B&B's conclusion that BP classifiers are unergative. They show that in addition to having morpho-phonological specifications for handshape, BP classifiers contain morphological specifications that B&B associate in other classifier predicates with internal arguments. They show that BP classifiers can be telic and this is in contradiction with the empirical facts of unergativity across (spoken) languages. Grose et al. (2007) conclude that BP classifiers are transitive predicates, just like Hdlg classifiers. The difference with Hdlg classifiers is that the internal argument in BP classifiers is semantically restricted to being a "part" of the external argument, i.e. a body part or limb. They then propose an analysis along the lines of (27).[7]

(27)   ROSIE S(👆)+BOW
       Rosie head-bow
       "Rosie bowed her head"

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[7] Interestingly enough, similar constructions in Romance languages are analyzed as complex predicate/incorporation structures by Delfitto & Schroten (1992). According to them, structures like the Spanish *levantar la mano* ("raise one's hand"), in which the (body part/limb) object is always interpreted as belonging to the subject, should be analyzed as unergative (meaning "hand-raising") rather than transitive.

Mathur & Rathmann (2007) have a different analysis of the classifier constructions, yet with respect to argument structure they arrive at a similar conclusion to that of B&B, dividing classifiers into three types, which they call: handling, manipulate and move. Similar to Grose et al. (2007) however, they analyze BP classifier examples (manipulate, in their analysis) as involving a theme in addition to the agent. Also, unlike B&B, they take handling classifiers to involve three arguments instead of two: agent, theme and instrument. This is an interesting point to which we will return in sections 1.3.3.1. and 1.3.3.2.

Benedicto & Brentari (2004) have functioned as a starting point for most, if not all, recent work on the syntactic representation of ASL classifiers. All those works rely to some extent on the classification that B&B made. Although the papers by Grose et al. (2007) and Mathur & Rathmann (2007) indicate that their analysis of BP classifiers may require some modifications, they need not pose a serious problem for Benedicto & Brentari's proposal. Perhaps BP classifier constructions are better analyzed as transitives, incorporating some sort of cognate object (as in the English "dance a dance", "live a life"), rather than unergatives.[8] Note, however, that when it comes to the issue of alternating syntactic behavior under examination in Benedicto & Brentari (2004), the question of whether these verbs are transitive or unergative becomes less relevant simply because both transitives and unergatives have an external argument as opposed to unaccusatives.[9] What is more interesting is that all three accounts point to the fact that there is a restriction on the external argument in classifier constructions: the external argument is in all data provided analyzed as having the thematic role of AGENT. This will be discussed in the next section.

1.3.2. Agents or Animate Causers?

To understand the issue better, allow me to present the analysis of causative-inchoative pairs as put forward by Reinhart (2000 et seq.). For the linguistic coding of causal relationships, Reinhart proposes a feature system in which clusters of different combinations of two binary features correspond to different thematic roles. "Rather than viewing the thematic roles as primitives, we may search for a system of formal features that compose θ-roles, and govern θ-selection and linking (mapping)"

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[8] Such an analysis would not, a priori, be implausible. Recall that Hale & Kayser (2002) argue that unergative verbs like *dance*, *cry*, *sing* involve a transitive structure where an empty light verb selects for a noun. The problem for any such analysis, on the other hand, is the existence of uncontroversially one-place, unergative verbs, where verbs of emission present very good candidates (see Reinhart 2002 and Marelj 2004 for discussions).

[9] It is known that transitives and unergatives pattern together with respect to unaccusativity diagnostics such as auxiliary selection (see section 1.2.1.2.) and (impersonal) passivization. See a.o. Perlmutter (1978).

(Reinhart, 2002: p.2). She labels the two binary features as "/c- cause change" (which she explains is the feature shared by agents and causes, namely that they cause a change of state) and "/m- mental state" (which she explains is the feature that distinguishes agents from causes, namely the involvement of some mental properties of the participant). The system contains nine feature clusters as presented in (28) below.

(28)

       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].)

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

Of interest here is the difference between the [+c] cluster and the [+c+m] cluster. Reinhart explains that "the characteristic property of verbs selecting a [+c] argument is that they allow this argument to realize as either an unspecified cause, or as an agent or instrument" and gives the following examples (29).

(29)

       a)   The wind /Max /the key opened the door
       b)   The storm /Max /the stone broke the window.
       c)   The heat /Max /the candle melted the ice.
       d)   Max /the noise /the gun scared Lucie.
       e)   Fred /Fred's behavior /the discussion surprised Lucie.

                    (from Reinhart, 2002: p.14)

The set of verbs in (29) can be further distinguished by their internal role. In (29a-c) it is a theme ([-c-m]). It is these verbs that participate in the causative-inchoative

alternation: universally, they all have an unaccusative alternate as in (30). The unaccusative alternate is derived from the transitive through a <u>Reduction</u> operation that eliminates the [+c] cluster from both syntax and semantics. We will get back to this operation in section 1.3.3.2.

(30)

       (a) The door opened.
       (b) The window broke.
       (c) The ice melted.

The verbs in (29d-e) select an experiencer ([-c+m]) as their second argument. They do not participate in the causative-inchoative alternation and will not be further discussed here.[10]

Reinhart states: "The varying interpretation of the external role is found only with [+c] verbs. Verbs selecting an agent ([+c+m]) have fixed interpretation (…). The feature /+m present in this cluster entails that the argument must be human or animate (though, as is well known, machines, and particularly computers, behave linguistically as if they were human)". So unlike the verbs in (29), verbs that select a [+c+m] cluster do not allow causes or instruments, only agents (31).

(31)   The baby/ *the spoon /* hunger ate the soup.

Cross-linguistically, these agentive verbs do not partake in the causative-inchoative alternation: the internal argument of the transitive agentive verb cannot surface externally to form an unaccusative (32b).

(32)

       (a)   The baby ate the soup.
       (b)   *The soup ate.

Benedicto & Brentari claim that classifier predicates in ASL "enter into a systematic argument structure alternation system of the two *well-known* types in spoken languages" (p.745, italics are mine). One of these alternations is the "transitive/intransitive one". "This classical alternation is the one that relates a transitive verb (with two arguments: an agent and a theme) with an intransitive unaccusative verb (with one single argument, the theme)" (p.768). They then give a "classical example" of this alternation, presented here in (33).

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[10] These verbs also have a one-place alternate, but unlike the alternates of (29a-c), the experiencer alternates of (29d-e) are unergative. Compare *Max worries* to the examples in (30). For more details, the reader is referred to the original work by Tanya Reinhart.

(33)

        a)   John opened the door.
        b)   The door opened.

                                    (B&B, 2004: p. 768, example 5, repeated as 32)

In footnotes they mention that "this alternation is also called causative-inchoative in the literature", but that they follow the view of Hale and Kayser (1993, 2000) that "these alternations are basically alternations of transitivity and not of causativity", which aligns with their observation that the external role of the transitive alternate is an agent rather than a causer (B&B, 2004: footnotes 6 and 36).
As we saw in our review of Reinhart's work, there is more than one type of transitive verb that has an intransitive alternation but none of them alternates in the way Benedicto & Brentari describe it (i.e. with a transitive that selects an agent and a theme and an unaccusative that selects just a theme). If the alternation in question is indeed of the "well-known" causative-inchoative type which it resembles, we would expect the external argument of the transitive alternate to bear the thematic role of causer (the [+c] cluster in Reinhart's feature system) and we would thus expect that this argument can be realized not only as an agent (34a), but also as an instrument (34b) or a cause (34c).

(34)

        (a)   John opened the door.
        (b)   The key opened the door.
        (c)   The wind opened the door.

However, Benedicto & Brentari explicitly point out that the external argument of the transitive alternate in ASL classifier constructions is restricted to the role of AGENT only, as in (35a); ASL cannot use a Hdlg classifier to express causation by a natural force for example, as in (35b).

(35)

        a)   JOHN DOOR S(✊)+OPEN
                  John door CL(Hdlg):hand_manip._grab._obj.+OPEN
                  "John opened the door"

        b)   *WIND DOOR S(✊)?+OPEN
                  wind door CL(Hdlg)?+OPEN
                  "The wind opened the door".

This then constitutes a very important difference between ASL and other, spoken languages. Recall that Benedicto & Brentari (2004) argue that the functional heads associated with the argument structure changes in ASL are a property of Universal Grammar and as such in principle available to all languages, depending on parameterization. If this were true, we would expect agentive-inchoative alternations to appear in other languages too. This prediction is not borne out. In fact, if we assume (like B&B do) that the transitive is derived from the unaccusative, we would not only predict agentive-inchoative alternations but also unergative-inchoative alternations: B&B argue that the verbal root selects the number of the arguments, so they must assume that inchoative alternates of verbs like BREAK and SAW only select one argument), which could then combine with either a Hdlg classifier (in which case F1 would *add* the agent of the transitive alternate) or a BP classifier (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". This prediction is also not borne out. If we, on the other hand, assume (like Reinhart for example) that the intransitive is derived from the transitive, we would predict agentive verbs like "eat" to partake in the same alternation as verbs like "open" and we would predict sentences like (32b) (*"the soup ate") to be grammatical. This prediction is not borne out either. Rather than selecting for an agent, it is then more likely in the light of empirical generalizations that the transitive alternates described by Benedicto & Brentari select for the role of CAUSER as in the causative-inchoative alternations of spoken languages, but that this role is restricted to [+animate] or maybe even [+human] causers. An important question to be answered in further research is thus whether the external arguments under consideration are agents or animate/human causers.

Obviously, this point calls for additional investigations, necessary for the study of argument structure of classifier constructions in ASL. Perhaps this restriction is not limited to classifier constructions and applies more generally to verbs of all classes (plain verbs, agreement verbs and spatial verbs). This topic should also be studied in other sign languages: the particular restriction on the CAUSER role, unseen in spoken languages, may be a modality effect if it proves to be a common feature of sign languages. Future research into this area may then contribute significantly to the study of the human language faculty.

1.3.3. Problems with B&B 2004

1.3.3.1. Empirical adequacy

In this section I will raise some issues that place serious question marks over the empirical adequacy of Benedicto & Brentari's account. First of all, in the previous section we have seen that there are some big issues with respect to the generalizability of the phenomena that they describe. Most prominently, we have pointed out how exceptional it would be to have an AGENT role participate in a transitive-intransitive alternation. Another point that has been made but may need to be emphasized is that it is unclear from B&B'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, B&B must 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 B&B's intention, but I do not see how their proposal as presented in their paper steers clear of this problem.

Secondly, contradicting the prediction of abundance just mentioned, there are big issues with respect to the productivity of the phenomena. Prompted by the lack of more examples of the data on which Benedicto & Brentari based themselves, particularly for the unergative-unaccusative pairs, I looked for more examples of this kind myself and barely found any.[11] As mentioned in the previous section, B&B claim that "classifier predicates in ASL exploit such *(syntactic)* system to enter into a systematic argument structure alternation system of the two well-known types in spoken languages" (Benedicto & Brentari, 2004: p.745). If there exists indeed such a syntactic system in ASL, one would expect it to be a productive process and thus examples should be plenty. My findings are that particularly the unergative-unaccusative alternation seems to be restricted to a couple of idiosyncratic pairs, rather than forming part of a largely productive process. This is not expected on the basis of their account.

Then, with respect to the syntactic tests Benedicto & Brentari used to demonstrate the INTERNAL status of an argument, I was not able to replicate their results with the informants I consulted, at least for the intransitive predicates. For my informants, the [distributive] morpheme test just seemed to yield plain ungrammatical results, BP and WE classifiers alike. Even the non-classifier verbs B&B used failed the test. Informants did not find it grammatically possible to add the morpheme to the verbs of many of the examples in B&B (like LAUGH, MELT, BOW, COME_UP_BESIDES) to start with; hence no distinction with respect to argument structure was possible on the basis of this test. This is a very surprising finding, for which at first sight no obvious explanation comes to mind other than perhaps a dialectal difference: the informants consulted by Benedicto & Brentari presumably come from the geographical area in the US known as the Midwest (including among others Indiana and Illinois states), whereas I consulted informants residing in the New England area (particularly Connecticut and Massachusetts states). There may be deeper issues here, though. I will put forward two possibilities.

First, it should be noted that it is not a priori known whether the ASL verbs LAUGH and MELT are unergative and unaccusative respectively. It is known that one-place verbs do not pattern cross-linguistically alike: as pointed out by Rosen (1984), certain pairs of corresponding verbs with meanings like *bleed*, *suffer*, *sweat*, *die*, *be afraid*, and *talk in a delirium* behave as syntactic unaccusatives in one language, and as unergatives in another. The following examples from (Rosen, 1984: p.61-67) are but an illustration:

(36)

	UNERGATIVE	UNACCUSATIVE

[11] Through personal communication (both face-to-face and by email) I have asked Diane Brentari as well as Elena Benedicto for more examples, but neither one has fulfilled that request.

"die"	Choctaw	Italian
"sweat"	Italian	Choctaw

Although the English verbs "to laugh" and "to melt" may be unergative and unaccusative respectively, cross-linguistic differences in argument structure exist (like the unavailability in ASL of a transitive version of MELT, as in "the cook/the heat melted the ice cream") and since ASL exhibits split cases (as in the BOW alternation presented by Benedicto & Brentari) we cannot blindly trust the inter-linguistic transfer of these properties. Although B&B did show how uncontroversial transitive verbs behave first and then applied the test to the one-place non-classifier predicates to prove its validity, it is only coupled with the fact that my informants considered their examples ungrammatical that this now becomes an issue, because it is no longer possible to say if the ASL verb SWEAT (or MELT) is like "sweat" in spoken Italian or in spoken Choctaw.[12]

A second possibility, perhaps more convincing, is related to the different morpho-syntactic behavior of the three verb classes defined by Padden (1988). Padden (1988, 1990) points out that plain verbs do not allow agreement morphology, only aspectual inflection; that agreement verbs allow both number and person agreement as well as aspectual inflection; and that spatial verbs –and thus the verbs in classifier constructions – do not allow number or person agreement, nor aspectual inflection (only locative agreement and noun classification). If we consider the [distributive] morpheme a specific case of number agreement, namely "exhaustive" agreement ("each"), then the prediction is that this morpheme is only allowed in combination with agreement verbs. This would explain the fact that both plain verbs (LAUGH, ?MELT) and spatial verbs (BOW, COME_UP_BESIDES) are rejected as ungrammatical in combination with this morpheme. If this explanation is in the right direction, it obviously begs the question: how do we explain the findings of B&B with respect to this test?

For the NOTHING test, Benedicto & Brentari claim that the "none of the…"-reading of the resulting structure is only compatible with an internal argument. However, they mentioned that there is a second, related reading that was grammatical with both BP and WE classifiers. My informants in general acknowledged that second reading, which has a wider scope, denying the entire VP (without the subject) rather than the object alone. The classifier constructions then translate as, for example, "the actors didn't bow at all". In the few cases where they did accept the "none of the…"-reading, the judgments were very weak and hence conclusions about a systematic difference between the two possible interpretations for any type of classifier are unreliable.

Both tests given to demonstrate the EXTERNAL status of an argument are semantic in nature -indicating the presence of an agent- and therefore only indirectly address the issue. The Negative Imperative test for example originally goes back to Lakoff (1966), who presented a list of criteria to distinguish stative predicates from non-stative predicates. The rationale behind the distinction is: there are contexts in which non-stative predicates are acceptable and stative predicates are not. Stative predicates are sensitive to a number of different features of predicates. Agentivity is one of the major factors: stative predicates are always non-agentive. Thus, among other tests, Lakoff

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[12] Actually, in their paper B&B present the one-place verbs first and then apply the test to a transitive.

showed that only non-statives can occur in progressives and in imperatives, and statives cannot. However, there are examples in the literature where stative predicates pass some of the tests (see 37 below).

(37)

      a)   Stop hating everyone!
      b)   Stop annoying me!
      c)   Don't fear spiders!

Their non-classifier example of the Negative Imperative test may correctly show that SWEAT does not include an agent, but the conclusion that the verb is unaccusative is unproven: for English, Levin & Rappaport (1995) analyze "sweat" as a one-place, unergative verb with a patient/theme role. These comments are but one way to say that the tests used by B&B to target the external argument are certainly not bullet proof. Although B&B generally emphasize on the distinction between the internal and external status of the argument, rather than on its thematic role, both the WILLING test and the Negative Imperative test are meant to detect agents. So, when the tests apply, it picks out only a subset of all verbs with external arguments, namely agentive verbs. Plus, there is a grey area with respect to the grammaticality of the results of both of these tests. The informants I consulted give conflicting results for these tests.
For the unergative-unaccusative alternation, the BOW example from Bendicto & Brentari (illustrated above in examples 13, 23 and 24) was at its best confusing to all of my informants. This wasn't so much due to the tests, it seemed: the WE classifier version of it was often even rejected as having any kind of "bow"-meaning at all. Unfortunately, other verbs that fit the paradigm and would be testable seem scarce if not unavailable. This casts doubts on the existence of a productive unergative-unaccusative alternation in classifier constructions in ASL (this was mentioned in the previous section already). It is particularly problematic for the hypothesis put forward by B&B that these alternates are derived through a syntactic operation: if an operation is restricted to the lexicon, it can reasonably be non-productive, but one would expect any syntactic operation to be productive. So, this lack of examples can be taken as an argument against deriving the alternations in syntax.

For the transitive-intransitive alternation, pairs of classifiers were slightly easier to find. As examples of this alternation, Benedicto & Brentari (2004) give both MOVE (38) and SAW (39).

(38)

      a)   Ø BOOK C(✍)+MOVE
                pron.3sg book CL(Hdlg):hand_manip._obj.+MOVE
                "S/he moved the book".

      b)   BOOK B(✋)+MOVE
                book CL(WE):object+MOVE
                "The book moved".

(39)

    a)   Ø PLANKS S(✊)+ SAW
              pron.3sg planks CL(Hdlg):hand_manip._instr.+SAW
              "S/he sawed the planks".

    b)   PLANKS B(✋)+ SAW
              planks CL(WE):instrument+SAW
              "The planks are/got sawed".

In their proposal, both of these two pairs belong to the same category with respect to the argument structure changing properties of their classifiers. However, as they mentioned themselves, there is a difference between these two verbs with respect to the classifier handshapes. There are those that represent (handling of) the object directly, i.e. without the mediation of an instrument. And there are those that represent (handling of) the object indirectly, i.e. through an instrument. In the latter case, the handshape represents (handling of) the instrument that is operating on the direct object. Handling classifiers of the C(✊)+MOVE example are of the first type. We shall simply keep calling those "handling" (Hdlg) classifiers. Handling classifiers of the S(✊)+ SAW example are like the second type. We shall now call those "handling-instrumental" (Hdlg-i) classifiers. For the whole entity classifiers, the same notation difference shall be made: "whole entity" (WE) for the B(✋)+MOVE type and "whole entity-instrumental" (WE-i) for the B(✋)+ SAW 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 B&B's proposal would predict. A possible split between classifiers that refer to (handling of) an object and classifiers that refer to (handling of) an instrument became apparent. We will take a closer look at this in the following section.

1.3.3.2.   **Manner verbs and unaccusativity**

In their discussion of the classifier pairs for the transitive-intransitive alternation, B&B collapse MOVE type verbs and SAW type verbs. However, MOVE type verbs are causative verbs, but SAW type verbs form a different set, which I will refer to as *manner verbs*. These two verb groups differ in a) the arguments they select as part of their theta-grid, and b) the argument structure alternation they partake in. Allow me to present the analysis of manner verbs (like "peel", "cut", "screw") by Reinhart (2000, 2002). Manner verbs allow either an agent or an instrument subject, as in (40), but unlike verbs selecting a [+c] cluster (see section 1.3.2.) they do not allow a cause, as in (41). They also do not have a reduced (unaccusative) entry (42).

(40)

       a)   Max peeled the apple (with the knife).
       b)   The knife peeled the apple.

(41)   *The heat peeled the apple.

(42)   *The apple peeled.

What defines this set is that the verbs include a reference to a specific instrument (i.e. the event denoted could not take place without that instrument). In interpretative terms of causality, this means that the verb is associated with a set of two conditions, which only together are sufficient: it selects two [/+c] roles. In standard agent verbs (as in (31) and (32) in section 1.3.2.)) an instrument is always allowed optionally, but it is not directly selected by the verb (the allowance of an instrument is a general entailment licensed by the agent role, which is shown further down in this section and needs not be listed for each individual entry). Manner verbs, however, select an instrument as part of their grid. So their entry is (43).

(43)   drill/peel ([+c+m], [-c-m], [+c-m])
        agent, patient, instrument

<div align="right">(Reinhart, 2002: p.16)</div>

Reinhart shows that when a verb selects two [/+c] roles, only one is obligatorily realized (and the other may be present only in the semantics). The mapping generalizations she puts forward determine that if both agent and instrument are realized, then the agent must be the external argument, as in (40a). But if only the instrument is realized, as in (40b), it must be the external one.
Reinhart also mentions the following. "Idan Landau pointed out that the set of manner verbs is much wider than those selecting an instrument. Verbs like *fill* are also associated with a set of two conditions which are sufficient only together (- the filler and the water in (44), which can be both viewed as causing the pool to fill).

(44)

       a)   Max/the hose/ the storm filled the pool with water.
       b)   The water[+c-m] filled the pool.
       c)   fill ([+c], [-c-m], [+c-m])
       d)   The pool$_i$ filled t$_i$ with water.

Though "the water" in (44) would not be labeled an instrument, its relation to the verb is the same as in the instrument-verbs in (40-43). So it is also a [+c-m] cluster. But the external cluster differs here: *fill* is compatible with an agent, an instrument and a cause role, as in (44a), i.e. the verb selects a [+c] cluster, rather than an agent [+c+m]. Its entry, then, is given in (44c).

Again, assuming that of two [/+c] roles, one can be unrealized syntactically, we obtain also (44b), analogously to (40b). But since this is a [+c] verb, we expect to find also an unaccusative realization (obtained by reduction, to which we turn directly). Indeed we find it in (44d). That (44d) is a derived (reduced) form, but (44b) is not, can be witnessed in Hebrew, which marks such processes in the morphology: in (44a,b) the verb is *mile*, while in (44d) it is *hitmale* (reflexive morphology, common also with unaccusatives)" (Reinhart, 2002: p.16).

The conclusion that can be drawn from Reinhart's analysis is that the difference between MOVE-type verbs and SAW-type verbs is inherent to the semantics of these verbs and that this has implications for the possible argument structure alternates that they may show up in. Benedicto & Brentari unjustifiably collapse the two verb types.

Note further that, regardless of the status of any instrument role, its presence is contingent on the presence of an agent. If there is no agent, the instrument cannot be licensed. The Instrument Generalization is given in (45) below (see Marelj 2004 for references and discussion):

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

Recall (see section 1.3.2. – Agents or Animate Causes?) that in Reinhart's Theta System (see also Chierchia 1989/2004), one place unaccusatives are derived from two-place predicates. In the Theta System this is the result of the operation of Decausativization, where the reduction is the elimination function. Hence, the external role is eliminated from both the syntax and semantics (compare (47b) to (47a)). This being the case, the prediction is that Instruments cannot be licensed with unaccusatives. This prediction is borne out (compare (46b) to (46a) below).

(46)

         a)   Max broke the window (with a hammer).
         b)   The window broke (*with a hammer)

(47)

         a)   ($\exists$e) [breaking (e) & Agent (e, Max) & Theme (e, the window)]
         b)   ($\exists$e) [breaking (e) &Theme (e, the window)]

Unlike with unaccusatives, the external role in passives is not reduced, but saturated. What the <u>Saturation</u> operation does, is make the theta-role unavailable for syntactic purposes. Passive saturation closes existentially the external argument of a verb. As a consequence, the role is present semantically, but syntactically unrealized (see Marelj 2004 for details and discussion). As the role is still present semantically, licensing of instruments is predicted to be fine. This prediction is borne out (48).

(48)

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

Now, B&B collapse manner verbs with causative verbs into one group and in so doing propose that a classifier predicate like SAW articulated with a Hdlg-i classifier (S(✊)+ SAW) has two syntactic arguments -of which one is external and agentive and one is internal and non-agentive- and is thus transitive; and articulated with a WE-i classifier (B(✋)+ SAW) it has one single argument -which is internal and non-agentive- and is thus unaccusative. Since SAW necessarily involves an instrument and you cannot realize an instrument in a one-place unaccusative (cf. the ungrammaticality of (46b)), the construction with a WE-i classifier is either some sort of passives (compare (49b) with (48a)) or a manner verb reduction of the type "the knife cut the bread". We will discuss these options in the next section. Most importantly, derivations with SAW-type verbs cannot be unaccusatives: there simply is no equivalent of "the window broke" (46b) for a verb like SAW (49(c)).

(49)

      (a)   Peter sawed the planks.
      (b)   The planks were sawed.
      (c)   *The planks sawed.

1.3.4. Passives, Manner Verb Reductions and Noun Incorporation

Interestingly, the English translation given in B&B (2004) for the alleged "unaccusative" alternation of the manner verb SAW is a passive: "The planks are/got sawed" (their example (42)b, p. 773), "The wood is cut (*voluntarily)" (their example (43)b, p.774), "There are no planks cut" (their example (45)b, p.775) and "Each plank is cut" (their example (46)b, p.775). Let us take a look at the plausibility of a passive analysis of Hdlg-i classifier constructions.
Though most ASL literature says there are no passives in this language at all, there are a few works that claim there are. Janzen et al. (2001) say that active and passive constructions are distinguishable in ASL, but rather than being formed by a word-order

alternation as in English, the passive is marked by a particular arrangement of grammatical features surrounding the verb in the predicate. "The prototypical passive in an ASL transitive clause is constructed when (a) the signer presents the clause from the point of view of the patient rather than the agent, even though an agent is understood to be carrying out the action; and (b) the agent is demoted, which often means that the agent is not mentioned, even though there are instances of a more weakly demoted agent still present in the clausal structure". This is to say that the core semantic properties of a passive as defined for other spoken languages apply to ASL's passives, too.[13] Additionally, they provide some particular information about ASL passives, such as specifics about their morphological form: "Critical morphological features are the direction of movement of the verb toward the signer and the eye gaze of the signer, which is associated with the patient rather than the agent of the action" (Janzen et al. 2001, p.283).

Kegl's (1990) account includes passives in an inventory of predicate types and focuses on verb detransitivization for this construction. Primarily, Kegl associates the passive form with the absence of a noun phrase (NP) argument for an otherwise transitive *agreement* verb, which normally agree with both a subject and an object by beginning and ending its movement at loci in front of the signer's body associated with agent and patient respectively. In Kegl's view, the NP that would be the subject of the verb obligatorily disappears, with only a single spatial location remaining associated with the object of the verb. The passive construction in Kegl's view is marked by a lack of movement because there is no locus associated with any agent. Instead, the detransitivized verb form is articulated entirely at the final object location. The verb HIT for example, has a movement normally beginning at a spatial location at which the subject is assigned, with an 'S' (☝) handshape on the dominant hand moving from this location to a second location associated with the object of the transitive verb, where a '1' (☝) handshape on the nondominant hand is the point of contact. The detransitivized verb, labeled AT_HIT, has only the final configuration articulated at the signer's own torso (see Kegl (1990) for additional notational details). Kegl suggests that this is a true morphological passive because it is detransitivized, the hands are reoriented toward the signer, and the ''role prominence'' is shifted to the object of the verb, or the ''direct argument'' (Kegl 1990, p.166). If any movement is retained in such verbs, it is ''a constrained, minimal movement that does not agree with any position other than the SBP (signer's body)'' (Kegl 11990, p.167).

The constructions under consideration do not fit either of these descriptions. They clearly do not meet the criterion crucial to either of these analyses, namely the directedness toward the signer: in utterances like B(☝)+ SAW, the verb is not directed toward the signer. Another important difference between the passives in Kegl's analysis and the WE-i classifier constructions is that the classifier constructions clearly contain movement that is not constrained to agree with the signer's body. Kegl explicitly mentions that passives are derived from *agreement* verbs, which excludes classifier constructions from consideration since they are restricted to the *spatial* verb class. Finally, if they were passive constructions, they would allow for agent-oriented adverbs (50), which B&B show they don't (51).

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[13] Up to this point, the properties described by Janzen et al. are also exhibited by semantically passive-like (though "morphologically active") constructions, like *si/se* passives in Romance and Slavic (see Marelj 2004 and the references there).

(50)   The boat was sunk voluntarily.

(Chomsky (1986), p.118, example 124(ii))

(51)   B(✋)+ SAW_WOOD *WILLING
        CL(WE-i):2D_flat_obj+SAW_WOOD voluntarily
        "The wood is cut (*voluntarily)"

(from B&B 2004, p.774, example 43b)

The derivations with the WE-i classifier in SAW-type verbs could be passives, but, more likely, they are manner verb reductions (52).

(52) Manner verb reduction type interpretation.

        B(✋)+ SAW_WOOD
        CL(WE-i):2D_flat_obj+SAW_WOOD
        "The saw cut the wood". ("The saw sawed the wood")

This would also explain the reported impossibility of doubling the instrument (53b), which should then be read as #"The saw cut the wood with a chain saw"). The impossibility of (53a), with a Hdlg-i classifier, is unexpected, however.

(53)

        a)   Ø *CHAIN_SAW S(✊)+SAW_WOOD
                pro chain saw CL(Hdlg-i):hand_manip._instr.+SAW_WOOD
                "S/he is sawing with a chain saw".

        b)   *CHAIN_SAW B(✋)+SAW_WOOD
                pro chain saw CL(WE-i):instrument+SAW_WOOD
                "There was sawing being done with a chain saw".

(B&B 2004, p.775, example 47)

With respect to the difference between (53a) and (53b), it is of interest to bring up Meir's (1999) lexical analysis of classifier constructions in Israeli Sign Language (ISL) as manifestations of noun incorporation. She explains that for spoken language, there are two types of noun incorporation processes: compound noun incorporation and classifier noun incorporation (Rosen, 1989). These two types are characterized by a different set of properties. In classifier noun incorporations, the phenomena of "doubling" ("i.e. the possibility of the nominal argument associated with the incorporated morpheme to appear as an independent N in the clause, heading its own

projection" Meir, 1999: p.3) and "stranding" ("i.e. the ability of modifiers associated with the incorporated arguments to appear in the clause even when the head is null" Meir, 1999: p.3) are allowed, because the verb's argument structure is unaffected by the noun incorporation process. When noun incorporation results in a compound, the resulting predicate has a different argument structure than the original verb and "doubling" and "stranding" are ruled out. Meir then shows that for ISL, "theme" classifiers behave like classifier noun incorporations and "instrumental" classifiers behave like compound noun incorporations and should therefore be distinguished as two separate classes[14].

Meir uses this distinction to show a difference between "theme" (handling and whole entity) and "instrumental" (handling-instrumental and whole entity-instrumental) classifiers in ISL. For her analysis, the important difference lies between BREAK-type verbs and SAW-type verbs. Since she doesn't look at argument structure alternations, she does not distinguish between the two types of classifiers *within* SAW-type verbs: handling-instrumental and whole entity-instrumental classifiers. Meir emphasizes that NI constructions in different languages behave differently with respect to the properties described, and Benedicto & Brentari (2004) explicitly argue for a syntactic analysis of all their classifier data, but perhaps a lexical process may be at play for the instrumental (Hdlg-i and WE-i) classifiers and explain the particularities of these manner verbs in ASL: if the Hdlg-i classifiers are compound noun incorporations, the impossibility of doubling of the instrument in such constructions (i.e. the ungrammaticality of (53a) would be explained.

1.3.5. Conclusion

We can conclude from this section that there exists some debate about the analysis Bendicto & Brentari propose. My findings based on interviews with informants could not confirm the validity of the data provided by Benedicto & Brentari. Independently, based on the work of Reinhart (2000, 2002), I pointed out that Benedicto & Brentari collapse SAW-type verbs and BREAK-type verbs and I showed that the two verb types should be distinguished from each other and cannot be analyzed the same way. On the basis of all this, the need was felt to check with a wider range of signers and empirically test for the reported correlations. An experiment was designed.

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[14] Meir labels classifiers by the thematic role of the entity that the classifier represents, not by their form. Her "theme" classifiers collapse both whole entity and handling classifiers in the terminology used in this thesis. "Instrumental" classifiers refer to the classifiers used in verbs that involve instruments (i.e. manner verbs): both handling-instrumental and whole entity-instrumental classifiers in the terminology used in this thesis.

2. EXPERIMENT

2.1. Method

The general goal of this experiment was to empirically test for correlations between classifier type and argument structure in American Sign Language, by collecting responses from a larger group of participants than one-to-one consulting would allow. To this end a computer-based experiment was run 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 B&B as discussed throughout section 1.3.), a novel comprehension task had to be designed to directly test for the presence or absence of an agent in the interpretation of a classifier construction.

The more specific goal of this experiment was to provide empirical evidence for the claim made in this thesis (section 1.3.3.2.) that the WE-i classifier constructions are alternates of manner verbs and therefore cannot be unaccusatives. This was addressed in the following way.

Hypothesis: The WE-i classifier construction does not represent an unaccusative alternate of a transitive-intransitive alternation.

First, let me clarify the label "unaccusative" here. Syntactically, 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). But, crucially, they are semantically different; whereas passives have an implicit agent, inchoatives lack agents. This was demonstrated in examples (46)-(48) in section 1.3.3.2. The relevant structures are repeated here in (54). I will use the term "unaccusative" here for structures as in (54a).

(54)

  a)   The window broke.
       ($\exists$e) [breaking (e) &Theme (e, the window)]

  b)   The window was broken (with a hammer).
       $\exists$e $\exists$x [breaking (e) & Agent (e, x) & [-c-m] (e, the window)]

Now, recall from sections 1.3.2. and 1.3.3. how Decausativization relates causative/inchoative pairs (this is explained explicitly in 1.3.3.2.). The operation eliminates the external role from both the syntax and semantics. Therefore, if the WE-i

classifier construction were an unaccusative alternation of a causative verb (like MOVE or BREAK), it would lack an agent both syntactically *and* semantically. Then, to prove that the WE-i classifier construction is not an unaccusative alternate of a transitive-intransitive alternation, 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 a classifier construction in this manner. It is however possible to rule out the unaccusative nature of it this way, since the presence of an agent –be it syntactically or semantically- does rule out unaccusativity for these verbs.

This can be seen for the English verb "to sink" in the example below (55), where a syntactically present agent is bold-faced and the implicit agent of the passive licenses the presence of agent oriented-adverbs (where volitionality is taken to be the core property of agents, see Dowty 1979, 1991). The transitive in (55a) shows both the syntactic presence of an agent and its semantic presence; the passive in (55b) shows no syntactic presence but the grammaticality of adding the agent-oriented adverb shows the semantic presence of an agent; the unaccusative in (55c) finally, shows neither a syntactic nor a semantic presence of an agent.

(55)

      a)   **They** sunk the boat (voluntarily).
      b)   The boat was sunk (voluntarily).
      c)   The boat sank (*voluntarily).

                        (Chomsky (1986), p.118, example 124(ii))

In all alternations available for manner verbs like SAW, on the contrary, an agent is present either syntactically or semantically. This is because manner verbs are associated with a set of two conditions, sufficient only together, as explained in section 1.3.3.2.. In simple terms, there is no drilling or sawing without both the agent and the instrument. This is illustrated in (56) below. The agent is syntactically present in the transitive (bold-faced in (56a)) and the agent is implicitly present in both the manner verb reduction and the passive: although only the passive in (56c) can take an agent-oriented adverb (which is licensed by the implicit agent), the implicit presence of an agent licences the presence of the instrument in (56b) – by virtue of the Instrument Generalization stated in (45) and repeated here as (57).

(56) Manner verb alternations

      a)   **Peter** sawed the planks.
      b)   <u>The saw</u> sawed/cut the planks.
      c)   The planks were sawed (voluntarily).

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

Predictions are as follows. Based on their analysis of classifier constructions (as outlined in section 1.2.1.) Benedicto & Brentari (2004) predict the following correlation pairs.

Predictions:

        Body part - Whole entity
        Agent - No agent

        Handling - Whole entity
        Agent - No agent

        Handling-i - Whole entity-i
        Agent - No agent

Based in part on the analysis put forward by Benedicto & Brentari (2004), but with the modification of the hypothesis about the analysis for WE-I classifier constructions, I on the other hand predict the following correlations.

Predictions:

        VERB TYPE 1 (unergative-unaccusative alternation):
        Body part (BP) - Whole entity (WE)
        Agent - No agent

        VERB TYPE 2 (transitive-unaccusative alternation):
        Handling (Hdlg) - Whole entity (WE)
        Agent - No agent

        VERB TYPE 3 (manner verb alternation):
        Handling-i (Hdlg-i) - Whole entity-i (WE-i)
        Agent - Agent

2.2. Stimuli

Videos of signed classifier constructions were created for the various classifier types. The following four verbs, given in pairs of WE vs. BP, were tested for the unergative-unaccusative alternation (58). They will be referred to as verbs of verb type 1. The

classifiers are represented by the name of the hand shapes they use ('S' (✊); '1' (☝);
'money' (🖐)) for the dominant hand[15].

(58) VERB TYPE 1

1. BOW '1' (☝)   vs. BOW 'S' (✊)
2. GO-UP 'V$_{upside down, bent}$'   vs. GO-UP 'V$_{upside-down, bent, wiggle}$'
3. TURN '1' (☝)   vs. TURN 'S' (✊)
4. GO-BY '1' (☝)   vs. GO-BY 'V$_{upside-down, wiggle}$'

For verbs of verb type 2, the transitive-intransitive alternation, the following six pairs
were tested (59). The Hdlg classifiers are presented on the left, the WE classifiers on
the right.

(59) VERB TYPE 2

1. OPEN (DOOR) 'B'   vs. OPEN (DOOR) 'money'/'S'
2. CLOSE (WINDOW) 'B'   vs. CLOSE (WINDOW) 'S'
3. MOVE (BOOK) 'B'   vs. MOVE (BOOK) 'C'
4. MOVE (HOCKEY PUCK) 'C$_{baby}$' vs. MOVE (HOCKEY PUCK) 'claw'
5. BREAK (PENCIL) '1'   vs. BREAK (PENCIL) 'S'
6. FLAP (PAPER) 'B5'   vs. FLAP (PAPER) 'O$_{flat}$'

For the third verb type, composed of manner verbs, the following six pairs of WE-i vs.
Hdlg-i were tested (60).

(60) VERB TYPE 3

1. SWEEP (FLOOR) 'B5'   vs. SWEEP (FLOOR) 'S' (✊)
2. SAW (PLANKS) 'B'   vs. SAW (PLANKS) 'S' (✊)
3. BRUSH (TEETH) '1'   vs. BRUSH (TEETH) 'Money'
4. SLICE/CUT (POTATO) 'B'/'1'   vs. SLICE/CUT (POTATO) 'Money'
5. SCREW (A SCREW) 'U'   vs. SCREW (A SCREW) 'Money'
6. SPOON-FEED S/O (YOGHURT) 'U'   vs. SPOON-FEED S/O
                                         (YOGHURT) 'Money'

Videos of action scenes were created to match each classifier pair. The visual scenes
consist of the action expressed by the verb, occurring either with or without a visibly
external agent. These will be referred to as WITH and WITHOUT scenes. This was the

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[15] The utterance of some of these signs involves the non-dominant hand. The non-
dominant handshape, however, was always the same in both versions of a pair and is
therefore not mentioned here. For the full forms of the stimuli, see the videos in the
appendix.

same for all verbs. The implications of this, however, are reversed for verbs of verb type 1 as compared to verbs of verb type 2 and 3. I will explain this in the following paragraphs.

For verb type 1, taking the first verb of the list (BOW) as an example, this amounts to the following. There is a WITHOUT scene of a girl bowing by herself (*without* the intervention of an external agent) and there is a WITH scene of a girl "being bowed" – i.e. forced/made to bow- (here the bowing takes place *with* the intervention of an external agent). It has to be noted 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: paradoxically, the intervention of a visibly external agent in the video scene results in no agentivity of the girl bowing, and vice versa. Therefore, an agentive interpretation of a classifier construction within verb type 1 is visualized by a scene where the argument of the verb is the agent of the action (the WITHOUT scene); the non-agentive interpretation is visualized by the scene where the argument of the verb is not the agent of the action (the WITH scene).

So there are 4 stimuli for each verb, as schematically presented in (61).

(61)

Verb type 1 stimuli	Kind:	Involves:
	Sign type WE	whole entity classifier
	Sign type BP	body part classifier
	Scene type WITH	no agentivity
	Scene type WITHOUT	agentivity

This is illustrated for the verb BOW in the following screen shots (62-65).

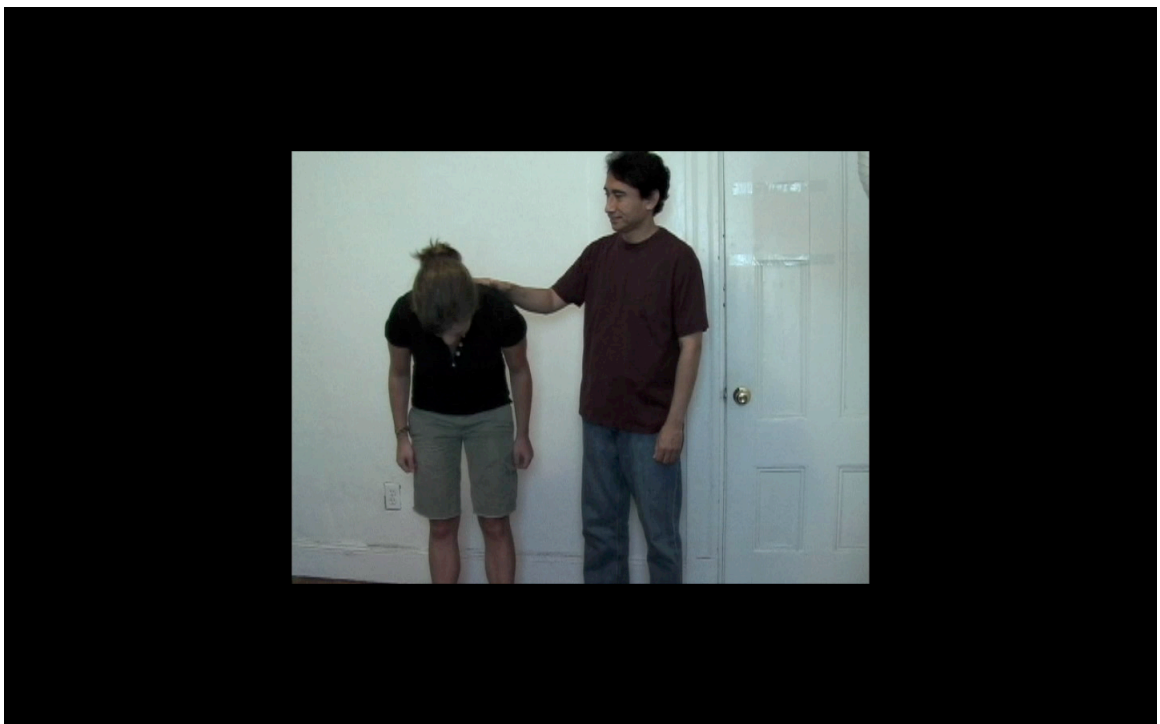(62)   Verb type 1: Sign WE

(63)   Verb type 1: Sign BP

(64)   Verb type 1: Scene WITHOUT

(65)   Verb type 1: Scene WITH

Different from those for verb type 1, the stimuli for verb types 2 and 3 have straightforward correspondences: the WITH and WITHOUT scenes correspond with agentivity and no agentivity of the verb's subject respectively. Taking the first verb of the verb type 2 list as an example, this amounts to the following. There is a WITHOUT

scene of a door opening by itself (i.e. *without* an agent), and there is a WITH scene of a door being opened by a person (i.e. *with* an agent).

Note that for the verbs of verb type 3 this leads to rather implausible visual scenes. In the WITH scene of the verb SAW for example, a person is sawing planks with a saw. In the WITHOUT 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 WE and WE-i classifiers –as opposed to Hdlg and Hdlg-i classifiers– correlate with structures with crucially NO AGENT.

In sum, for both verb type 2 and verb type 3 an agentive interpretation is visualized by the scene with an agent (the WITH scene); a non-agentive interpretation is visualized by the scene without an agent (the WITHOUT scene).

So here too there are 4 stimuli for each verb, schematically presented in (66).

(66)

Verb type 2/3 stimuli	Kind:	Involves:
	Sign type WE/WE-i	whole entity/whole entity-instrumental classifier
	Sign type Hdlg/Hdlg-i	handling/handling-instrumental classifier
	Scene type WITHOUT	no agent
	Scene type WITH	agent

The following screen shots are examples of stimuli for verb type 2 (BREAK) (67-70).

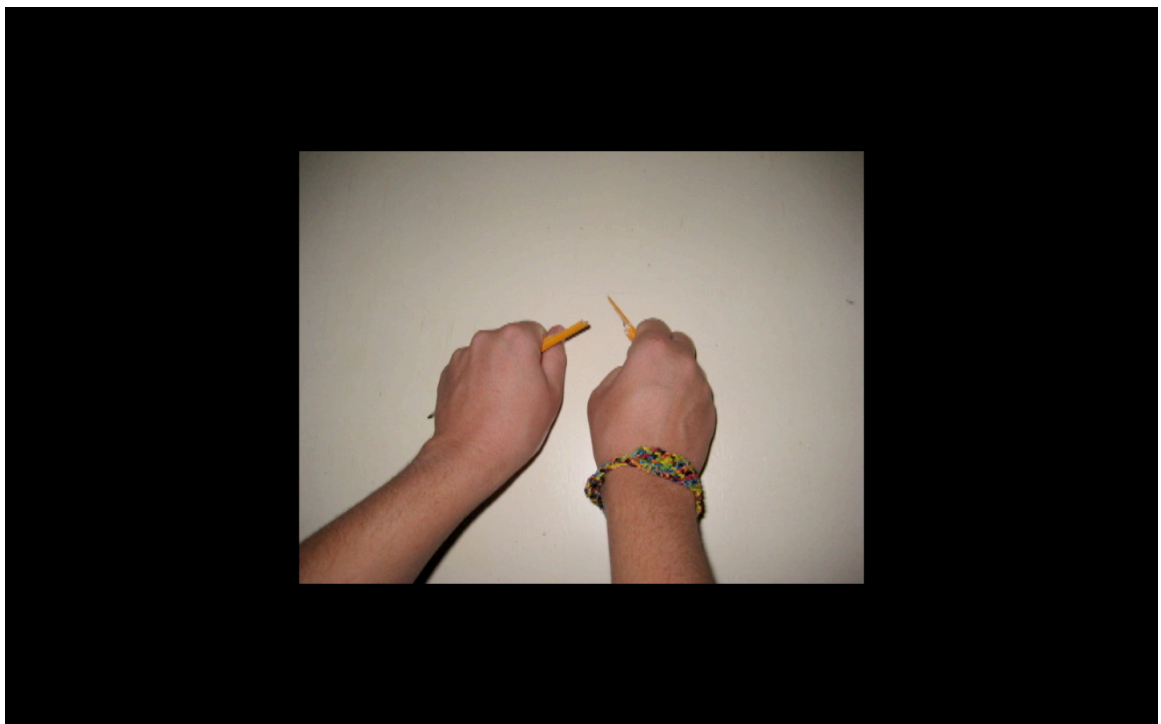(67)   Verb type 2: Sign WE

(68)   Verb type 2: Sign Hdlg

(69)   Verb type 2: Scene WITHOUT

(70)   Verb type 2: Scene WITH

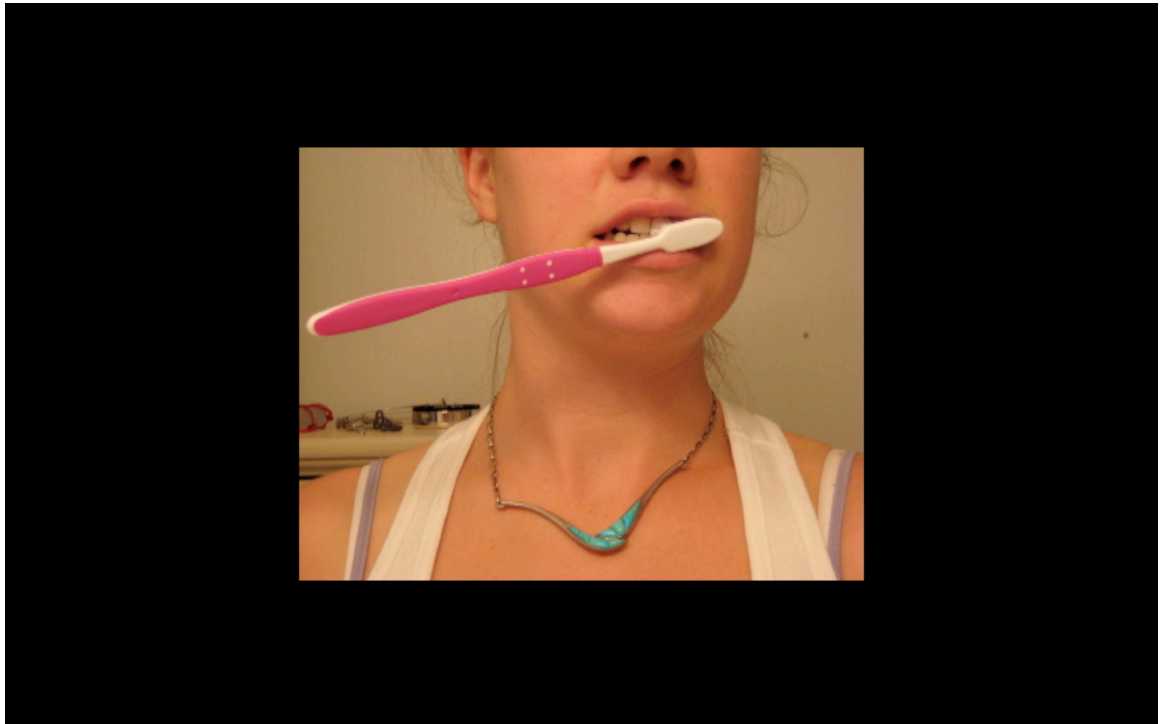The following screen shots are examples of stimuli for verb type 3 (BRUSH) (71-74).
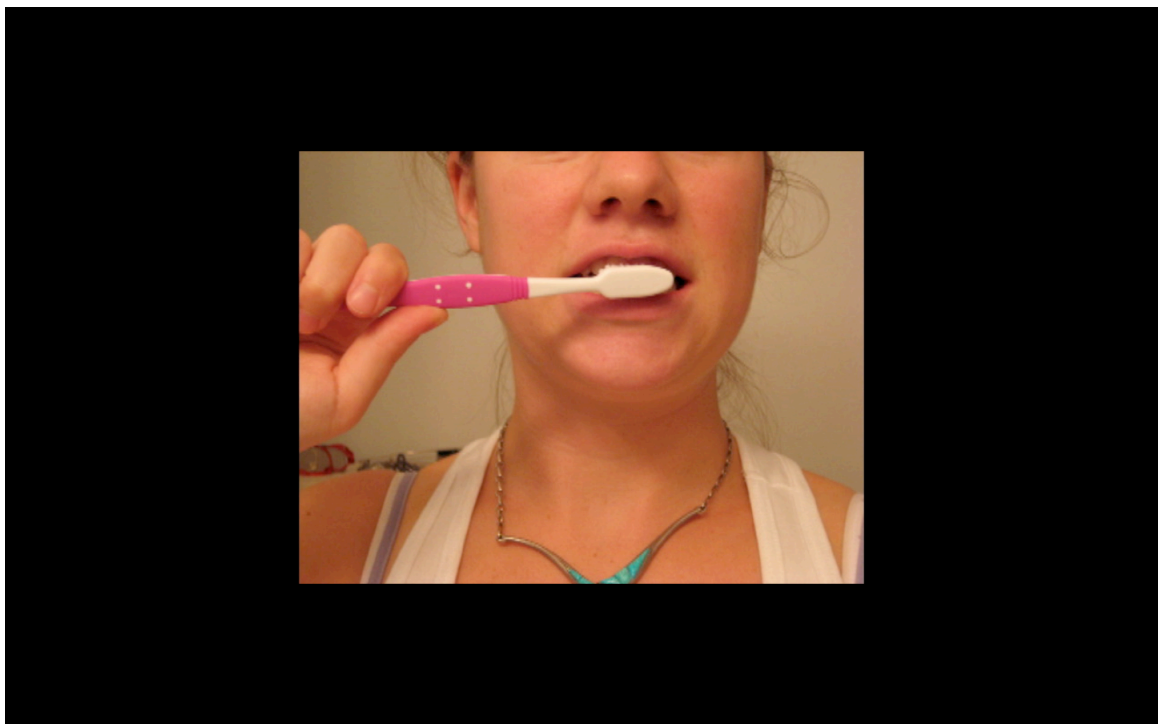
(71)   Verb type 3: Sign WE-i

(72)   Verb type 3: Sign Hdlg-i

(73)   Verb type 3: Scene WITHOUT

(74)   Verb type 3: Scene WITH

2.3. Tasks

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 study on a signed language, the experiment was designed de novo. 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. They 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 a 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.
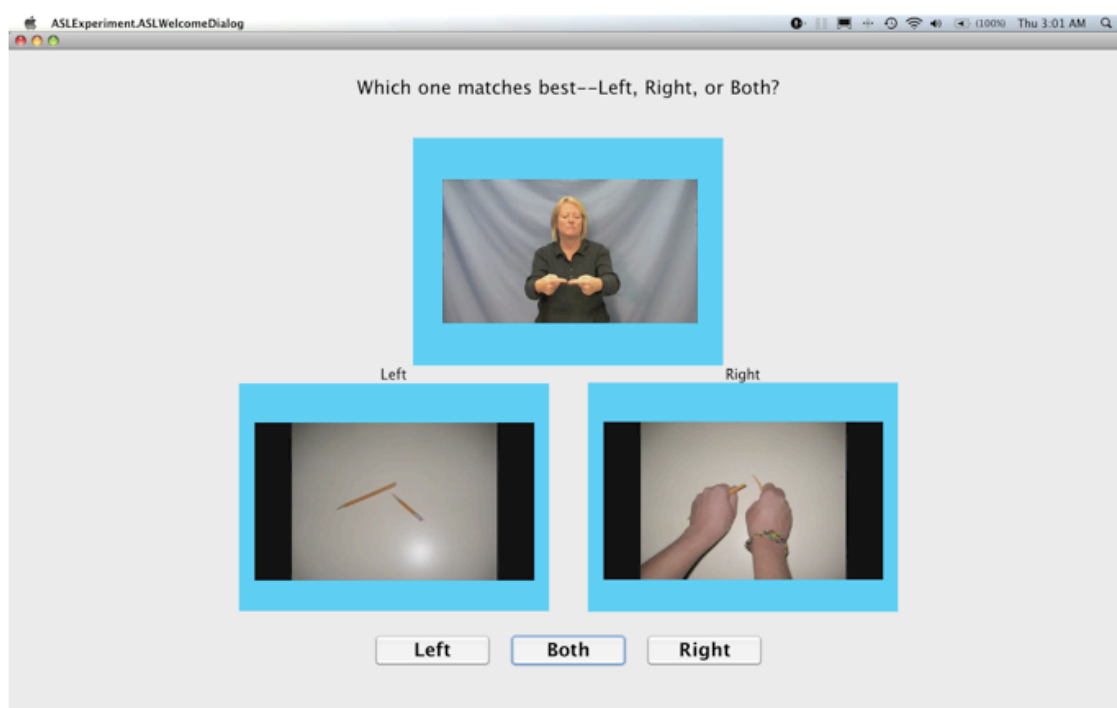
(75)   Example SET-UP for SCENE-mode

	SCENE WITHOUT	
SIGN BP		SIGN WE
RESPONSE "BP"	RESPONSE "BOTH"	RESPONSE "WE"
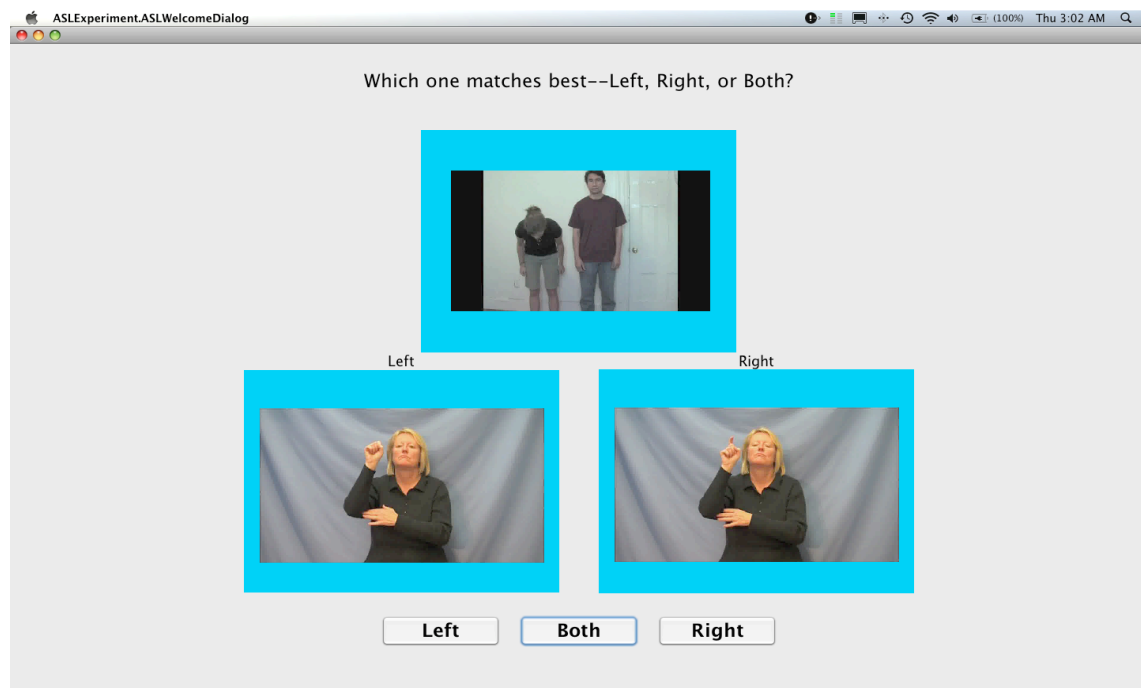
(76)   Example SET-UP for SIGN-mode

	SIGN WE	
SCENE WITHOUT		SCENE WITH
RESPONSE "WITHOUT"	RESPONSE "BOTH"	RESPONSE "WITH"

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.

2.4. Participants

Based on their answers to a survey, which was administered before the start of the actual experiment, participants were divided into 4 groups based on their experience with ASL.

2.4.1. NATIVE

The first group consists of native signers only. Native signers were defined for this experiment as people who are fluent in ASL and have been exposed to the language since birth, because their parents are Deaf signers. This group is very important as they represent the grammar of a language that has been acquired in the most natural circumstances. It is the population most comparable to what other linguistic research would base claims about a language's grammar on. It is this population that will be used to test our hypotheses about the argument structure of ASL classifiers constructions.

2.4.2. NEAR-NATIVE

The second group consists of near-native signers of ASL. The definition of what constitutes a near-native is unclear from the literature. For this experiment, near-native signers were defined as people who are fluent in ASL, started learning the language before the age of 2 and have used the language as their primary mode of communication throughout life (with family, friends and in school). The distinction is usually made between natives and near-natives, but it is unclear to what extent their linguistic intuitions are affected by their respective backgrounds. I was interested to see if, compared to natives, the group of near-natives as defined here shows a difference in performance with respect to my topic.

2.4.3. LATE LEARNERS

A third group consists of late learners of ASL. Late learners are generally interpreted as people that know ASL, but did not start learning the language until later in life. The interpretation of the term "later in life" may vary, of course. For this experiment, late learners are defined as people that did not start learning ASL until they were 18 years or older. The nature of the ASL community is such that the majority of its members are not native signers. This is the opposite of most spoken languages.[16] The late learners group serves as a comparison for the native grammar group. Their performance in this experiment may also provide interesting links to other second language acquisition research.

2.4.4. NOVICES

Finally, a group of novices was tested: hearing people with no knowledge of, or experience with ASL. All novices in this experiment were hearing, speaking people that did not know any ASL, had never had any ASL experience before, and did not grow up with deaf parents or family members. They served as a control group. If the specific part of ASL grammar that we are testing is to some degree accessible to people that have never been acquainted with the language, this may point to the gestural and/or iconic origins of signed languages.

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[16] This point is presented with more detail in the results section of this thesis.

2.5. Data recording

All verbs were presented in 4 conditions: per verb each member of the stimuli set was presented on top of the screen once. Trials were replicated by testing the different conditions on a number of verbs per verb type. 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 there were 16 verbs x 4 conditions = 64 items. Each participant got all items once in randomized order. Choice options were also randomized with respect to their left/right location on the screen.

In total 67 participants took the experiment. Based on their answers to the survey, they were placed in groups according to their ASL experience. If there was even the slightest uncertainty about which group to place them in (due to missing or contradicting answers to the survey) or about their ability to perform the task (due to diminished vision for example) they were excluded from analysis at this point. Twenty-four participants were excluded in this way. The distribution of the 43 remaining cases over the four participant groups was as follows: 14 were native signers (all of whom are deaf), 6 near-native signers (all of whom are deaf), 11 late learners (of whom 4 deaf and 7 hearing) and 12 were novices (all of whom are hearing). All signers (natives, near-natives and late learners) were recruited in Washington, D.C. on Gallaudet University campus; all non-signers (novices) were recruited in Cambridge, MA on MIT campus.

The two modes of representation (sign/scene on top) were looked at separately. All participants' responses to the stimuli were coded as 0, 1 or 2. In scene mode, a "WE/"WE-i" classifier response was coded as a 0 and a "BP"/"Hdlg"/"Hdlg-i" classifier response was coded as a 1. In sign mode, a "WITHOUT" scene response was coded as a 0 and a "WITH" scene response was coded as a 1. "BOTH"-responses were coded as a 2.

2.5.1. ONE-analyses

For the ONE-analyses, I focused on responses where participants had selected one stimulus only as the best match. This means all "BOTH"-responses were excluded from this analysis. Averages were computed for each participant over all non-"BOTH" answers per verb category per classifier/scene type. For SCENE-mode this resulted in percentages "BP"/"Hdlg"/"Hdlg-i"-response per verb category per scene type. For SIGN-mode this resulted in percentages "WITH"-response per verb category per classifier type. Per mode an ANOVA was run using these percentages as the dependent factor.

2.5.2. TWO-analyses

In addition, two ANOVAs were run on the percentages of "BOTH"-responses counted over all responses (0's, 1's AND 2's). As mentioned above, the "BOTH"-responses were initially excluded from analysis so as to get an idea of what the preferences were. The TWO-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 ONE-analyses. Again, the two modes of representation were analyzed separately.

3. RESULTS

The experiment will be discussed in 3 parts. The methods and analyses presented in the previous section are common to all parts. The first part will discuss the results of the native signers in SCENE mode and address the correlation of classifier type with argument structure, on its own. The second part will discuss the results of the native signers in SIGN mode and compare the two modes of presentation (SCENE and SIGN mode) in the experiment. The third part will discuss the differences between the results of the native signers and the participants in the other groups.

3.1. Argument structure per classifier: testing B&B2004

The primary goal of this study was to empirically test for a systematic interpretation of different classifier types in ASL. For this purpose we will only look at the results of the native signers. We will start with SCENE mode.

Below we repeat the hypotheses outlined in section 2.1.. Benedicto & Brentari (2004) hypothesize the following correlations (77).

(77) B&B's Hypotheses

      VERB TYPE 1 (unergative-unaccusative alternation):
      Body part (BP) – Whole entity (WE)
      Agent – No agent

      VERB TYPE 2 (transitive-unaccusative alternation):
      Handling (Hdlg) – Whole entity (WE)
      Agent – No agent

      VERB TYPE 3 (transitive-unaccusative alternation):
      Handling-i (Hdlg-i) – Whole entity-i (WE-i)
      Agent – No agent

On the contrary, we hypothesize the correlations in (78).

(78) Alternative Hypotheses

      VERB TYPE 1 (unergative-unaccusative alternation):
      Body part (BP) – Whole entity (WE)
      Agent – No agent

      VERB TYPE 2 (transitive-unaccusative alternation):

Handling (Hdlg) – Whole entity (WE)
Agent – No agent

VERB TYPE 3 (manner verb alternation):
Handling-i (Hdlg-i) – Whole entity-i (WE-i)
Syntactic Agent – Semantic Agent

3.1.1. Predictions

On the basis of these hypothesized correlations, we predict the following behavior for our participants in response to the stimuli. Remember that the implications of the absence of an external agent in the visual scene of a verb of type 1, as opposed to a verb of type 2 or 3, are reversed.
In WITHOUT scenes for verb type 1, the subject of the action has an agentive character, since she is performing the action herself, voluntarily. Participants are thus predicted to respond with BP classifier constructions, assuming those include an agent, and not WE classifier constructions, assuming those truly do not include an agent. For verbs of both verb type 2 and 3, the WITHOUT scenes show objects undergoing an action without the involvement of an agent: they are intended to represent non-agentive readings. For stimuli with verbs of verb type 2, the WITHOUT scenes are thus predicted to yield WE classifier responses, assuming those constructions do not include an agent, and not Hdlg classifier responses, assuming those do include an agent. These predictions follow from both B&B's hypotheses as well as ours.
Yet for stimuli with verbs of verb type 3, the predictions are different: Hdlg-i classifier responses should not be predicted by either B&B nor us, assuming those include an agent; yet, unlike B&B, we do not predict WE-i classifier responses either, assuming they really include an agent, too. So we predict a lot of BOTH-responses to these stimuli, indicating participants' uncertainty, and/or responses with either classifier type 50% of the time when participants do make a choice.
In the WITH scenes, we predict the following. For verb type 1, the WITH scene is meant to represent a non-agentive reading: the subject of the verb does not perform the action herself, but rather undergoes the action. We predict participants to prefer WE classifier constructions in response to those scenes (and not BP classifier constructions). For verb type 2 and 3, the WITH scene is meant to represent an agentive reading: the subject of the verb performs the action on the object. For stimuli of verb type 2, we thus predict participants to match the WITH scene with Hdlg classifier constructions. So far for the WITH scenes our predictions are the same as Benedicto & Brentari's.
Finally, for the WITH scenes of verb type 3, predictions differ again: although Benedicto & Brentari predict Hdlg-i classifier responses, we predict participants to allow both Hdlg-i classifier constructions and WE-i classifier constructions to match the WITH scene, since we hypothesize both to include an agent.
The expected results are visualized in the graphs below: one graph based on B&B's predictions (79), one graph based on our own predictions (80). The predictions differ only for verb type 3, where we predict 50% Hdlg-I classifier responses to both WITH and WITHOUT scenes. Note that the reasons are different: for WITH scenes, we hypothesize both classifier types to be applicable; for WITHOUT scenes, we hypothesize neither type to apply.

(79) Predictions based on B&B alone. All bars are at 0% or 100% (with a 5% margin to allow for noise).
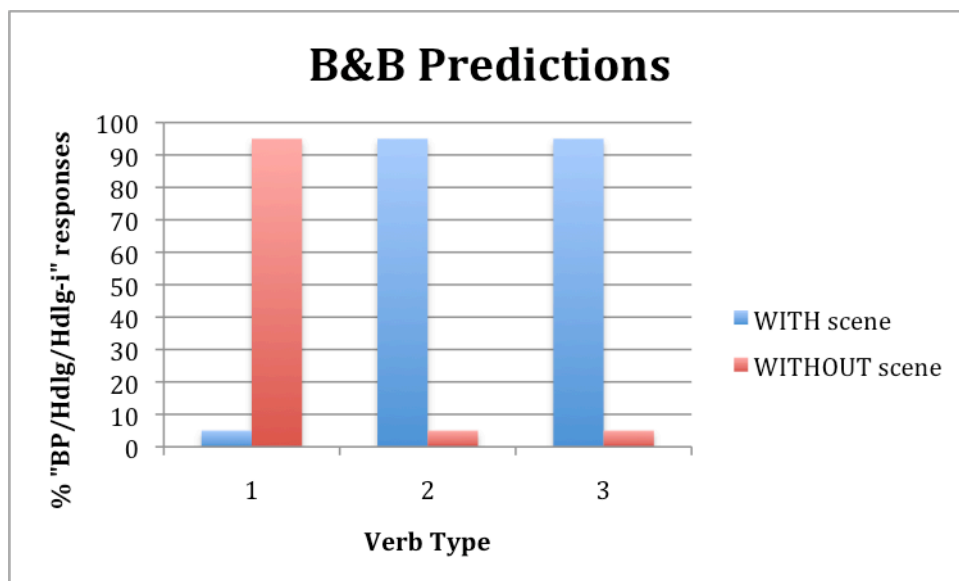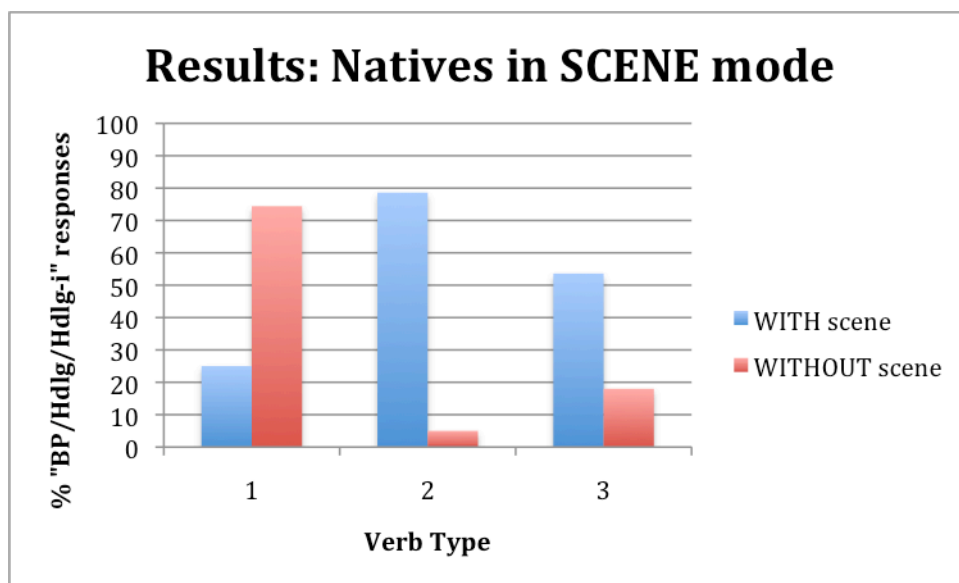

(80) Our Predictions. All bars are at 0% or 100% (with a 5% margin to allow for noise), or at 50%.
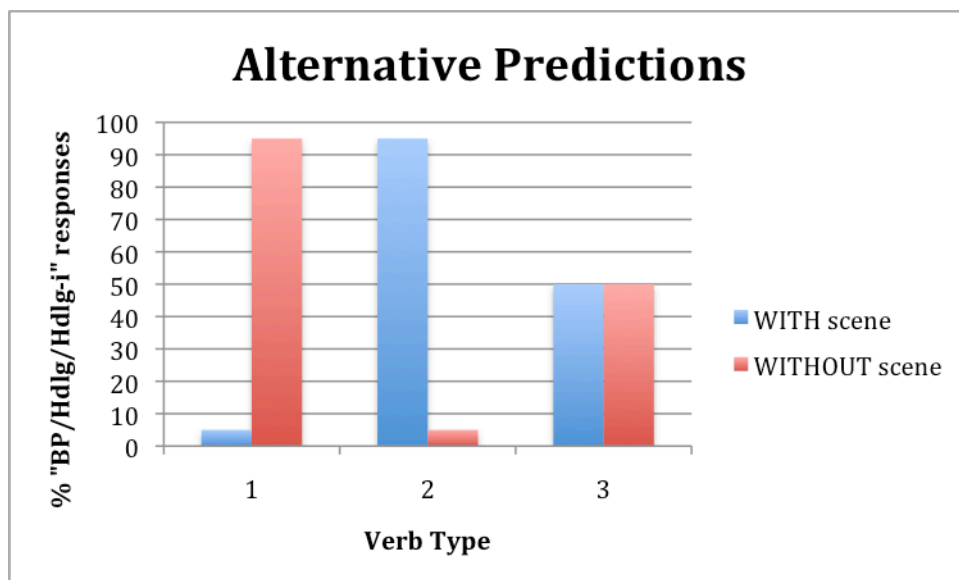
3.1.2. Results

When we compare the actual results that were obtained for native signers in SCENE mode (81) to the two pictures sketched above, we see that the picture is yet different.

(81) Results obtained for native signers in SCENE mode, from the ONE analysis.

The ONE-analysis reveals a significant interaction of verb type and agentivity of the scene (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 agentivity status of the scene and there is an effect of agentivity in all three verb types. The WITHOUT scenes of verb type 1 get more BP-classifier responses than WE-classifier responses; this pattern is reversed for the WITH scenes. For verb type 2, the WITH scenes get more Hdlg-classifier responses than WE-classifier responses and for the WITHOUT scenes we see a very small percentage of Hdlg-classifier responses and thus most responses here were WE-classifiers. The WITH scenes of verb type 3 get almost as many WE-i classifier responses as Hdlg-i classifier responses; the WITHOUT scenes get fewer Hdlg-i classifier responses than WE-i classifier responses.

The results from the TWO-analysis are visualized in graph (63) below. They too, show a significant interaction effect of verb type and agentivity (Greenhouse-Geisser $F_{(2,78)}=3.5$, $p=0.041$). There is a significant difference between verb type 2 and 3 in both WITH and WITHOUT scenes ($p<0.001$ and $p=0.013$ respectively) and an additional one between verb type 1 and 2 ($p<0.001$) in WITHOUT scenes. The other way around, for verb type 1 there is no difference between the amounts of BOTH responses in the two scene types. The WITH scenes for verb type 2 and 3, however, get significantly more BOTH responses than their WITHOUT 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 verb type 1 and verb type 2 ($p=0.001$) and between verb type 2 and verb type 3 ($p<0.001$). Overall, as we can see in the graph, verb type 2 provokes the least amount of BOTH responses from participants.

(82) Results obtained for native signers in SCENE mode, from the TWO analysis.
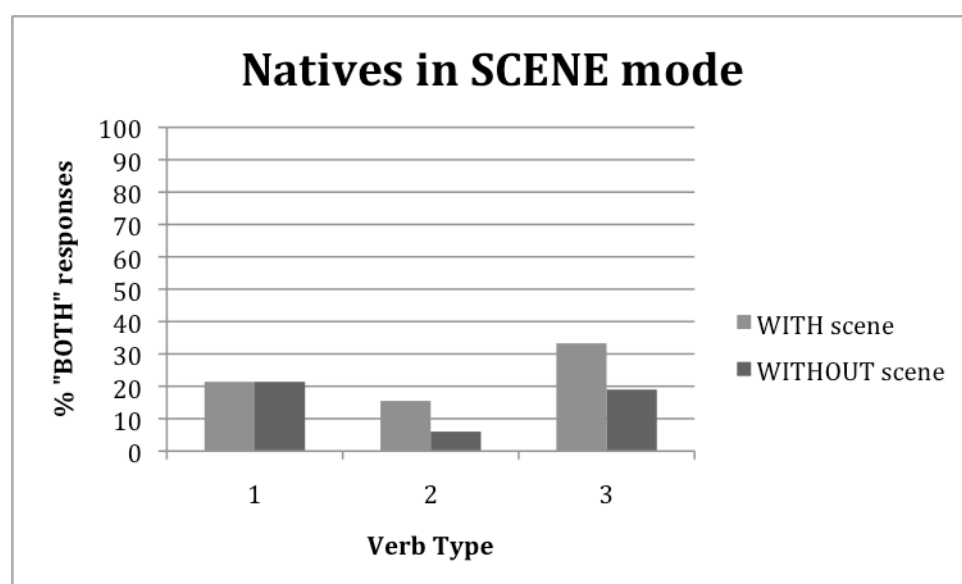

3.1.3. Discussion

We cannot say the results confirm the predictions based on Benedicto & Brentari's hypotheses about the correlations of classifier type and argument structure. We do see a clear interaction of scene type and the classifier type responses for all verb types, with scenes that have an agentive reading receiving more responses with classifiers that are said to involve an agentive morpheme than scenes that do not have an agentive reading. But apart from the WITHOUT scenes for verb type 2, none of the bars really resemble the picture they would predict. With the exception of the WITHOUT scenes for verb type 2 (where the bar is close to 0%), the bars are not near the extremes (0% and 100%) like Benedicto & Brentari would predict.

Now can we say the results confirm the alternative predictions, based on our own hypotheses? For verb types 1 and 2, Benedicto & Brentari's and our predictions were the same, because we have no alternative hypothesis for the argument structure of the classifiers involved. However, taking our experiences with informants prior to the experiment into account, we may have expected responses to be messier than our predictions. In particular for verb type 1, the informants consulted prior to the experiment gave us no indication of a systematical interpretation of the two classifier types within this verb category. The results of the experiment show a tendency towards 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 TWO-analysis for verb type 1 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, our results may hide a split between the stimuli: the WITH scenes for two
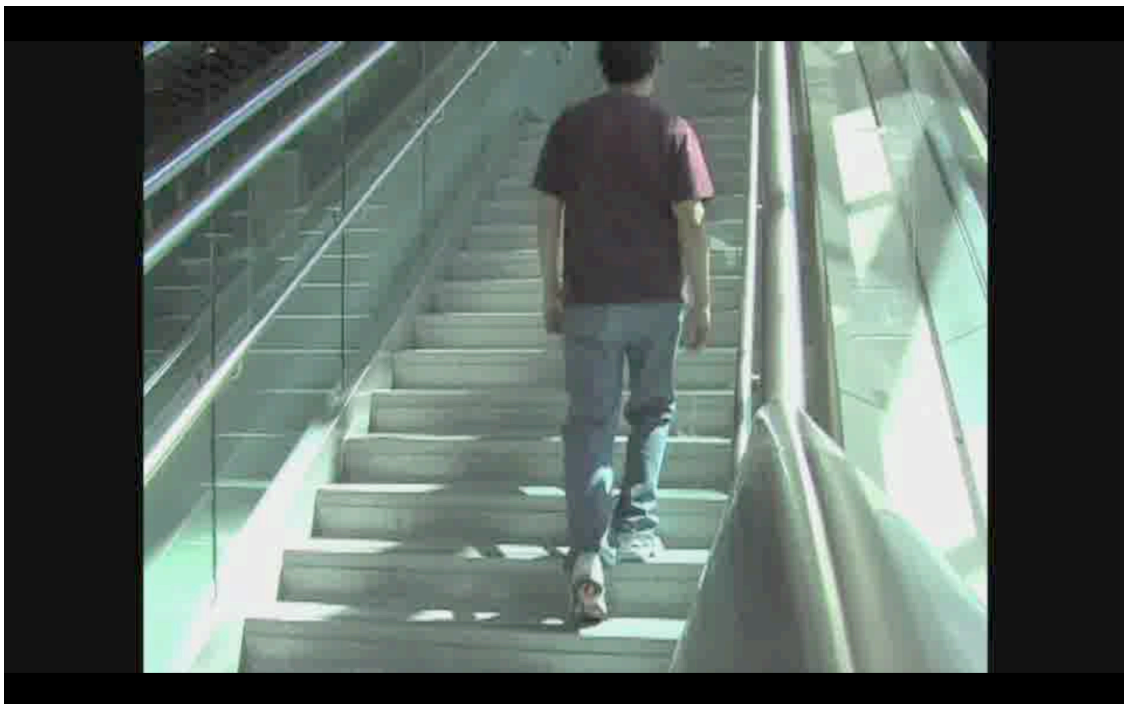
verbs include non-human causers instead of another person than the subject of the verb causing the action. Compare the WITH and WITHOUT scenes for GO-UP ((83) and (84) below) with those for BOW (as exemplified in section 2.2.).

(83) WITH scene for GO-UP
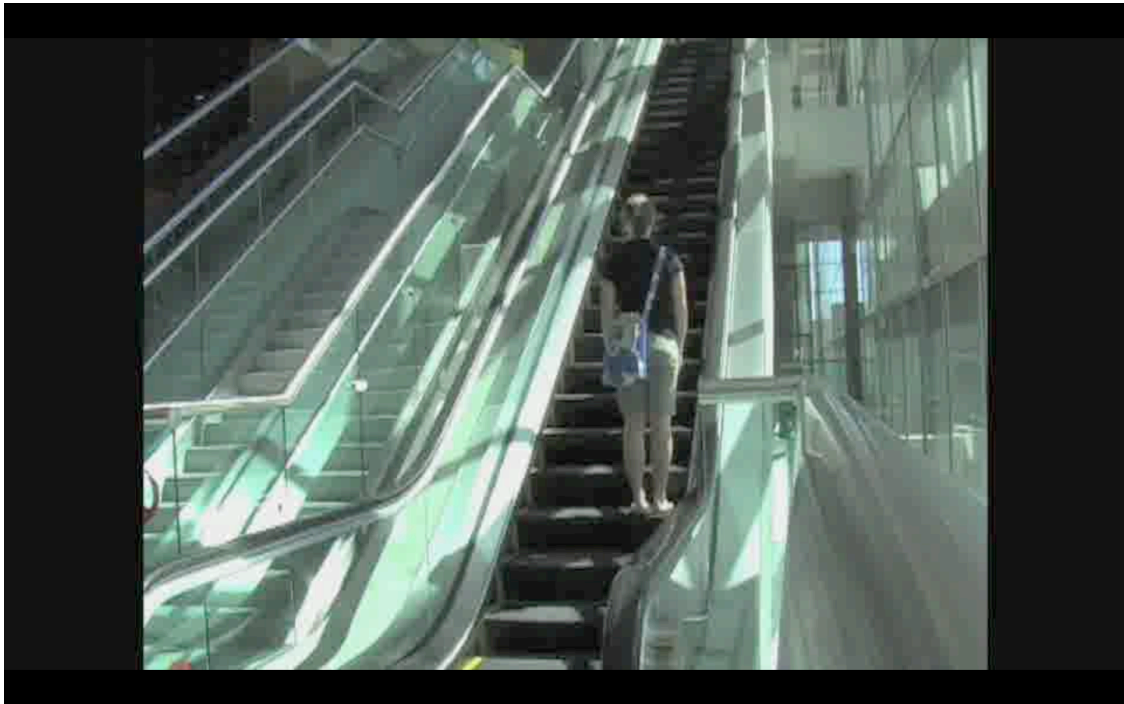
(84) WITHOUT scene for GO-UP

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 person in the action may confuse participants in the WITH scenes for BOW and TURN. 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 person. This may be taken into account in future experimental design.

The high percentage of "BOTH" responses in the WITH scenes of verb type 1 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. All in all, the results presented here are compatible with, but do not make a strong case for the hypothesized correlations in verbs of verb type 1.

Of all verb types, the results for verb type 2 come closest to both our and Benedicto & Brentari's predictions and give the best support for the hypothesized correlations between classifier types and argument structure. The preferred matches to WITHOUT scenes are undoubtedly the WE classifier constructions; this is confirmed by a low percentage of BOTH responses. For WITH scenes, participants clearly prefer Hldg classifier responses to WE classifier responses, but they still allow WE classifier responses part of the time. This can be explained in the following way. For verb type 2, the WITH 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 WITHOUT 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 the assumption that in the cases of decausativization, the external role is completely reduced and thus absent from syntax and semantics of inchoatives/unaccusatives (see Reinhart 2002 for details and elaboration). If there is not even an agent in the scene (which visualizes the semantics of the verb), then these scenes are certainly not expected to correlate with a sign that contains an explicit (syntactic and semantic) agent. Compare in this respect the percentage of BOTH responses for WITH scenes with that for WITHOUT scenes. This explanation certainly does not hold for verb type 1, hence we find no difference in percentages BOTH responses between the two scene types there.

The results from the TWO-analysis may also shed some light on the reliability of the response patterns observed for verb type 2 as compared to verb type 1. Although the WITH scenes for verb type 2 get significantly more BOTH responses than their WITHOUT alternatives, it is remarkable that both scene types get a relatively low percentage of BOTH responses compared to verb type 1. Verb type 1 gets about 20 % BOTH responses for both scene types, a sign that the interpretation patterns here are not so clean cut.

Contradicting B&B's predictions, both the results from the ONE-analysis and those from the TWO-analysis provide evidence that a distinction should be made not only between verb type 1 on the one hand and verb types 2 and 3 on the other, but also between verb types 2 and 3 themselves. The bars are not near the extremes, as Benedicto & Brentari would predict. Neither are they both around 50% like we alternatively predicted, but very relevant to our discussion is that one of them is. For the WITH scenes participants give both Hldg-i classifier responses and WE-i classifier responses, which confirms our 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 WITHOUT scenes is also pretty high, which can be interpreted as a confirmation of our 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 scene types in verb type 1, this percentage may also be interpreted as uncertainty on the part of the participants about the interpretation of the sign. If the WE-i classifier 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 WE-i classifier to the Hdlg-i classifier, contrary to predictions. Participants can be expected to prefer the WE-i classifier construction, if the agent in this construction is merely implied rather than syntactically present as in the Hdlg-i classifier and therefore less in contradiction with the scene depicted. It may be unclear at this point what the correct analysis of the WE-i classifier constructions is, but the results from the ONE-analysis show significantly different behavior from participants with respect to verb type 3 as compared to verb type 2. The results from the TWO-analysis show the same: while verb type 2 provokes the least amount of ambiguity of the stimuli or uncertainty from the participants, verb type 3 provokes the most. This is yet more confirmation that for WITH scenes as well as WITHOUT scenes, native signers treat classifier constructions of verb type 2 and those of verb type 3 differently.

3.2. Modes of presentation

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.[17] As explained in the section about the experimental design, I presented my participants with stimuli in both of these ways, which I call modes.
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.[18] Perhaps the two modes of presentation in this experiment can be compared to the difference between production and comprehension: you are either going from the concept to the linguistic 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 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. So far we've looked at the results from SCENE mode only, but now we will bring in SIGN mode as well.

3.2.1. Predictions

Since it was the first time this particular method was used, nothing was known about the effect of mode of presentation. Hence, no particular difference between SCENE mode and SIGN mode was expected. We therefore assumed that in SIGN mode any hypothesized correlations would show in a similar way as we assumed for SCENE mode. Benedicto & Brentari would thus predict bipolar response patterns again with responses for verb type 1 exhibiting the exact opposed pattern compared to verb type 2 and 3: for verb type 1 they would predict WITHOUT-responses for the BP classifiers (and thus close to 0% WITH-responses) and close to 100% WITH-responses for the WE classifiers; for verb types 2 and 3 they would predict close to 100% WITH-

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[17] Of course, as is common practice in psycholinguistic research, experiments with written language stimuli do offer the same possibility as sign language.
[18] See Koster et al. (submitted) and Van Rij et al. (submitted) for some recent work on the difference between production and comprehension in spoken language research.

responses for the Hdlg and Hdlg-i classifiers and for the WE and WE-i classifiers they would predict WITHOUT-responses (and thus close to 0% WITH-responses). Their predictions are visualized in (85).

(85) Predictions for SIGN mode based on Benedicto & Brentari (2004).
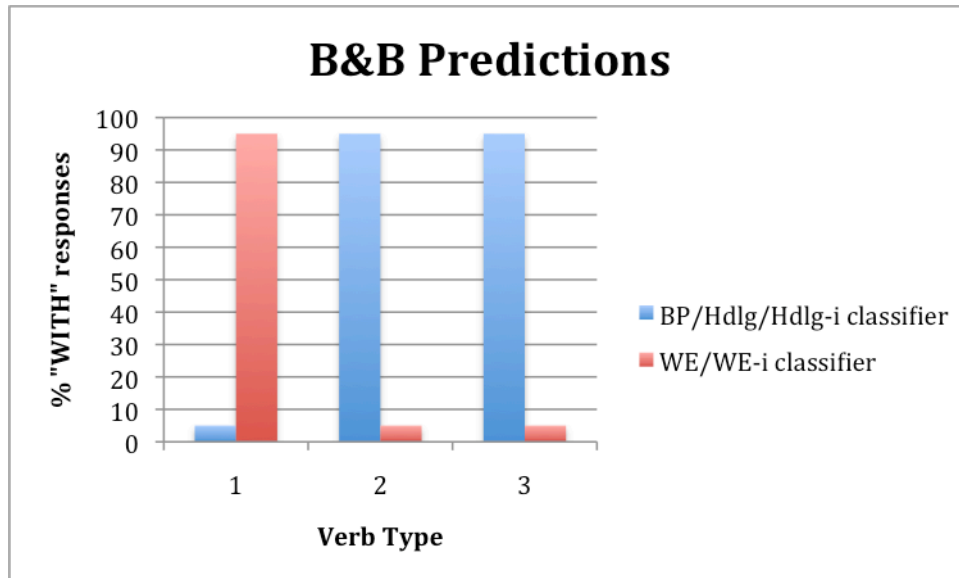
We, on the other hand, would predict slightly different response patterns: following B&B's predictions for verb types 1 and 2, but predicting a different picture for verb type 3. Here our predictions also differ from our predictions in SCENE mode: assuming Hdlg-i classifier constructions include an agent, we predict mostly WITH-responses for those signs; assuming WE-i classifier constructions include an agent as well, we predict participants to match those signs with WITH-responses, too. So we predict all responses to stimuli of verb type 3 to be WITH-responses. Our predictions are visualized in (86) below.

(86) Our predictions for SIGN mode.

Alternative Predictions
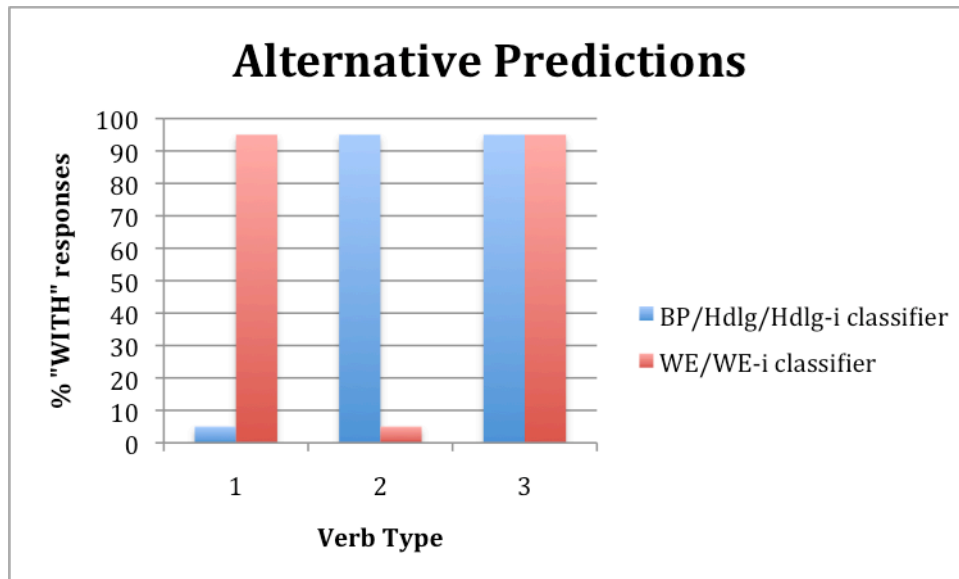
3.2.2. Results

In the graph below (87), I present the results from the ONE-analysis of the native signers' responses in SIGN mode. The interaction effect of verb type and classifier (Greenhouse-Geisser $F_{(2,78)}=147.6$, $p<0.001$) is similar to that between verb type and agentivity (in SCENE mode). The effect of classifier is robustly significant for each of the three verb types ($p<0.001$ in all cases). As for the effect of verb type per classifier, post-hoc comparisons confirm what is obvious from the graph: that the results for BP classifiers in verb type 1 differ significantly from both those for Hdlg classifiers in verb type 2 ($p<0.001$) and from those for Hdlg-i classifiers in verb type 3 ($p<0.001$), but that the results for Hdlg classifiers in verb type 2 do not differ significantly from those for Hdlg-i classifiers in verb type 3 ($p=1.000$). Results for WE classifiers in verb type 2 however, differ significantly from those for WE classifiers in verb type 1 ($p<0.001$) as well as from the results for WE-i classifiers in verb type 3 ($p<0.001$), but the results for WE classifiers in verb type 1 and those for WE-i classifiers in verb type 3 are similar ($p=1.000$).

(87) Results obtained for native signers in SIGN mode, from the ONE analysis.

Results: Natives in SIGN mode
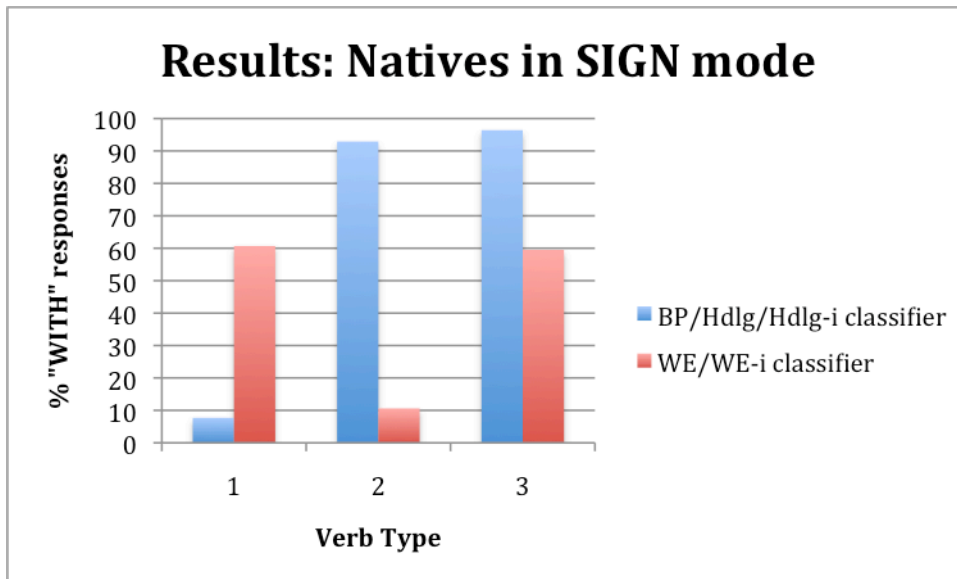
As for BOTH responses (88), there is not much difference between patterns in SIGN and SCENE mode. There was a main effect of verb type (Greenhouse-Geisser $F_{(2,78)}=4.9$, $p=0.010$) and of classifier (Greenhouse-Geisser $F_{(1,39)}=25.2$, $p<0.001$). The effect of verb type found in the ANOVA lies in a difference between verb type 2 and verb type 3 ($p=0.005$) and a difference between verb type 1 and verb type 2 ($p=0.053$).

(88) Results obtained for native signers in SIGN mode, from the TWO analysis.

Natives in SIGN mode
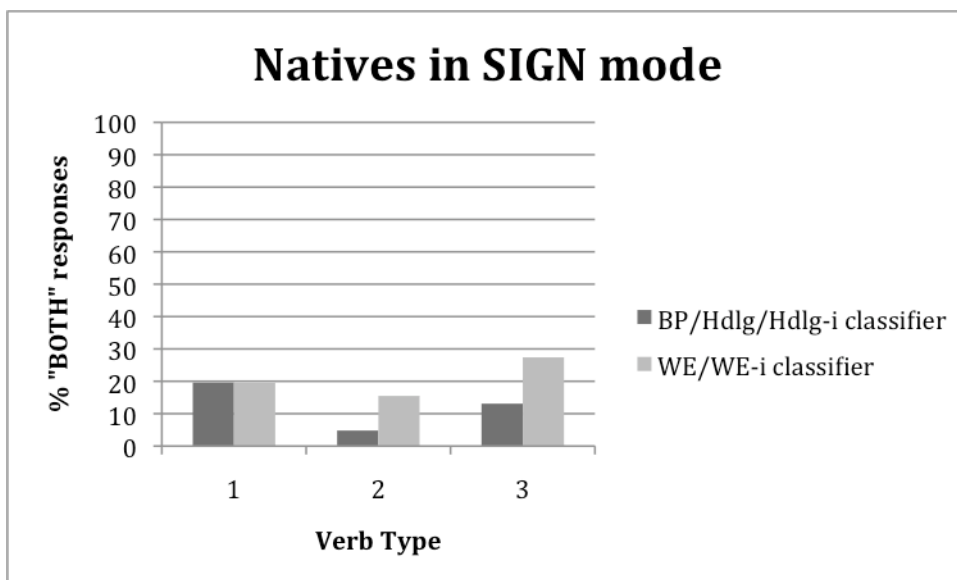
3.2.3. Discussion

The results confirm our predictions that due to reversed implications of the absence of an external agent, the BP classifier constructions yield significantly different responses than the Hdlg and Hdlg-i classifier constructions. The results then provide support for the hypothesis that these three classifier constructions (BP, Hdlg and Hdlg-i) include an agent. For the WE classifier constructions it is verb type 2 that stands out as confirming our predictions. Similar to what we saw in SCENE mode, however, the TWO analysis shows that participants seem to allow both WITH and WITHOUT scenes to correlate with the WE classifier constructions in verb types 2 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"). It seems, as mentioned in the discussion of the results in SCENE mode, that does not contradict our hypothesis for verb type 2.

Verb type 1 and 3 on the other hand receive mixed responses from participants. There may be an explanation for the mixed responses given for the WE classifier in verb type 1 that is still compatible with the hypothesis that these WE classifier constructions do not have an agent. Let me first provide a brief background on directional and locative predicate pairs of the type illustrated in (11) in section 1.2.1.2. (see Ackema, (1995): Chapter 4; and Reinhart, 2000: Section 2.2. for more elaboration).

The distinction in Dutch and Italian between the pairs of directional predicates (e.g., *run to the park*) and the locative ones (e.g. *run in the park*) goes back to the hypothesis that unaccusativity can be determined in terms of the aspectual properties of the predicates. Namely, whereas the directional "run" is aspectually an event, the locational "run" is aspectually a state (it is still an activity, not a stative). This relates to unaccusativity as follows: V+directional-PP selects an auxiliary *be*, whereas V+locational-PP selects an auxiliary *have*.[19] The prediction of these accounts 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 – shows that this is not the case. She concludes that the unaccusatives that "fall of this aspectual wagon" are the so-called gradual completion verbs (*increase*, *decrease*, etc.), which are not events but states (activities).[20]

The data below are copied from Reinhart (2000: Section 2.2 - Can it be Aspect?).

"Entailments depending on the state-event distinction.

i. Temporal sequencing:
    a sequence of events reported expresses temporal ordering, a sequence of states does not.

(23)   a) The door opened and broke.
        b) The door broke and opened.
(24)   a) The leaves withered and dropped.
        b) The leaves dropped and withered.
(25)   a) The vacuum cleaner spanned and moved
        b) The vacuum-cleaner moved and spanned.

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[19] This goes back to Borer (1994) and van Hout (1995).
[20] See Dowty (1986), Reinhart (1986) and Hatav (1989, 1993) for discussion.

(26)   a) The child grew and developed.
        b) The child developed and grew.

ii. Termination:

       past tense events entail (loosely) that the event has ended, a past tense state
       does not.

(27)   a) The vase broke →The vase is no longer (in the process of) breaking.
        b) The apple dropped →The apple is no longer dropping.
(28)   a) The tree grew ~→ The tree is no longer growing.
        b) He drifted (away) ~→ He is no longer drifting."

                 (from Reinhart, 2000: Section 2.2 - Can it be Aspect?)

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. Their argumentation in short goes as follows. 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 in section 3.1.3..

The analysis Neeleman and Ackema have is very important in relation to a native speaker's judgment of how the role of the argument is interpreted in both directional and locative version of such pairs. Consider the following examples in Dutch (89), where both the unergative alternations and the unaccusative alternations would match scenes where the subject of the verb carries out the action voluntarily, on his/her own initiative. In (89a) "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 (89b) "springen" is used with a directional PP and the interpretation is then that Jan jumps into a specific location, which is the ditch. In (89c) the locative version of "rennen" ("to run") means that Jan runs at a specific location, which is in the park; in (89d) "rennen" is directional and the interpretation is that Jan runs to a specific location, which is the park.

(89)

    (a) Jan springt in de sloot.
       Jan jumps-locative in the ditch
       "Jan jumps (around) in the ditch"

    (b) Jan springt in de sloot.
       Jan jumps-directional into the ditch
       "Jan jumps into the ditch"

    (c) Jan rent in het park.

Jan runs-locative in the park
"Jan runs in the park"

(d) Jan rent naar het park.
Jan runs-directional to the park
"Jan runs to the park"

Dutch

Though the argument may be in a different syntactic position, in both alternates does the runner (Jan) maintain some thematical agentivity/volitionality. Compare these Dutch verbs to the ASL verbs that were tested for verb type 1 in this experiment. In particular the '1' ( ) handshapes in the WE classifiers in GO-BY and TURN seem likely to allow an agentive interpretation. In the light of all of the above, the agentive interpretation of a human argument in the unaccusative alternate of a split intransitivity verb may be normal. This, however, should be tested in further detail before any conclusions can be drawn. All in all, the stimuli for verb type 1 produce somewhat ambiguous results. In order to make a stronger case for the hypothesized correlations, additional research is required with more stimuli.

For verb type 3, the results for the WE-i classifier show that this classifier type is certainly not interpreted as lacking an agent per se. It is mostly associated with an agentive interpretation, but contrary to predictions it is sometimes associated with the WITHOUT scene or with both scenes. Perhaps this is due to the fact that the WE-i classifiers 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. The WE-i classifiers for SAW, SWEEP, BRUSH-TEETH, for example may then become associated with a generic meaning of "sawing", "sweeping" or "brushing one's teeth" respectively. This, too, is a speculation and additional research is needed to explain these results.

The overall percentages of BOTH responses show that participants aren't just guessing: there is an indication of a certain reliability of the ONE-analysis. Again though, where participants don't follow the paradigm, they give more BOTH responses: verb type 1 and verb type 3 provoke less pronounced preferences from our participants than verb type 2 does, and especially the WE and WE-i classifiers prove problematic for verb type 1 and 3 respectively.

In conclusion, neither our, nor Benedicto & Brentari's predictions are exactly borne out. Of course, taking into consideration the results discussed earlier for SCENE mode, this does not come as a surprise. Still, compared to the results in SCENE mode, the results in SIGN mode present a more robust pattern of classifier-argument structure correlations. Especially verb type 2 shows a pattern very close to the paradigm predicted. It becomes apparent though, that the hypotheses made by Bendicto & Brentari cannot explain the full range of data and that WE-i classifier constructions do not lack an agent the way WE classifier constructions of verb type 2 do.

3.3. Age of Acquisition

To learn about the grammar of a language we should preferably study participants that are native in this language. This is usually obvious and not hard to achieve, for most current experimental research studies (spoken) languages with plenty of users, of which the majority is native. For sign languages the situation is slightly different. They are minority languages[21], used by a cultural and social minority and always surrounded –and sometimes even oppressed- by a spoken language majority[22]. It is hard to make a good estimate about the size of the population of ASL users, because too often deafness and ASL are wrongfully conflated; not everyone with a significant degree of hearing loss uses ASL or participates in a signing community, nor is everyone that uses ASL deaf or hard of hearing (Mitchell et al., 2006). Most people who are categorized as deaf suffer from age-related hearing loss: they usually grow up with a spoken language and don't experience any trouble with their hearing until well into adulthood. As a consequence, most people who are audiologically deaf do not sign. On the other hand, ASL is often used in households where not everybody is deaf. More than 80 % of the children born to deaf couples have no hearing impairment (Mitchell & Karchmer, 2004). When these children with no hearing loss are born into families that use ASL they grow up with ASL as their first language. No one has ever directly studied the question of how many people use ASL in the United States, but it has been estimated that the number was about 500.000 in 1972 (Mitchell et al., 2006). With the drastic changes in general US demography over the past decades, this number can be expected to differ from the current population size.

More important than the exact total, it should be noted that this population, a minority in itself, does not consist of a majority of native signers. Of all children growing up deaf or hard of hearing, probably no more than 4% is born into a signing family (Mitchell & Karchmer, 2004). Even though signing families may include hearing as well as deaf children, this is an indication that very few members of the ASL community are native users of the language. Most ASL users were not born into signing families and pick up sign language once they get in touch with the Deaf community outside their homes. For those members that grew up deaf or hard of hearing, hopefully their acquisition of ASL started within the first years of their lives. But for many of them it may not have started until or even after puberty, depending on onset and discovery of their deafness, their parents' attitude and the language policies of their schools. There are also many hearing members of the community, excluding those born into signing families for the moment, for whom acquiring ASL may not have been of importance during childhood but who become involved at some point later in their lives for professional or social reasons. So contrary to most other, spoken languages, the majority of the community consists of non-native users.

Testing the grammar of ASL for the particular constructions in my experiment, I wanted to incorporate this substantial part of the language community and compare

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[21] Only a few known exceptions exist, such as the sign language on Martha's Vineyard (USA), the sign language in Kata Kolok on Bali (Indonesia) and the sign language in Yucatec Mayan (Mexico).

[22] For an interesting anecdotic, ethnographical account of the sociolinguistic interaction and identity experiences of people in the reversed situation see Gesser (2007).

participants of different ASL acquisition experiences with respect to their performance on the experimental tasks.
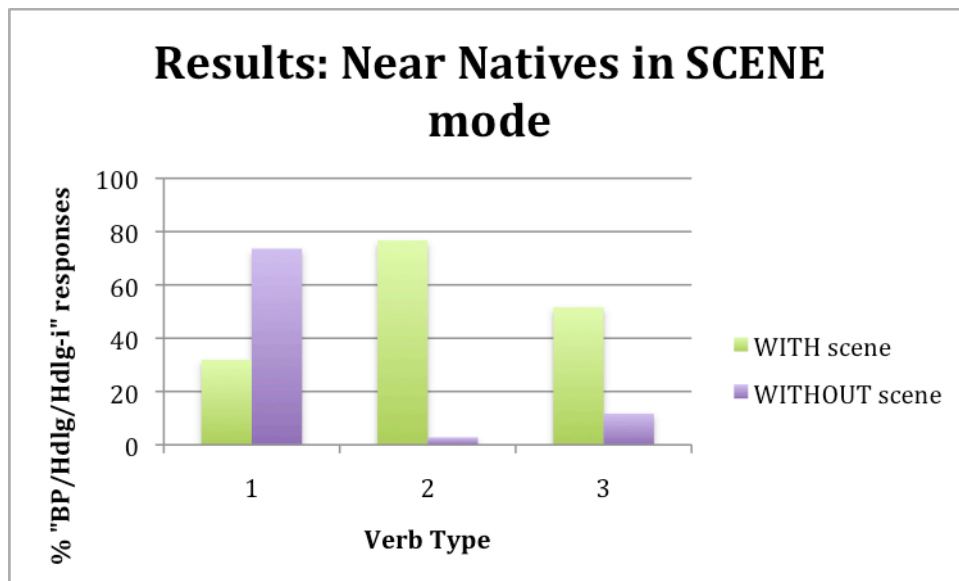
3.3.1. Near-natives

Let us start with the near-natives. Near-natives have different sources of language input during their acquisition of ASL than natives do. For near-natives the adult grammar example is mostly experienced at day care/school or at social gatherings where elders of the Deaf community are present, whereas for natives this example is available from the outset from their families and their families' friends. However, as the term implies, their linguistic behavior is expected to approach that of the natives. We predict that for the near-natives in this experiment, who started learning ASL before the age of 2, perform similarly to natives.

3.3.1.1. Results

The graphs below present the results of the ONE-analysis for the near-natives in both scene (90) and sign mode (91). No significant difference between natives and near-natives was found. This means that the effects found for natives apply to near-natives: there is a significant interaction of verb type and agentivity in SCENE mode, and of verb type and classifier in SIGN mode. In SCENE mode, the interaction effect of verb type and agentivity holds in all directions: all three verb types have different effects no matter the agentivity status of the scene and there is an effect of agentivity in all three verb types. In SIGN mode, the effect of classifier is robustly significant for each of the three verb types, but for the BP/Hldg/Hdlg-i classifiers verb type 1 differs significantly from verb type 2 and verb type 3 (but verb type 2 and verb type 3 do not) and for the WE/WE-i classifiers it is verb type 2 that differs significantly from the rest (but verb type 1 and verb type 3 don't).

(90) Results obtained for near-native signers in SCENE mode, from the ONE analysis.
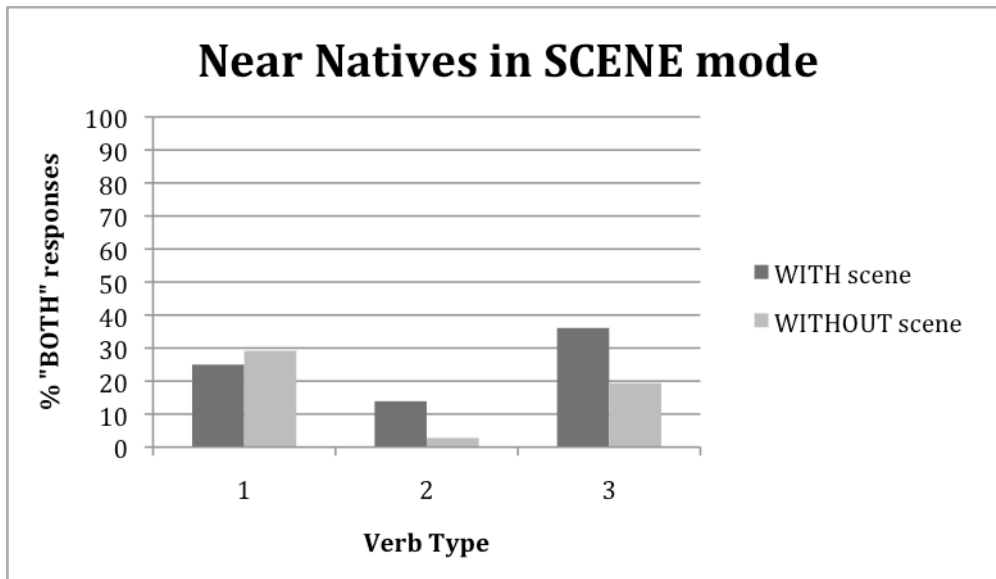
(91) Results obtained for native signers in SIGN mode, from the ONE analysis.
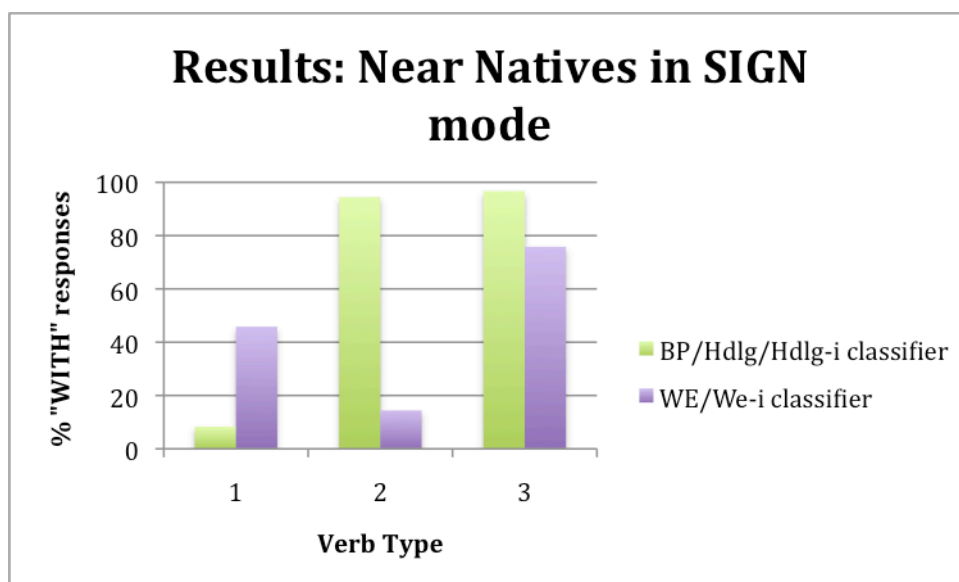
Also with respect to the TWO-analysis, near natives get similar effects as natives: in both modes, verb type 2 gets significantly less BOTH responses than both verb type 1 and verb type 3. In SCENE mode, there is an additional interaction effect. For WITH scenes verb type 2 differs significantly from verb type 3, for WITHOUT scenes verb type 2 gets significantly less BOTH responses than both verb type 1 and verb type 3. The effect of agentivity of the scene is significant only within verb type 2 and verb type 3 in this mode.

(92) Results obtained for near-native signers in SCENE mode, from the TWO analysis.

Near Natives in SCENE mode

(93) Results obtained for near-native signers in SIGN mode, from the TWO analysis.

Near Natives in SIGN mode
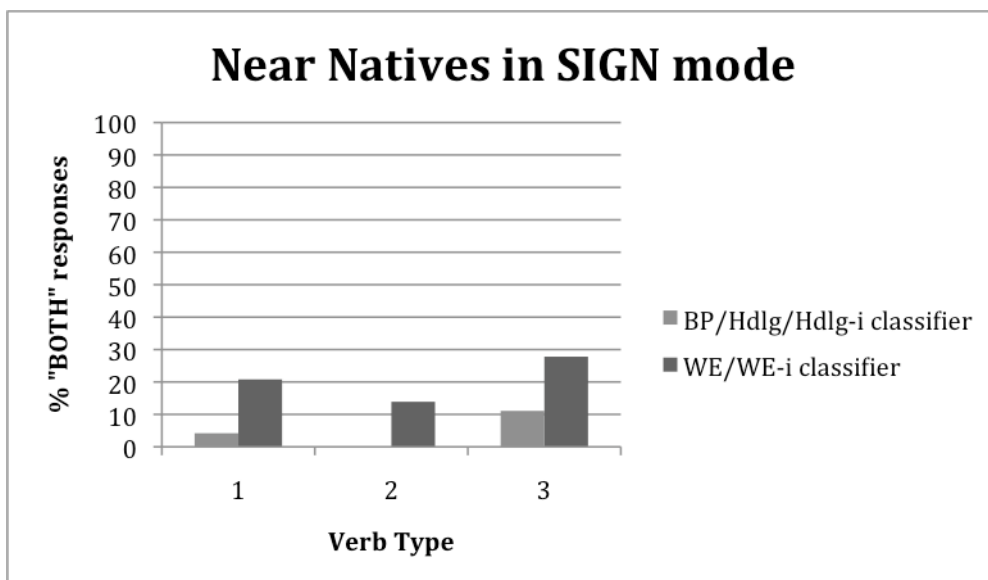
3.3.1.2.   Discussion

As far as this experiment goes, we can conclude that near-natives do not differ from natives as a group. This supports the idea that near-natives who started learning ASL before the age of 2 behave linguistically similar to natives, and that the grammar resulting from their ASL acquisition process, though having started slightly later, can be compared to the grammar resulting from a typical first language acquisition process of ASL. It should be noted that the cut-off age of acquisition for this experiment was very young (<2) and that the number of near-natives in this experiment was rather small (6). Perhaps a larger set of participants (possibly including participants who started learning ASL at or after age 2 but before age 4, for instance) would show more

variation in the data. It could then be interesting to look for a cut-off point: a specific age after which the start of acquisition of ASL can no longer result in native-like grammar. Nevertheless, it is unlikely that the lack of a group difference here is due to the size of the group alone, since none of the other groups, which consist of more participants, show significant differences with respect to the natives either, as we will see in the following sections.

3.3.2. Novices

The novices, not possibly having the similar "grammar" for ASL as signers do, were expected to differ qualitatively from the natives. Since they do not know this language, we may expect them to be lost and choose at random all the time. This is clearly not what they do ((94) and (95)).

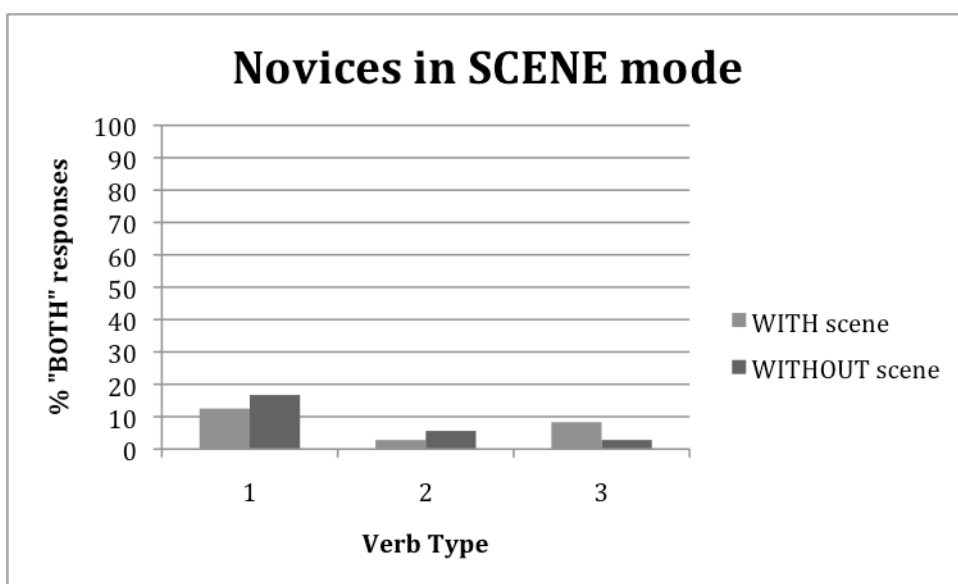(94) Results obtained for novices in SCENE mode, from the ONE analysis.

(95) Results obtained for novices in SIGN mode, from the ONE analysis.

70
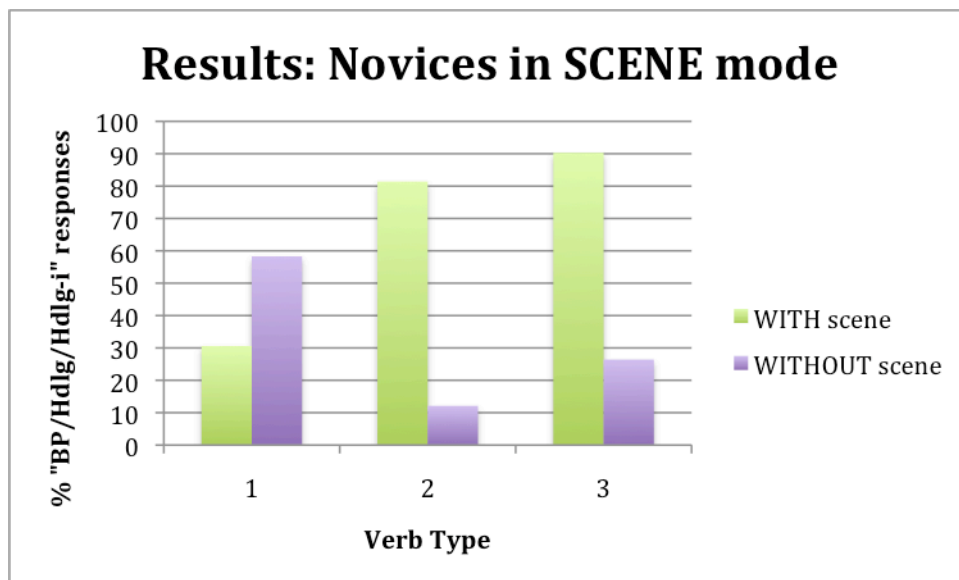
Results: Novices in SIGN mode
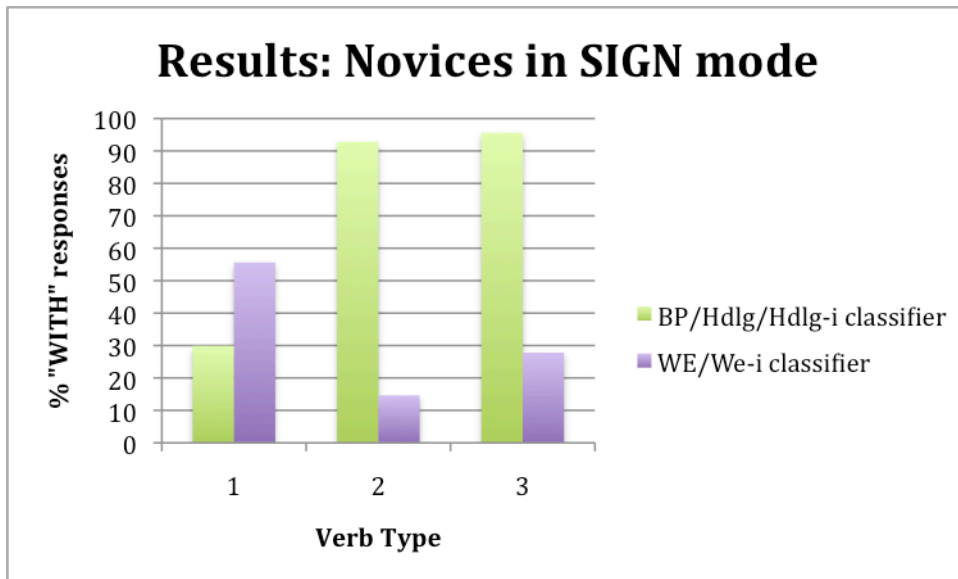
The graphs show that, despite their lack of experience with ASL, novices pick up on the correlations between signs and scenes. Contrary to predictions, statistics do not reveal significant differences between their performance and that of natives. The pattern for the BOTH responses in SCENE mode, however, differs significantly from that of the natives. This difference can be explained as follows. The novices, as intelligent as human beings are, pick up on a pattern in the stimuli and therefore show overall preferences that are similar to those of natives. In this respect, it should be noted that there was no time constraint on the experiment; perhaps novices would show less competence if under time pressure. However, the novices do not have fine-grained linguistic intuitions like natives do and therefore do not show nearly as much doubt as natives do, as we can see in the graphs of the TWO-analysis ((96) and (97)).

(96) Results obtained for novices in SCENE mode, from the TWO analysis.

Novices in SCENE mode

(97) Results obtained for novices in SIGN mode, from the TWO analysis.
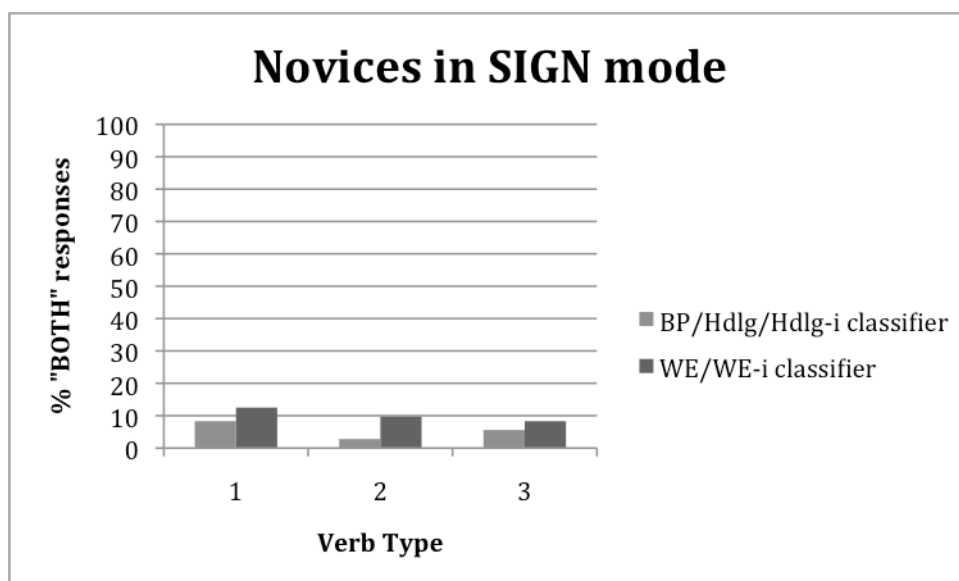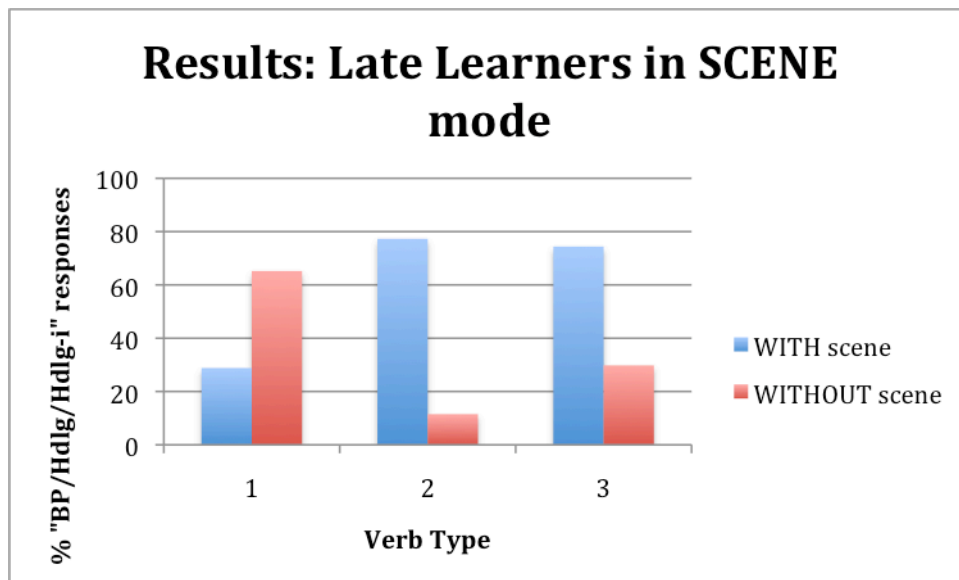

3.3.2.1.   Discussion

It seems obvious that there is some gestural and/or iconic origin to sign languages. Many researchers of sign languages have suggested that gestures from the ambient culture were a source of both lexical and grammatical elements (Casey, 2003; Newport & Supalla, 2000; Wilcox, 2004). It could well be that the ASL signs in the experiment bear enough gestural iconicity for non-signers to understand their meaning. Recent research indicates that especially in the use of classifier constructions signs may share some properties with gesture (Casey, 2003; Kendon, 2004; Liddell, 2003). This proposal then predicts that there will be similarities in the representation of motion events in gesture and in sign. This seems most probable for the items in the experiment that involve Hdlg or Hdlg-i classifiers. The processing of these signs, to novices, may be a form of gesture recognition (perhaps reminiscent of action perception). The results obtained in this experiment are clearly of relevance to questions about the relation between gesture and (sign) language and the (iconic) origins of sign languages, among others. Many follow-up research ideas come to mind. First of all, a control experiment could be done on a spoken language to see if novices are able to find the right pattern in "non-iconic" linguistic stimuli. Eye-tracking research could look into the gaze of participants during this type of task: it is known that beginning signers focus more on the hands than on the face, in contrast to fluent signers; what do novices look at? Rather than testing their comprehension, one could also present non-signers with only the scene stimuli from this experiment and ask them to produce gestures that match the action visualized in the scene: after repeated stimuli does a pattern arise in the forms that they come up? And does that pattern bear any similarities to what we see in ASL? The comprehension of the novices in this experiment suggests novices may produce utterances similar to the classifier constructions natives would produce. However, Schembri et al. (2005) did such a study and found that the differences between non-signers and native signers were biggest in the handshape units (and not in the location or movement units of the gestures/classifier constructions). Ongoing work by Coppola

and others (p.c.) also seems to produce very different results from the ones of this experiment: in their studies, novices and natives differ greatly with respect to the production of signs. This points to a remarkable difference between comprehension and production studies for sign language studies, among other things. Unfortunately going into detail about these issues here is beyond the time scope of this thesis.
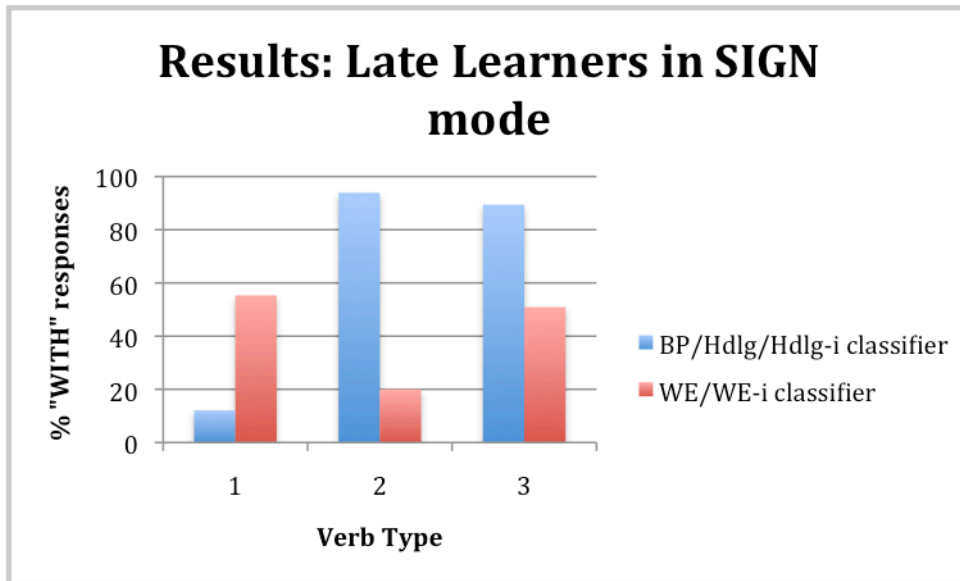
3.3.3. Late learners

As explained in the introduction of this section on the age of acquisition, ASL has a different native to non-native users ratio than most spoken languages. In spoken languages usually non-native users form a relatively small group that doesn't have much influence on the language grammar or use, but in sign language the non-native users are perhaps so dominant –especially in educational and welfare settings- that they have substantial influence on language grammar or use. The difference between natives and late learners may be equivalent to the difference between natives and so-called second language users in spoken language research. Given the reported difficulties in both second language acquisition (Mayberry, 2006) and first language acquisition (Newport & Meir, 1985) to master the use of classifiers, we may expect the results of the late learners to hint at subtle differences at least. So finally, let's take a look at the late learners group. The results are shown in the graphs below (98-101).
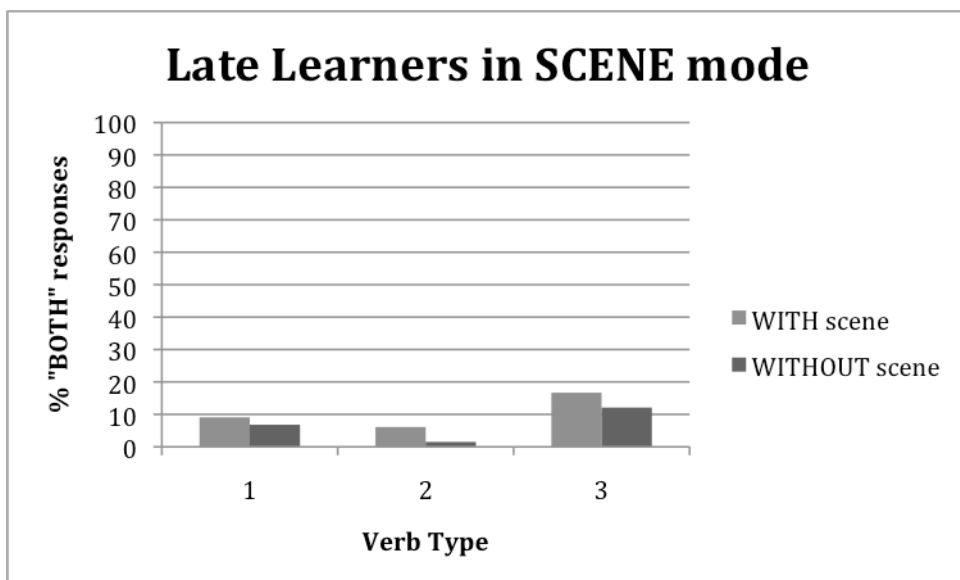
(98) Results obtained for late learners in SCENE mode, from the ONE analysis.
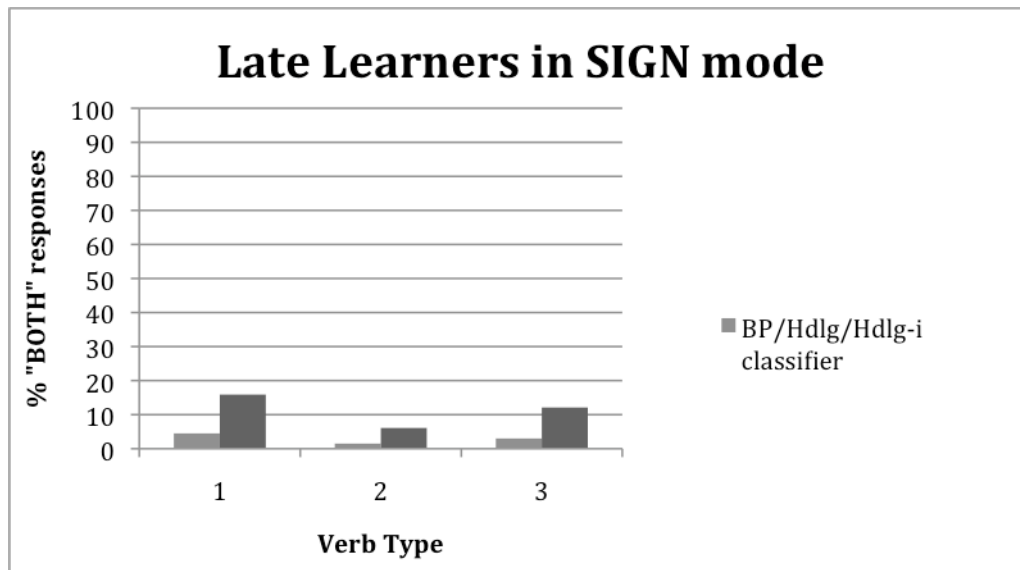

(99) Results obtained for late learners in SIGN mode, from the ONE analysis.

(100) Results obtained for late learners in SCENE mode, from the TWO analysis.

(101) Results obtained for late learners in SIGN mode, from the TWO analysis.

3.3.3.1.   Discussion

Contrary to expectations, no statistical difference can be pointed out between the late learners and the natives in this experiment. Although they do not differ qualitatively from the natives in their response pattern, the results of the late learners tell us that subtle differences exist between their interpretations and those of the natives. The late learners seem to have mastered this part ASL grammar roughly, but they may be missing small subtleties in interpretation due to their diminished language learning capacity at their age of acquisition and/or due to other factors, such as a shorter total of years of exposure to the language (this was not controlled for in this experiment). It may be interesting to redo the experiment under time pressure in order to reveal these "hidden" differences between groups. There are many additional questions of interest about the performance of the late learners in this experiment as compared to other research on second language acquisition in sign languages as well as in spoken languages, but unfortunately this is beyond the scope of this thesis and will be left open to future investigation.

3.3.4. Group and mode differences

Looking at the graphs of all groups, one can tell that there is a quantitative difference rather than a qualitative one. Although the ONE-analysis gives a marginally significant effect of group in SCENE mode (Greenhouse-Geisser $F(3,39)=2.6$, $p=0.067$), it washes out in the post hoc comparisons. In the TWO-analysis, there is an effect of group in SCENE mode with an even smaller p-value (Greenhouse-Geisser $F(3,39)=3.3$, $p=0.031$) but it still washes out in the post hoc comparisons. Compared to SIGN mode, however, these values are remarkable. This indicates that mode of presentation may affect results in sign language experiments. In this study, the two modes were analyzed separately and the factor as such can therefore not be assessed directly.

3.3.5. Methodology

Improvements of the experiment for further research may be adding a time constraint on participants' responses: this would possibly reveal bigger differences between the participant groups and/or between modes. Also, 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 could 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.

4. CONCLUDING REMARKS

This thesis studied the argument structure of classifier constructions in ASL. Based on observation and grounded in two different theoretical proposals, predictions were made about the presence of an agent in the interpretation of various classifier types. These predictions were tested in a computer-based experiment. The results confirm the existence of various correlations between classifier type and argument structure, although they show room for interpretation. It seems that more research is needed especially for the verbs of type 1 (which were hypothesized to partake in an unergative-unaccusative alternation) and those of verb type 3 (for which predictions differed for each of the theoretical proposals). The results clearly confirm the difference between verbs of verb type 2 and those of verb type 3 and thus provide ample evidence for the claim contra Benedicto & Brentari (2004) that WE-i classifier constructions should be distinguished from WE classifier constructions and cannot be analyzed the same way with respect to argument structure.

Two other issues were incorporated into the experiment. One was the mode of presentation. Due to the pioneer nature of this project, there were no a priori predictions about the effect of mode. Stimuli were therefore presented in both SCENE mode and SIGN mode in order to maximize the chances that any conclusions about the argument structure of the classifier constructions would represent independent tendencies. Although no direct measure of the effect of mode is available because the two modes were analyzed separately, there are indications to believe that the mode of presentation does have an effect on participants' responses. This may be of importance when looking for empirical evidence for linguistic claims in sign language research. More research is needed to look further into the difference.

The second issue was the participants' age of acquisition of ASL. Because of interest in the effects of the atypical sociolinguistic setting of the language, an interest in acquisition issues of language in general and an interest in the relationship between gesture and sign, the results of native signers were compared to the results of two groups of signers who started their acquisition of ASL at different points in life (near-natives and late learners) and to the results of people who were completely new to ASL (novices). Although no overall effect of group was found in the statistics, subtle differences were hinted at. Near-natives, as expected, perform similar to natives on the task. Their intuitions with respect to the correlations between argument structure and classifier constructions seem equal to those resulting from a typical first language acquisition process (i.e. to those of the natives). Late learners however, seem to lack some of the sophistication found in the judgments made by natives. This is generally in line with the literature on second language acquisition in both signed and spoken languages. The results bear relevance to the idea that learning a language after the critical period for language learning is qualitatively different from learning a language within the critical period, but there are other possible factors that influence their behavior and that were not controlled for in this experiment. Surprisingly, novices show a similar pattern to that of natives. They too, however, lack the ambiguities in interpretation shown by natives and seem to be performing a simple pattern-search rather than a linguistic task. Their performance is interesting in the broader perspective of research on the relationship between sign language and gesture. Unfortunately the scope of this thesis did not allow for much elaboration on this issue of age of acquisition.

This thesis is the result of what in many ways was a pioneer study. I hope to have left many interesting questions for future research.

5. Appendix

- The following table gives an overview of all effects with p-values < 0.010 found in the ANOVA's performed on the results of the experiment.

Effects	ONE.sign	ONE.scene	TWO.sign	TWO.scene
Verbtype	.000	.073	.012	.000
Verbtype*Group	.006	.000	-	-
Classif/Agentiv	.000	.000	.000	.007
Classif/Agentiv*Group	.041	-	-	-
Verbtype*Classif/Agentiv	.000	.000	-	.041
Verbtype*Classif/Agentiv* Group	-	-	-	-
Group	-	.067	-	.031

- For the original stimuli for the experiment, see the videos in the digital appendix.

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