The Unity of Focus:

Evidence from Sign Language (ASL and LSF)*

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Abstract. In spoken language, focus (i) is often realized by phonological prominence (e.g. with higher pitch, greater loudness and longer duration); (ii) it signals the activation of alternatives; (iii) it has diverse semantic effects, ranging from contrastive to exhaustive; and (iv) the phonology/semantics interface is arguably driven by a biological 'effort code' whereby greater pitch excursions are associated with greater emphasis (Gussenshoven 2001, 2004). We argue that versions of all four properties hold of ASL and LSF focus, which suggests that focus has a unified semantics and to some extent a unified semantics/phonology interface across modalities. Earlier studies emphasized the *diversity* of focus realization in ASL, and the importance of syntactic movement (Wilbur 2012), which made it hard to isolate the role of prosody. By studying particularly simple paradigms in which movement is inapplicable, we show that sign modulations and non-manuals may suffice to mark focus, with both contrastive and exhaustive effects, as in spoken language. And we suggest that a modified version of the 'effort code' is arguably at work in ASL and LSF, with focused signs realized not just with raised eyebrows (as is standard), but also with greater amplitude, speed acceleration, and longer hold times, among others. Finally, we note some differences between our ASL and our LSF data – notably the presence of forward leans in ASL but not in LSF (which, however, includes head nods).

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In spoken languages, focus (i) is normally realized by phonological prominence, which in English is effected by higher pitch, greater loudness and longer duration (e.g. Katz and Selkirk 2011). Semantically, it (ii) signals the activation of alternatives (e.g. Rooth 1996), and (iii) it has diverse effects, ranging from contrastive (as in (1)a) to exhaustive (as in (1)b) – although both arguably involve the activation of alternatives.[4]

(1) a. I'll introduce John to Mary, and then I'll introduce BILL to her.
b. If you invite John OR Mary, the party will be a success.
=> no inference that the party will be a success if the addressee invites John AND Mary

Finally, it has been speculated that (iv) the realization of focus realization is driven by a biological 'effort code' whereby greater pitch excursions are associated with greater emphasis/importance (Gussenshoven 2001, 2004).[5]

Following in part Wilbur 2012, we show that these four properties are conjointly realized in ASL and LSF, which suggests that focus realization and interpretation can and should be studied from a cross-modal perspective. While we know of no formal studies of focus in LSF, earlier studies on ASL emphasized the *diversity* of focus realization, which often involves syntactic movement (Wilbur 2012). Both contrastive and exhaustive focus were studied, but exhaustive readings were only investigated in specialized constructions somewhat similar to pseudoclefts (Wilbur 2012, Caponigro and Davidson 2011), where the respective roles of focus and of its environment were hard to tease apart. By studying particularly simple paradigms in which movement is inapplicable, we show that sign modulations and non-manuals may suffice to mark focus, with the same diverse semantic effects as in spoken language. And we suggest that a modified version of the 'effort code' is arguably at work in ASL and LSF, with focused signs realized with raised eyebrows (as is standard), but also greater amplitude, speed accelerations, and longer hold times, among others. We also discuss some differences between ASL and LSF focus – notably the fact that Wilbur's 'forward leans', which are found in ASL, are absent from our LSF data, while the latter include systematic head nods.

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[4] The exclusive reading may be analyzed as a variety of lexical enrichment (Geurts 2011) or as association with a covert exhaustivity operator (Chierchia et al. 2012)). The latter analysis requires and the former makes plausible that alternative activation is involved in the process.

[5] In alternative-based analyses, one might want to reintepret Gussenhoven's effort code to take greater emphasis/importance to signal the activation of alternatives obtained by replacing the focused element with competing elements.

Wilbur 1999 establishes that in ASL "the primary indicator of stress marking is the significant increase in peak velocity of prominent signs"[6], and that as in English "a single prominence is assigned to the right-most lexical item in the phrase", but that unlike in English prominence cannot be moved, with the result that focus is preferably realized by movement; in Wilbur's terms, for focus realization ASL is '[-plastic]', unlike English but like Catalan. Interestingly, Wilbur and Patschke 1998 do discuss cases in which contrastive focus is realized *in situ* by a 'forward lean', as in (2) – a mechanism we will find in our own ASL data as well.

(2) Wilbur and Patschke 1998, cited in Wilbur 2012

	lean back		lean forward	
IX_1 NOT SAY 'DEATH',	IX_1	SAY 'BET'		[ASL]

'I didn't say "death", I said "bet".'

While Wilbur emphasizes the *diversity* of strategies of focus realization in ASL, we will show that in a subset of ASL and LSF cases prominence and non-manuals alone (including forward leans) can realize contrastive and exhaustive focus, which makes for a particularly minimal comparison with English.

Our data were elicited from Lamberton for ASL and from Ducasse for LSF. Both are Deaf children of Deaf, signing parents, and they co-authored this piece. Data were elicited using the 'playback method', with repeated quantitative acceptability judgments (1-7, with 7 = best) and repeated inferential judgments (on separate days) on videos involving minimal pairs. We asked our informants to put emphasis on certain words, and thus the *production* part was artificial, just as it would be for the creation of experimental stimuli; but the subsequent (and repeated) *judgment* task made for minimal comparisons between appropriate and deviant sentences depending on the placement of focus marking.

ASL data were transcribed by Lamberton himself; LSF data were transcribed by Aristodemo and Santoro, who are not native LSF signers but have experience working with LSF videos, and they consulted with Ducasse in some cases.[7] For reader-friendliness, we use a revised transcription system (the */-notation*) in which sign modulations are indicated by modifying the glosses themselves, while non-manuals

[6] See Wilbur and Martínez 2002 for a more detailed discussion of the respective roles of velocity, acceleration (= the first derivative of velocity) and jerk (= the second derivative of velocity) in marking prominence in ASL.

[7] Importantly, Ducasse's remarks during judgment tasks in elicitation sessions suggest that mouth and eye modifications are relevant to the expression of focus as well. Some instances of eye modifications are by-products of eyebrow raising, but it might be that not all are. We leave this question, as well as that of mouthing, for future research, and do not attempt to transcribe these modifications in this piece.

appear above the capitalized glosses, with iconic symbols whenever possible – in the order: 1. body changes 2. head changes 3. facial expressions, e.g. /ʃ^:

(3) a. Non-manuals: / = forward lean; \ = backward lean; ‡ = raised shoulders } = head nod. ^ = raised eyebrows ~ = lowered eyebrows
b. Sign modulations: **WORDS** = greater amplitude; _WORDS_ = longer hold time; +WORD or +[WORDS]+ = speed acceleration

1 Contrastive Focus

1.1 Contrastive focus in ASL

In (4)-(5), the letter names *B* and *J* count as new in the second clause, while the other letter names count as given, and thus standard theories (e.g. Schwarzschild 1999) lead one to expect focus on *B*/*J* but not on the other letters. The contrast is particularly clear between (4)a-(5)b and (4)b-(5)b (the c-d examples offer less minimal comparisons because the signer used slightly different non-manuals).

(4) *Context:* The speaker is an ASL instructor teaching students to fingerspell three-letter sequences.
IX-2 WILL FINGERSPELL A C E D, FINISH
a. 4.2 _/^_ _**A**_ B E D
b. 7 A _/^_ _**B**_ E D
c. 4.2 A B _/~_ _**E**_ D
d. 4.6 A B E ___/__ _+**D**_
'You will fingerspell *ACED, then ABED*.' (ASL, 21, 52; 5 judgments)

(5) *Context:* The speaker is an ASL instructor teaching students to fingerspell three-letter sequences.
IX-2 WILL FINGERSPELL A C E D, FINISH
a. 4.4 _/^_ _**A**_ J E D
b. 7 A _/^_ _**J**_ E D
c. 4.2 A J _/~_ _**E**_ D
d. 4.6 A J E ___/~__ _+**D**_
'You will fingerspell *ACED*, then *AJED*' (ASL, 21, 54; 5 judgments)

Since the letter names appear in a quoted sequence, we do not expect syntactic movement to affect their realization. Thus focus is solely realized by prominence, and it is acceptable on new but not on old elements. In the acceptable examples, focused *B* ad *J* involved (i) raised eyebrows; (ii) a forward lean, as in Wilbur and Patschke 1998 and Wilbur 2012; (iii) a longer hold time; and (iv) a greater sign amplitude. (iv) is compatible with Gussenhoven's 'effort code', but (ii)-(iii) might argue for a variant 'salience code', whereby focused elements are more perceptible for the intended

audience. While also (i) exists in some spoken language focus constructions (Dohen 2005, Dohen and Loevenbruck 2009), its grammatical function in sign language is still debated (see Wilbur 2012 for references, and Dachkovsky and Sandler 2009 for an analysis that likens raised eyebrows to H tones in spoken language).

In (6) and (7), different ('trembling') versions of fingerspelled letters are used to realize proper names (thus we write A_{NN} to transcribe the trembled letter *A* used to abbreviate this proper name); these are used rather than mentioned, but since they are semantically conjoined, one also doesn't expect syntactic movement to be applicable – and the results support the same generalizations as the mentioned letter names in (4)-(5), with the same means of marking focus, except that speed acceleration replaces greater sign amplitude.

(6) *Context:* The speaker is trying to teach groups of students to work together.
TODAY IX-1 SEVERAL MEETING-rep FIRST MEETING A_{NN} C_{HARLES} E_{DITH} D_{ENIS}, FINISH

a. 4 ___/^___
_+A_{NN}_ B_{ILL} E_{DITH} D_{ENIS}

b. 7 A_{NN} ___/^___
_+B_{ILL}_ E_{DITH} D_{ENIS}

c. 3 A_{NN} B_{ILL} ___/^___
_+E_{DITH}_ D_{ENIS}

d. 3.2 A_{NN} B_{ILL} E_{DITH} ___/~___
_+D_{ENIS}_

'Today I have several meetings. My first meeting is with Ann, Charles, Edith and Denis, then with Ann, Bill, Edith and Denis.' (ASL, 21, 70; 4 judgments)

(7) *Context:* The speaker is trying to teach groups of students to work together.
TODAY IX-1 SEVERAL MEETING-rep FIRST MEETING A_{NN_a} C_{HARLES_b} E_{DITH_c} J_{OHN_d}, FINISH

a. 5 __/^__
_**A_{NN_a}**_ B_{ILL_b} E_{DITH_c} J_{OHN_d}

b. 7 IX-1 WILL MEET-rep A_{NN_a} C_{HARLES_b} E_{DITH_c} J_{OHN_c}, FINISH A_{NN_a} ___/^___
_**B_{ILL_b}**_ E_{DITH_c} J_{OHN_d}

c. 3 IX-1 WILL MEET-rep A_{NN_a} C_{HARLES_b} E_{DITH_c} J_{OHN_d}, FINISH A_{NN_a} B_{ILL_b} ___/~___
_+E_{DITH_c}_ J_{OHN_d}

d. 3.5 IX-1 WILL MEET-rep A_{NN_a} C_{HARLES_b} E_{DITH_c} J_{OHN_d}, F_{INISH} A_{NN_a} B_{ILL_b} E_{DITH_c}
__/~__
_**J_{OHN_d}**_

'Today I have several meetings. My first meeting is with Ann, Charles, Edith and John, then with Ann, Bill, Edith and John' (ASL, 21, 71; 4 judgments)

Our generalizations also hold of the mentioned word *OR* in (8)c, which involves a forward lean, raised eyebrows, speed acceleration, and a longer hold time of the sign.

(8) *Context:* The speaker is an ASL instructor teaching students to sign 3-word sequences.
IX-2 WILL SIGN 'ANN$_a$ AND BILL$_b$', FINISHED
a. 6.5 'ANN$_a$ OR BILLb'
b. 4.2 '_**ANN$_a$**_ OR BILL$_b$'
c. 7 'ANN$_a$ _+OR_ BILL$_b$'
d. 3.5 'ANN$_a$ OR _+**BILL$_b$**_'
'You will sign 'ANN AND BILL', then 'ANN OR BILL'.' (ASL, 21, 74; 4 judgments)

1.2 Contrastive focus in LSF

Similar patterns are found in LSF, with some differences: (i) forward lean wasn't observed; by contrast, (ii) we found regular use of head nods to mark focus, and in addition (iii) we display below two instances of raised shoulders, notated as ‡. Importantly, head nods would be hard to distinguish from forward leans in ASL, as these involve a movement of the *entire* upper part of the body; hence at this point their *absence* from our ASL transcriptions should not be over-interpreted.

(9) *Context:* The speaker teaches fingerspelling to his students.
IX-1 WANT IX-2 FINGERSPELLING A C E D THEN-PAF
a. 7 A B E D
b. 1.4 _+**A**_ B E D
c. 7 A _+**B**_ E D
d. 1.4 A B _+**E**_ D
e. 1.4 A B E _+**D**_
'I want you to fingerspell *ACED,* then *ABED*' (LSF, 42, 69; 5 judgments)

In (10)b, the focused element was a proper name *PIERRE* (related to the noun for 'stone'); it involved a movement with greater amplitude, a longer hold time and speed acceleration.

(10) *Context*: Every day, the speaker teaches his students to collaborate in pairs.[8]
TODAY IX-1 TEACH OLIVER JEAN MARIE TOMORROW
a. 1.3 **OLIVER** PIERRE MARIE
b. 7 OLIVER _+**PIERRE**_ MARIE
c. 1.3 OLIVER PIERRE _+**MARIE**_
'Today I'll teach Oliver, Jean and Marie, and tomorrow I'll teach Oliver, Pierre and Marie.' (LSF, 42, 49; 3 judgments)

[8] While all proper names are signed towards the center of signing space, there are slight positional differences – within the central area, they tend to be signed from left to right.

The same generalizations hold of the phone numbers in (11), where new digits but not old ones can be focused.[9]

(11) NUMBER TELEPHONE POSS-1
a. 7 01 43 43 53 43
b. 1.4 01 _**4**_3 43 53 43
c. 1.4 01 43 _**4**_3 53 43
d. 7 01 43 43 _**5**_3 43
e. 1.4 01 43 43 53 _**4**_3
'My phone number is 01 43 43 53 43.' (LSF, 42, 73; 5 judgments)

In sum, in the examples discussed in this section, contrastive focus was marked in both languages by raised eyebrows, accompanied with forward leans in ASL, and with head nods and greater sign amplitude in LSF. Greater sign amplitude was often seen in ASL as well, and longer hold times and speed accelerations were also commonly seen in both languages.

2 Exhaustivity Focus in ASL and LSF

We turn to the role of focus in triggering exhaustive readings. In the extant literature, exhaustivity effects in sign language were primarily studied in special constructions – in particular in question-answer pairs in discourse in Wilbur 2012, and single-sentence question-answer pairs in Caponigro and Davidson 2011 (a construction somewhat similar to pseudoclefts). In both cases, it is hard to decide whether the exhaustivity

[9] We attempted to obtain the same pattern with the mentioned word *OR*, as in (i) (obtained from different videos); we give at the beginning the two judgments we obtained (session 1, session 2):
(i) *Context:* The speaker teachers LSF to a beginning student.
IX-1 WANT IX-2 SIGN [4 WORD]$_a$ THEN-PAF [4 WORD]$_b$ [YES NO ADD IMPOSSIBLE]$_a$
a. 7 7 THEN-PAF [YES NO OR IMPOSSIBLE]$_b$ (44, 66)
b. 1 7 [_+**YES**_ NO OR IMPOSSIBLE]$_b$ (44, 67)
c. 1 7 [YES _+**NO**_ OR IMPOSSIBLE]$_b$ (44, 68)
d. 7 7 [YES NO +**OR** IMPOSSIBLE]$_b$ (44, 69)
e. 7 7 [YES NO OR _IMPOSSIBLE_]$_b$ (44, 70)
In session 1, we obtained the expected pattern in b., c., d., though e. was unacceptable. In second 2 (where the consultant re-assessed the videos from home, nearly 2 months after the first session) everything became acceptable, but the consultant added notes about the meanings that made it clear that the emphasis was itself quoted – for instance *YES* became 'highly affirmative', *OR* became exclusive, etc.

effect is due to focus marking *per se* or to the syntactic/pragmatic environment it is found in. Here we investigate constructions in which focus marking alone is responsible for the emergence of an exhaustive reading.

2.1 Exhaustivity focus in ASL

The initial effect is seen in the contrast between neutral and focused *OR* in (12)a-b. Judgments were accompanied with an inferential task to test whether *OR* was in fact exclusive.

(12) *Context:* The addressee is throwing a party. The speaker has some preferences as to who should be invited.
a. 6.8 IF IX-2 INVITE ANN_a OR $BILL_b$, IX-1 WILL GIVE-2 $10.
=> if the addressee invites both Ann and Bill, the speaker has to give him $10
b. 7 IF IX-2 INVITE ANN_a **_OR_** $BILL_b$, IX-1 WILL GIVE-2 $10.
=> if the addressee invites both Ann and Bill, the speaker doesn't have to give him $10
'If you invite Ann or Bill, I'll give you $10.' (ASL, 21, 76; 5 judgments)

In (12)a, no exclusive reading is available, which is unsurprising since *OR* appears in a downward-entailing environment, where embedded implicatures are extremely limited. By contrast, in (12)b the exclusive reading is dominant with focused *OR*, realized with a forward lean, raised eyebrows, greater amplitude and a longer hold time. These truth-conditional effects are replicated under *BET* in (13). While *BET* does not create a downward-entailing environment, for pragmatic reasons it does not invite an embedded implicature; none is obtained without focus, but with focused *OR* a clear effect emerges.

(13) *Context:* Tomorrow there will be a party. The speaker and the addressee make a bet about who will show up.
a. 7 IX-1 BET ANN_a OR $BILL_b$ COME.
=> in case Ann and Bill and nobody else come, the speaker wins his bet
b. 7 IX-1 BET ANN_a _+[**OR**]_ $BILL_b$ COME.
=> in case Ann and Bill and nobody else come, the speaker doesn't win his bet[10]
'I bet that Ann or Bill will come.' (ASL, 24, 07; 3 judgments)

Interestingly, there are several other ways to form disjunction in ASL. In each case focus was acceptable, but we obtained inconsistent semantic judgments. Specifically, for a given sentence, there were often inconsistent inferential judgments from one trial to the next under *IF*, while exclusive readings were obtained under *BET*;

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[10] On the second trial, our consultant added the following remark: 'some people might interpret the emphasis on OR as being as opposed to AND, thus they would think both could show up and speaker

still, we don't conclude anything from the latter fact, as we have more judgments with *IF* than with *BET*, and those with *IF* and *BET which were obtained at the same time* often gave rise to the same pattern. Such inconsistent results were obtained with: *OR-WHICH* (placed between and before the disjuncts), *EITHER-OR* (placed between and before the disjuncts), *OR-IX-IX* (placed before the disjuncts), *OR-V* (placed before disjuncts). We leave this empirical question for future research.

2.2 Exhaustivity focus in LSF

In our LSF data, focused *OR* triggered an exclusive reading in conditionals[11] (in (14)[12]) and under *BET* (in (15)); here too, LSF differs from ASL in that (i) no forward lean was perceptible in LSF, but (ii) heads nod were observed, and (iii) an upwards shoulder movement could sometimes be seen.

(14) *Context*: Tomorrow, there is a party. The speaker and the interlocutor make a bet about who will come.[13]
a. 7 PARTY IF PIERRE OR MARIE COME, IX-1 1-GIVE-2 10 EUROS.
=> if both Pierre and Marie come, the speaker has to give the addressee 10 euros
‡}^
b. 7 PARTY IF PIERRE **OR** MARIE COME, IX-1 10 EUROS 1-GIVE-2.
'If Pierre or Marie come(s), I will give you 10 euros.' (LSF, 44, 23; 3 judgments)

(15) *Context*: Tomorrow, there is a party. The speaker and the interlocutor make a bet about who will come.[14]
a. 7 IX-1 BET PIERRE OR MARIE COME.
=> In case Pierre and Marie and nobody else come, the speaker has won his bet
}^
b. 7 IX-1 BET PIERRE **OR** MARIE COME.
=> In case Pierre and Marie and nobody else come, the speaker hasn't won his bet
'I bet that Pierre or Marie will come.' (LSF, 44, 33; 3 judgments)

LSF can also realize disjunction with a postposed alternating pointing sign, *OR-IX$_a$-IX$_b$*. Interestingly, both in a conditional and under *BET*, the focused version was just

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would still win his bet'. The same remark was made with other examples involving focused disjunctions of different varieties.

[11] Two remarks should be added. First, our informant had similar judgments with conditionals that involved no word for *IF* (but just non-manual markers on the *if*-clause; 44, 27). Second, in our very early work on focused vs. unfocused *OR* in LSF, we failed to detect a truth-conditional contrast, as even unfocused *OR* appeared to be exclusive under *IF*. This failure might be due to the fact that the semantic task was administered differently: instead of specifying a situation and asking an inferential question, we asked the consultant to select from a list of situations those that would license a certain inference (e.g. 'In which of the following situations must the speaker give 20 euros to the addressee?' (42, 10).

[12] A similar sentence with the opposite verb-object order can be found in (16).

[13] While the proper names are signed in the same central area, they tend to be introduced from left to right within that area.

[14] While the proper names are signed in the same central area, they tend to be introduced from left to right within that area.

deviant, as seen in (16)-(17) (exclusive readings were obtained in the control sentences with a focused version of 'normal' *OR* in (16)c,d-(17)c,d).

(16) *Context*: Tomorrow, there is a party. The speaker and the interlocutor make a bet about who will come.[15]
a. 7 PARTY IF PIERRE OR MARIE COME, IX-1 10 EUROS 1-GIVE-2.
=> if both Pierre and Marie come, the speaker has to give the addressee 10 euros
b. 7 PARTY IF PIERRE **OR** MARIE COME, IX-1 10 EUROS 1-GIVE-2.
=> if both Pierre and Marie come, the speaker doesn't have to give the addressee 10 euros
c. 7 PARTY IF PIERRE_b MARIE_a $\text{OR-IX}_a\text{-IX}_b$ COME IX-1 10 EUROS 1-GIVE-2.
=> if both Pierre and Marie come, the speaker has to give the addressee 10 euros
d. 2 PARTY IF PIERRE_b MARIE_a **$\text{OR-IX}_a\text{-IX}_b$** COME IX-1 10 EUROS 1-GIVE-2
Intended: 'If Pierre or Marie come(s), I'll give you 10 euros.' (LSF, 44, 62; 3 judgments)

(17) *Context*: Tomorrow, there is a party. The speaker and the interlocutor make a bet about who will come.[16]
a. 7 IX-1 BET PIERRE OR MARIE COME
=> In case Pierre and Marie and nobody else come, the speaker has won his bet
b. 7 IX-1 BET PIERRE **OR** MARIE COME.
=> In case Pierre and Marie and nobody else come, the speaker hasn't won his bet
c. 7 IX-1 BET PIERRE_b MARIE_a OR-IXIX COME.
=> In case Pierre and Marie and nobody else come, the speaker has won his bet
d. 1.7 IX-1 BET PIERRE_b MARIE_a **$\text{OR-IX}_a\text{-IX}_b$** COME.
Intended: 'I bet that Pierre or Marie will come.' (LSF, 44, 56; 3 judgments)

As things stand, we do not know why these effects hold. It is possible, but unlikely[17], that there is something phonologically wrong with the focused version of $OR\text{-}IX_a\text{-}IX_b$. Alternatively, it could be that focusing on $OR\text{-}IX_a\text{-}IX_b$ fails to yield a semantic effect[18]

[15] In a.-b., the proper names are signed in the same central area, but they tend to be introduced from left to right within that area. In c.-d., they are more clearly assigned different positions.
[16] In a.-b., the proper names are signed in the same central area, but they tend to be introduced from left to right within that area. In c.-d., they are more clearly assigned different positions.
[17] When we tested contrastive focus on *OR-IX-IX*, as in (i), we did not get consistent results; but in each case the result was far more acceptable than in (16)d-(17)c.
(i) *Context: The speaker teachers LSF to a beginning student.*
IX-1 WANT IX-2 SIGN [4 WORDS]$_b$ THEN-PAF [4 WORDS]$_a$ – ['YES' 'NO' 'ADD' 'IMPOSSIBLE'] THEN-PAF
a. 7 ['YES' 'NO' 'OR-IX-IX' 'IMPOSSIBLE']
b. 5 ['YES' 'NO' **'+OR-IX-IX'** 'IMPOSSIBLE']
'I want you to sign four words and then four words again, namely: 'YES' 'NO' 'ADD' 'IMPOSSIBLE', and then 'YES' 'NO' 'OR-IX-IX' 'IMPOSSIBLE''. (LSF, 44, 71; 2 judgments)

[18] This might be because the disjunction is in the wrong position to allow for an alternative to be generated with a conjunctive meaning. This hypothesis is plausible, but dependent on a more detailed analysis of possible alternatives – the word *THE-TWO* could in fact appear in a post-nominal position and would yield the desired conjunctive meaning (44, 60); hence this expression should somehow not count as an alternative to the clause with $OR\text{-}IX_a\text{-}IX_b$. Note also that for the standard *OR* found between the

and is for this reason prohibited by some condition of economy. While we do not know why there should be such a difference between LSF *OR* and LSF *OR-IX*$_a$*-IX*$_b$, we already noted that some ASL disjunctions failed to get an exhaustive reading; it might be that the same effect is at work in LSF, but that our LSF informant doesn't accept idle instances of focus.

In sum, in all the examples discussed in this section, exhaustive focus on (standard) *OR* was marked in both languages by raised eyebrows and greater sign amplitude, accompanied with forward leans in ASL and head nods in LSF, and sometimes with longer hold time or speed acceleration in ASL. In both languages, a clear truth-conditional effect was seen when standard *OR* was embedded under *IF* clauses and under *BET*, as focus sufficed to trigger an exclusive reading.

3 Conclusions

Our data lead to several positive conclusions about focus in natural language.

1. First, despite the fact that many ASL constructions reported in Wilbur 2012 express focus by a combination of syntactic and prosodic means, when movement is inapplicable, sign modulations and non-manuals can suffice to express focus. The same result was obtained in LSF.

2. Second, in each language a given cluster of non-syntactic modifications has contrastive and exhaustive effects alike, depending on the context. Plausibly, then, it is no accident that contrastive and exhaustive focus can be expressed by the same means in spoken language – this result appears to hold of language in general, including sign languages.[19] It is certainly compatible with the view that focus signals the activation of alternatives, and that further material (contrastive elements present in the discourse, or a covert exhaustivity operator) is responsible for semantic differences between the two cases.

3. Third, the phonological realization of focus in both languages is of theoretical interest.

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disjuncts, one needs to posit either that a null conjunction counts as alternative (as this is a common way to form conjunction in LSF), or that the word *ADD* (which has a meaning akin to conjunction) does (44,58)).

[19] Interestingly, Katzir 2013 provides a purely semantic argument that suggests that the same notion of 'exclusion' is at work in contrastive and in exhaustive focus.

–increased amplitude, speed acceleration, longer hold times, and raised eyebrows were found in ASL and LSF alike (very systematically for raised eyebrows and forward leands/head nods);

–forward lean was found in our ASL but not in our LSF data; head nods were found in LSF (and might or might not have been part of 'forward leans' in ASL); and a couple of instances of shoulder raising were found in LSF but not in ASL.

Convergence between the two languages suggests that we are dealing with robust phenomena. By contrast, differences must be interpreted with great caution: they could be differences between two languages, or just between two signers – with the possibility that other ASL or LSF signers would not support the same generalizations.

As mentioned, in spoken language higher pitch, greater loudness and longer duration can be used to express focus. Longer duration is found in sign language as well. One might or might not want to equate greater sign amplitude with greater loudness or speed acceleration with higher pitch. But certainly greater loudness, pitch and sign amplitude, as well as speed acceleration, can be taken to instantiate Gussenhoven's 'effort code'. On the other hand, longer duration (in both modalities) and forward lean (in ASL) or head nods (in LSF) are not as clearly instances of 'greater effort'. A better generalization might be that the spoken and the signed modalities both make use of a 'salience code' whereby focused elements are *made more easily perceptible* (holding a sign longer and leaning towards the addressee to realize it are presumably ways to make a sign more easily perceptible).

4. Fourth, in ASL and LSF alike, raised eyebrows are a regular marker of focus – a standard result in the literature on ASL (Wilbur 2012, Dachkovsky and Sandler 2009). Future research should (i) compare this finding with the raised eyebrows found as co-speech gestures co-occurring with focus in Dohen 2005 and Dohen and Loevenbruck 2009, and possibly (ii) explore broader cognitive effects of raised eyebrows to determine whether and how they should be integrated to an 'effort' or 'salience' code.

Still, several questions remain for future research. First, one should try to replicate our findings with more consultants, and determine whether the differences we found between our ASL and our LSF data are differences between individual signers or between languages; similarly, one might use more sophisticated methods to assess the various manual and non-manual modifications studied here – a non-trivial undertaking

(see for instance Wilbur and Martínez 2002 on sign speed). Second, one should seek to tease apart the role of different markers, which were lumped together in the present study. Third, the case of exhaustive focus should be revisited to determine why in ASL and LSF alike 'standard' disjunction gives rise to clear exclusive readings, whereas other varieties of disjunction sometimes display a different behavior. Finally, it would be interesting to determine whether the head nods found in LSF are some kind of counterpart of the broader forward leans described in ASL.

References

Caponigro Ivano and Davidson Kathryn, 2011. Ask and tell as well: Clausal question-answer pairsin ASL. *Natural Language Semantics*, **19**(4): 323-371.

Chierchia Gennaro, Fox Danny and Spector Benjamin, 2012. The Grammatical View of Scalar Implicatures and the Relationship between Semantics and Pragmatics. In *Semantics: An International Handbook of Natural Language Meaning,* **3** : 2297-2332. Edited by Paul Portner, Claudia Maienborn, and Klaus von Heusinger. Berlin, NewYork: Mouton de Gruyter.

Dachkovsky, Svetlana and Sandler, Wendy: 2009, Visual Intonation in the Prosody of a Sign Language. *Language and Speech* 2009 52: 287 DOI: 10.1177/0023830909103175

Dohen Marion, 2005. *Deixis prosodique multisensorielle: Production et perception audiovisuelle de la Focalisation contrastive en français*. Ph.D. dissertation, Institut National Polytechnique de Grenoble.

Dohen Marion and Loevenbruck Hélène, 2009. Interaction of audition and vision for the perception of prosodic contrastive focus. *Language & Speech*, **52**(2-3) : 177-206.

Geurts Bart, 2011. *Quantity Implicatures*. Cambridge University Press.

Gussenhoven Carlos, 2001. *Intonation and biology*. In Jacobs, Haike & Wetzels, W.Leo (Eds.), Liber Amicorum Bernard Bichakjian. Maastricht: Shaker. 59-82.

Gussenhoven Carlos, 2004. *Phonology of Tone and Intonation*. Cambridge University Press.

Katz Jonah and Selkirk Elisabeth, 2011. Contrastive Focus vs. Discourse-New: Evidence from Phonetic Prominence in English. *Language* **87** (4) : 771-816.

Katzir Roni, 2013. A note on contrast. *Natural Language Semantics* **21** (4) : 333-343.

Rooth Mats, 1996. Focus. In Lappin, S., editor, *Handbook of Contemporary Semantic Theory*, pages 271–297. Blackwell, Oxford.

Schwarzschild, Roger: 1999, GIVENness, avoidF and other constraints on the placement of accent. *Natural Language Semantics* 7: 141–177.

Wilbur Ronnie B., 1999. Stress in ASL: Empirical Evidence and Linguistic Issues. *Language and Speech* **42** : 229–250.

Wilbur Ronnie B., 2012. Information structure. In Pfau, Roland, Markus Steinbach & Bencie Woll (eds.),*Sign language. An international handbook* (*HSK - Handbooks of linguistics and communication science*), 462-489. Berlin: Mouton de Gruyter.

Wilbur, R.B., & Martínez, A.M. (2002). Physical correlates of prosodic structure in American Sign Language. In M. Andronis, E. Debenport, A. Pycha & K. Yoshimura (Eds.), *Proceedings of the 38th annual meeting of the Chicago Linguistics Society* (pp.693–704). Chicago, IL: CLS.

Wilbur, Ronnie B. and Patschke Cynthia: 1998. Body Leans and the Marking of Contrast in American Sign Language. *Journal of Pragmatics* **30** : 275–303.