LRS and Welsh Negation

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1 A short introduction to LRS

LRS enables us to

1. use identities to account for concord phenomena (negative concord, multiple interrogatives).
2. provide a more local theory of semantic selection.
3. give a natural account of discontinuity phenomena in logical forms.

1.1 Ontology

(1) Appropriateness conditions for the sort *sign*:

sign	PHON	*phonology*
	SYNSEM	*synsem*
	LF	*lrs*

Note: The logical form of a sign is not its SYNSEM LOCAL CONTENT value; instead it is a direct property of the sign itself. The SYNSEM LOCAL CONTENT value only comprises the parts of the logical form that are necessary for semantic selection.

(2) Appropriateness conditions for the sort *lrs*:

lrs	TOP	*me*
	BOTTOM	*me*
	PARTS	*list(me)*

Intuitions:

- TOP: the term that is associated with the logical form of a complete phrase.
- BOTTOM: the maximal subtree in the term tree of a phrase that is in the scope of syntactically higher semantic operators within the same head projection.
- PARTS: all nodes of the term tree of the overall logical form that are contributed by this sign.

For ease of readability, we use a shorthand such that:

$\overline{\phi}$ gives the TOP value

$\underline{\phi}$ gives the BOTTOM value

$\phi[\psi_1, \ldots, \psi_n]$: the terms ψ_1, …, ψ_n are subterms of the term ϕ.

1.2 Lexical specifications of logical forms

In (3) we show the description of the logiscal form of *book* as given in its lexical entry:

(3) *book*: $\underline{\mathsf{book}'(x)}$ and $\textsc{top} = Qx[\phi]$

$$\begin{bmatrix} \textsc{top} & \begin{bmatrix} \textit{quantifier} \\ \textsc{var}\ x \end{bmatrix} \\ \textsc{bottom} & \mathsf{book}'(x) \\ \textsc{parts} & \left\langle x, \mathsf{book}'(x),\ \mathsf{book}' \right\rangle \end{bmatrix}$$

The BOTTOM value (the underlined term) is the predicate and its arguments. The TOP value is not fully specified. The PARTS list contains exactly all the subterms of the BOTTOM term. According to our specification, the TOP value is some quantifier that binds the variable x. Note that the quantifier is not introduced by the word *book*. As a consequence, it does not appear in the PARTS list but must, eventually, be introduced inside the head projection line of the noun.

(4) *some*: $\underline{\exists x}[\alpha \wedge \beta]$

$$\begin{bmatrix} \textsc{top} & \textit{me} \\ \textsc{bottom} & \exists x[\alpha \wedge \beta] \\ \textsc{parts} & \left\langle x,\ \exists x[\alpha \wedge \beta],\ [\alpha \wedge \beta] \right\rangle \end{bmatrix}$$

The quantifier is underlined, indicating that it is the BOT value. This term, the variable and the conjunction are also in the PARTS list. The metavariables α and β indicate that the two conjuncts are not themselves on the PARTS list.

(5) *everyone*: $\overline{\forall x}[\alpha[\underline{\mathsf{human}'(x)}] \rightarrow \beta]$

$$\begin{bmatrix} \textit{lrs} & \\ \textsc{top} & \boxed{1}\ \forall x[\alpha \rightarrow \beta] \\ \textsc{bot} & \boxed{2}\ \mathsf{human}'(x) \\ \textsc{parts} & \left\langle x,\ \boxed{1},\ \boxed{2},\ \mathsf{human}',\ [\alpha \rightarrow \beta] \right\rangle \end{bmatrix} \ \&\ \boxed{2} \triangleleft \alpha$$

The TOP value is overlined (the universal quantifier). The BOT value is the restriction to humans. The quantifier, all underlined subterms and the implication are in the PARTS list, but not the antecedent and the consequent of the implication (the metavariables α and β). With the expression $\alpha[\mathsf{human}'(x)]$ we indicate that the term $\mathsf{human}'(x)$ is a subterm of the term denoted by α.

(6) *read*: $\exists e[\phi[\underline{((\mathsf{read}'e)y)x}]$ and $\exists e.\phi \triangleleft \textsc{top}$

$$\begin{bmatrix} \textit{lrs} & \\ \textsc{top} & \boxed{1}\ \textit{me} \\ \textsc{bottom} & ((\mathsf{read}'e)y)x \\ \textsc{parts} & \langle e, x, y, \exists e\phi, ((\mathsf{read}'e)y)x, (\mathsf{read}'e)y, \mathsf{read}'e, \mathsf{read}' \rangle \end{bmatrix} \begin{array}{l} \&\ ((\mathsf{read}'e)y)x \triangleleft \phi \\ \&\ \exists e\phi \triangleleft \boxed{1} \end{array}$$

The BOTTOM value is the expected term. As all its subterms are specified, they occur in the PARTS list. The TOP value is not specified. However, there is an existential quantification (binding the variable e). The notation $\phi[((\mathsf{read}'e)y)x]$ states that the BOT value is a subterm of the term denoted by the metavariable ϕ. The additional constraint $\exists e.\phi \triangleleft \textsc{top}$ says that the existential quantification is a subterm of the TOP value. Note that neither ϕ nor the TOP value occur as elements of the PARTS list.

1.3 Principles

(7) The BOTTOM PRINCIPLE (BP):
In each *lrs*, the BOTTOM value is an element of the PARTS list and a component of the TOP value.

(8) The TOP PRINCIPLE (TP):

1. In every phrase, the TOP value of the non-head daughter is an element of its PARTS list.
2. In every utterance, every subterm of the TOP value of the utterance is an element of its PARTS list, and every element of the utterance's PARTS list is a subterm of the TOP value.

(9) SEMANTICS PRINCIPLE

In each *headed-phrase*,

1. the TOP value of the head and the mother are identical,
2. the BOTTOM value of the head and the mother are identical,[1]
3. the PARTS value contains exactly all elements of the PARTS values of the daughters,
4. the following conditions hold:
   (a) if the nonhead is a quantifier then its TOP value is of the form $Qx[\rho \circ \nu]$[2], the BOTTOM value of the head is a component of ρ, and the TOP values of both daughters are identical,
   (b) if the non-head is a quantified NP with a TOP value of the form $Qx[\rho \circ \nu]$, then the BOTTOM value of the head is a component of ν,
   (c) in a *head-marker-phrase*, the TOP value of the non-head is identical to the TOP value of the mother.
   (d) in a *head-adjunct-phrase*, the TOP value of the non-head is a component of the TOP value of the head, and
      i. if the non-head is an intersective modifier, then its TOP value is of the form $\alpha \wedge \beta$ and the BOTTOM value of the head is a component of β.
      ii. if the nonhead is a non-intersective modifier, then it is of the form $\alpha(\beta)$ and the BOTTOM value of the head is a component of β.
   (e) In a *head-filler-phrase*, the TOP value of the filler is a component of the TOP value of the head.

1.4 An Extensional Fragment

Quantifier Scope

(10) Every student read some book.

a. $\exists e \forall x[\mathsf{student}'(x) \rightarrow \exists y[\mathsf{book}'(y) \wedge \mathsf{read}'(e,x,y)]]$

b. $\forall x[\mathsf{student}'(x) \rightarrow \exists e \exists y[\mathsf{book}'(y) \wedge \mathsf{read}'(e,x,y)]]$

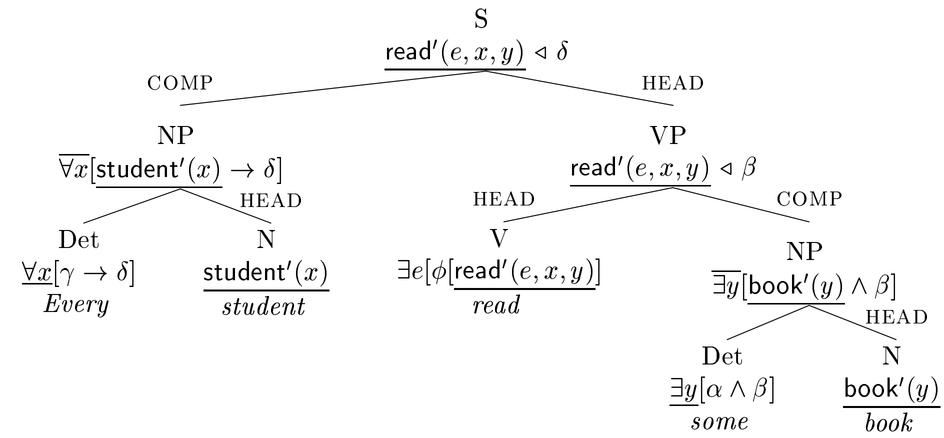
c. $\forall x[\mathsf{student}'(x) \rightarrow \exists y[\mathsf{book}'(y) \wedge \exists e[\mathsf{read}'(e,x,y)]]]$

d. $\exists e \exists y[\mathsf{book}'(y) \wedge \forall x[\mathsf{student}'(x) \rightarrow \mathsf{read}'(e,x,y)]]$

e. $\exists y[\mathsf{book}'(y) \wedge \exists e \forall x[\mathsf{student}'(x) \rightarrow \mathsf{read}'(e,x,y)]]$

f. $\exists y[\mathsf{book}'(y) \wedge \forall x[\mathsf{student}'(x) \rightarrow \exists e[\mathsf{read}'(e,x,y)]]]$

(11)



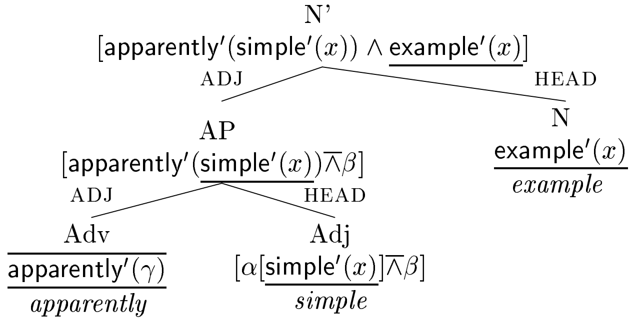
[1]Here we are assuming that quantified NPs are nominal projections.

[2]$Qx[\rho \circ \nu]$ is shorthand for the description $\left[\begin{array}{ll} \multicolumn{2}{l}{\textit{quantifier}} \\ \text{VAR} & \textit{var} \\ \text{SCOPE} & \left[\begin{array}{ll} \multicolumn{2}{l}{\textit{l-const}} \\ \text{ARG1} & \rho \\ \text{ARG2} & \nu \end{array}\right] \end{array}\right]$.

Recursive Modification

(12) (an) apparently simple example
$\mathsf{apparently}'(\mathsf{simple}'(x)) \wedge \mathsf{example}'(x)$

(13) Derivation:



2 Collocations and Polarity

(14) "The defining feature of a lexical item, by which such an item is recognized, is its pattern of co-occurrence with other items, that is its *collocational* behaviour. A lexical item is recognized as different from other lexical items because its total pattern of collocation is unique." (Butler, 1985, p. 130)

(15) a. Keiner hat einen Moment gefackelt, bevor er ins Wasser gesprungen ist.
nobody has a moment dithered before he into the water jumped has
'Nobody dithered a moment before jumping into the water.'

b. ? Keiner hat gefackelt, bevor er ins Wasser gesprungen ist.
Nobody has dithered before ... 'Nobody dithered before ...'

c. *? Peter hat einen Moment gefackelt, bevor ...
Peter has a moment dithered before ... 'Peter dithered a moment before ...'

d. * Peter hat gefackelt, bevor ...
Peter has dithered before ... 'Peter dithered before ...'

Following the insights of other frameworks, we introduce the attribute COLL at the level of *sign*. The value of COLL is a list, which is empty for non-lexical signs. A lexical sign has exactly one element in its COLL value: the root sign of the utterance in which it occurs. This is enforced by the COLL PRINCIPLE, which can be easily formalized in RSRL (Richter et al., 1999; Richter, 2000).

(16) The COLL PRINCIPLE (Sailer, 2000)

$$\boxed{1}\big[\textit{sign}\big] \Rightarrow \left(\begin{array}{l}\mathbf{A}\boxed{2}\ \mathbf{A}\boxed{3}\\ \left(\begin{array}{l}\texttt{dominate}(\boxed{1},\boxed{2})\\ \&\ \ \boxed{2}\big[\textsc{coll}\ \langle\boxed{3}\rangle\big]\end{array}\right) \Rightarrow \texttt{dominate}(\boxed{3},\boxed{1})\end{array}\right)$$

(17) A representational reformulation of some entailment notions:

entailment classification	example	lf characterization
antimorphic	*nicht* (*not*)	$\neg[\ldots\phi\ldots]$
anti-additive	*niemand* (*nobody*)	$\neg(\ldots)\exists[\ldots\phi\ldots]$
anti-multiplicative	*nicht jeder* (*not everybody*)	$\neg\forall[\ldots\phi\ldots]$
downward entailing	*wenige* (*few*)	$\neg\mathsf{many}'[\ldots\phi\ldots]$

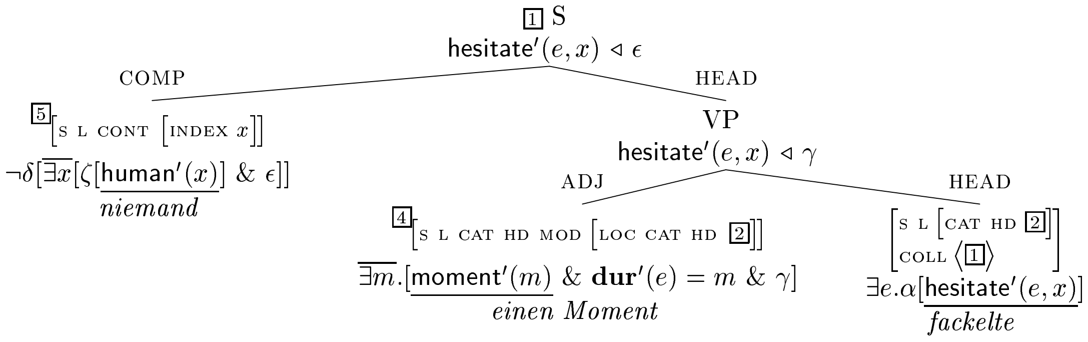


Figure 1: The analysis of *(dass) niemand einen Moment fackelte* (*(that) nobody dithered a moment*)

(18) Sketch of the lexical entry of *fackeln*:

$$\begin{bmatrix} \textit{word} \\ \text{PHON } \left\langle \textit{fackeln} \right\rangle \\ \text{SYNS LOC} \begin{bmatrix} \text{CAT HEAD } \boxed{2}\ \textit{verb} \\ \text{CONTENT} \begin{bmatrix} \text{INDEX } e \\ \text{MAIN } \boxed{3}\ \mathsf{hesitate}'(e,x) \end{bmatrix} \end{bmatrix} \\ \text{LF} \begin{bmatrix} \text{TOP } & me \\ \text{BOT } & \boxed{3} \\ \text{PARTS } & \left\langle e,\ x,\ \mathsf{hesitate}',\ \mathsf{hesitate}'(e),\ \boxed{3},\ \exists e.\alpha \right\rangle \end{bmatrix} \\ \text{COLL} \left\langle \boxed{1} \right\rangle \end{bmatrix}$$

$$\textbf{and} \quad \boxed{3} \triangleleft \alpha$$

$$\textbf{and} \quad \mathbf{E}\boxed{4} \left(\begin{array}{l} \texttt{dominates}(\boxed{1},\boxed{4}) \\ \boxed{4} \begin{bmatrix} \text{SYNS LOC} & \left[\text{CAT HEAD MOD} \left[\text{LOC CAT HEAD } \boxed{2}\right]\right] \\ \text{LF} & \left[\text{PARTS} \left\langle \ldots,\ \mathbf{dur}'(e),\ \ldots \right\rangle\right] \end{bmatrix} \end{array} \right)$$

$$\textbf{and} \quad \mathbf{E}\boxed{5} \left(\begin{array}{l} \texttt{dominates}(\boxed{1},\boxed{5}) \\ \boxed{5} \left[\text{LF} \left[\text{PARTS} \left\langle \ldots,\ \neg\beta,\ \ldots \right\rangle\right]\right] \\ \textbf{and } \boxed{3} \triangleleft \beta \end{array} \right)$$

3 Basic Welsh Data

The Welsh negation system is rich in interesting observations, but makes it hard to identify a set of core data for which a "simple" analysis should be sought. The data in this talk stem from Borsley (2001), Jones (2000) and other papers of the same authors.

3.1 Verbs with no negated form

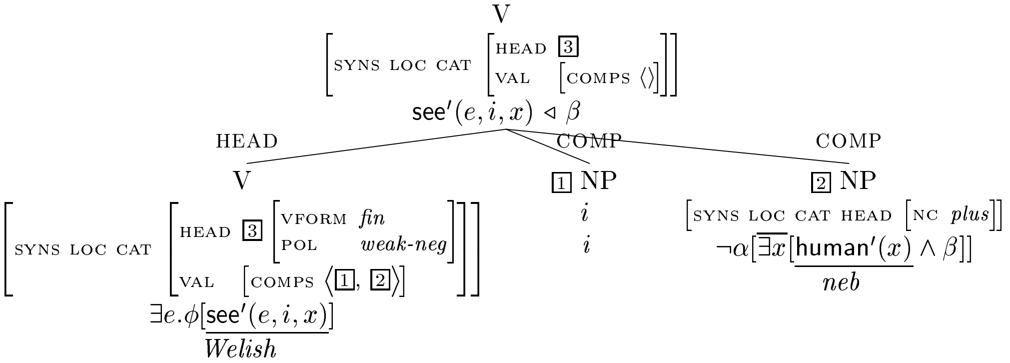
(19) a. Affirmative: Welish i Gwyn.
saw-1SG I Gwyn 'I saw Gwyn.'

b. Negated (n-word): Welish i neb.
saw-1SG I no one 'I saw no one.'

c. Negated (*dim*): Fydd Gwyn ddim yn cysgu.
will-be Gwyn NEG PROG sleep 'Gwyn will not be sleeping.'

Semantic properties: "Normal verbs" are not semantically negative. *dim* (*not*), *neb* (*no one*), etc introduce a negation.

(20) The syntactic analysis of (19b) in Borsley (2001), augmented by a simple LRS analysis:



There is independent evidence for the assumption that both *dim* and n-words introduce a negation operator into the logical form of the sentence:

(21) Alla' i ddim gneud dim byd.
can-1SG I NEG do nothing

'I can't do anything.' (single negation, SN)
'I can't do nothing.' (double negation, DN)

In the case of a DN reading, *dim* and the n-word contribute distinct negations, i.e., distinct nodes, to the overall term tree. In the case of the SN reading, they contribute identical negations, i.e., the same node, to the overall term tree.

In Polish an SN reading is the only possibility for similar sentences. In German, only a DN reading arises. In French if an n-word and the negative adverb *pas* co-occur, the DN reading is strongly favored, whereas both readings are possible if two n-words co-occur.

3.2 Verbs with polarity dependent forms

(22) PPI form of the copula:

a. Affirmative: Mae o 'n darllen.
is he PROG read 'He is reading.'

b. Negated (*ddim*): * Mae o ddim yn darllen.
is he NEG PROG read

c. Negated (n-word): * Mae neb yn yr ystafell.
is no one in the room

(23) NPI form of the copula:

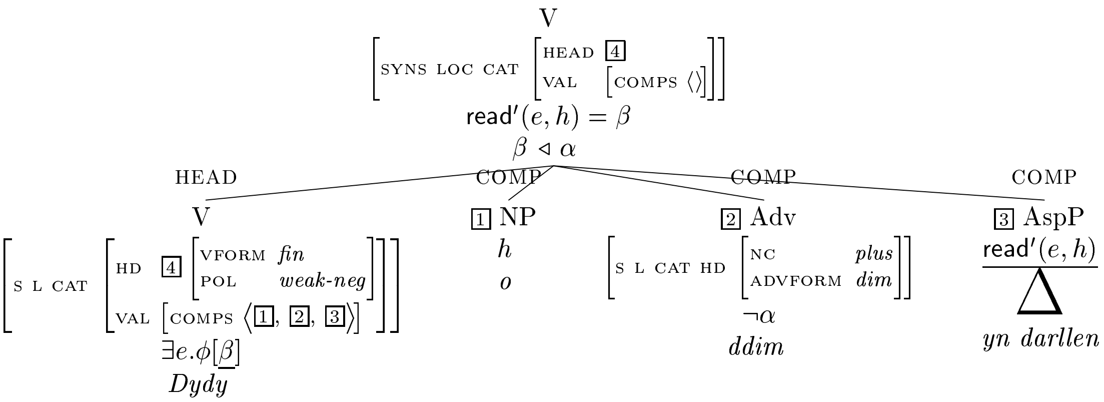
a. Affirmative: * Dydy o 'n darllen.
NEG-is he PROG read

b. Negated (*ddim*): Dydy o ddim yn darllen.
NEG-is he NEG PROG read 'He isn't reading.'

c. Negated (n-word): Does neb yn yr ystafell.
NEG-is no one in the room 'There is no one in the room.'

None of the sentences in (23) has a double negation reading. We assumed above that *dim* and *neb* introduce a negation. Therefore, it is not necessary to stipulate that *dydy* introduces a negation as well.

(24) The syntactic analysis of (23b) in Borsley (2001), augmented by a simple LRS analysis:



Borsley (2001) assumes the following principle:

(25) The Negative Dependent Constraint (NDC):

$$\begin{bmatrix} \textit{word} \\ \text{s l cat hd} \begin{bmatrix}\text{vform} & \textit{fin}\\ \text{pol} & \textit{weak-neg}\end{bmatrix}\end{bmatrix} \Rightarrow \begin{bmatrix}\text{s l cat val comps } \left\langle \ldots, \begin{bmatrix}\text{loc cat hd nc } \textit{plus}\end{bmatrix}, \ldots\right\rangle\end{bmatrix}$$

Alternatively, we could formulate the NDC as a general principle on the logical form of finite verbs.

(26) The Finiteness Polarity Principle (FPP):

For every finite, phrasal verbal projection v in Welsh:
if the top value of v contains a negation that has scope over the main value of v, then this very negation must be an element of the parts list of v.

In RSRL:

$$\mathbf{A}\boxed{1}\;\mathbf{A}\boxed{2}\;\mathbf{A}\boxed{3}\;\mathbf{A}\boxed{4}\left(\left(\begin{array}{l}\begin{bmatrix}\text{syns loc}\begin{bmatrix}\text{cat head}\begin{bmatrix}\textit{verb}\\ \text{vform } \textit{fin}\end{bmatrix}\\ \text{cont main } \boxed{1}\end{bmatrix}\\ \text{lf}\begin{bmatrix}\text{top} & \boxed{2}\\ \text{parts} & \boxed{3}\end{bmatrix}\end{bmatrix}\\ \& \ \boxed{4}\begin{bmatrix}\textit{negation}\end{bmatrix}\\ \& \ \boxed{4} \lhd \boxed{2}\\ \& \ \boxed{1} \lhd \boxed{4}\end{array}\right) \Rightarrow \texttt{member}(\boxed{4},\boxed{3})\right)$$

(27) Sketch of the lexical entry of *dydy*:

$$\begin{bmatrix}\text{phon} & \langle \textit{dydy}\rangle\\ \text{s l cat} & \begin{bmatrix}\text{hd} & \begin{bmatrix}\text{vform} & \textit{fin}\\ (\text{pol} & \textit{weak-neg})\end{bmatrix}\\ \text{val} & \begin{bmatrix}\text{comps } \boxed{1}\oplus\left\langle\boxed{2}\begin{bmatrix}\text{l cat val comps } \boxed{1}\end{bmatrix}\right\rangle\end{bmatrix}\end{bmatrix}\\ \text{lf} & \begin{bmatrix}\text{top} & \boxed{5}\\ \text{bot} & \beta\\ \text{parts} & \langle e, \exists e.\phi\rangle\end{bmatrix}\\ \text{coll} & \langle\boxed{3}\rangle\end{bmatrix} \ \& \left(\begin{array}{l}\boxed{4}\begin{bmatrix}\textit{negation}\end{bmatrix}\\ \& \ \beta \lhd \boxed{4}\\ \& \ \boxed{4}\lhd\boxed{5}\end{array}\right)$$

Borsley assumes that adverbs in the immediate post-subject position are complements, but adverbs that come later in a clause are not. The complement requirement in the NDC or the FPP immediately account for the following contrasts:

(28) a. * Welish i fo nunlla.
saw-1SG I him nowhere

b. Welish i ddim ohono fo nunlla.
saw-1SG I NEG of-3SGM him nowhere ‘I didn’t see him anywhere.’

c. Dydy Mair byth yn gweithio.
NEG-is Mair never PROG work 'Mair never works.'

In its present formulation the FPP predicts that while a DN reading is possible if there are two negative dependents, only an SN reading is allowed if there is a negative dependent and a negative adverb, as in (28b).

An alternative formulation is:

(29) The FPP (alternative version):

$$\mathbf{E}\boxed{1}\,\mathbf{E}\boxed{2}\,\mathbf{E}\boxed{4}\left(\begin{array}{l}\begin{bmatrix}\text{SYNS LOC}\begin{bmatrix}\text{CAT HEAD}\begin{bmatrix}\textit{verb}\\ \text{VFORM}\ \textit{fin}\end{bmatrix}\\ \text{CONT MAIN}\ \boxed{1}\end{bmatrix}\\ \text{LF}\begin{bmatrix}\text{TOP}\ \boxed{2}\end{bmatrix}\end{bmatrix}\\ \&\ \boxed{4}\begin{bmatrix}\textit{negation}\end{bmatrix}\\ \&\ \boxed{4}\lhd\boxed{2}\\ \&\ \boxed{1}\lhd\boxed{4}\end{array}\right)\Rightarrow\mathbf{E}\boxed{1}\,\mathbf{E}\boxed{2}\,\mathbf{E}\boxed{3}\,\mathbf{E}\boxed{4}\left(\begin{array}{l}\begin{bmatrix}\text{SYNS LOC}\begin{bmatrix}\text{CONT MAIN}\ \boxed{1}\end{bmatrix}\\ \text{LF}\begin{bmatrix}\text{TOP}\ \boxed{2}\\ \text{PARTS}\ \boxed{3}\end{bmatrix}\end{bmatrix}\\ \&\ \boxed{4}\begin{bmatrix}\textit{negation}\end{bmatrix}\\ \&\ \boxed{4}\lhd\boxed{2}\\ \&\ \boxed{1}\lhd\boxed{4}\\ \&\ \texttt{member}(\boxed{4},\boxed{3})\end{array}\right)$$

We can eliminate the attribute POL of Borsley (2001). The attribute NC, however, seems to be needed since it accounts for purely syntactic phenomena (Borsley's *Neb dim* constraint and *Dim* NP constraint).

The TOP value of LRS allows us to account for the distributional differences between negated and non-negated verbs and at the same time we do not need to stipulate a lexical ambiguity for verbs that do not exhibit negation-sensitive forms. The flexibility of the system can be illustrated with a characterization of the different forms of the copula:

- *dydy*: not negative; requires a negative dependent
- *mae*: no negation in the PARTS list; and negation is explicitly excluded from the expression in TOP.
- *sa*: negative; does not require a negative dependent:

(30) Sa/So/Smo i 'n gweithio heno.
NEG-be-PRES I PROG work tonight 'I am not working tonight.'

$$\begin{bmatrix}\text{PHON} & \langle \textit{sa}\rangle\\ \text{S L CAT} & \begin{bmatrix}\text{HD}\ \boxed{4}\begin{bmatrix}\text{VFORM} & \textit{fin}\\ (\text{POL} & \textit{strong-neg})\end{bmatrix}\\ \text{VAL}\begin{bmatrix}\text{COMPS}\ \boxed{1}\oplus\left\langle\boxed{2}\begin{bmatrix}\text{L CAT VAL COMPS}\ \boxed{1}\end{bmatrix}\right\rangle\end{bmatrix}\end{bmatrix}\\ \text{LF} & \begin{bmatrix}\text{TOP} & \boxed{5}\\ \text{BOT} & \beta\\ \text{PARTS} & \left\langle e, \exists e.\phi,\ \neg\gamma\right\rangle\end{bmatrix}\end{bmatrix}\begin{array}{l}\&\ \beta\lhd\phi\\ \&\ \beta\lhd\gamma\end{array}$$

Problems with a semantic formulation of the NDC It is a welcome effect of the NDC that a negation that is embedded in a complement does not suffice to satisfy the collocational requirements of *dydy*, even if it has semantic scope over the verb.

(31) a. * Doedd 'na gar neb ar y ffordd.
NEG-was there car no one on the road

b. Doedd 'na 'm gar neb ar y ffordd.
NEG-was there NEG car no one on the road 'There was no one's car on the road.'

Note that the same pattern occurs with verbs that lack a specific negative form:

(32) a. * Welish i gar neb ar y fordd.
saw-1SG I car no one on the road

b. Welish i 'm gar neb ar y fordd.
saw-1SG I car NEG no one on the road 'I saw no one's car on the road.'

$\neg\exists x\exists y\ [\mathsf{human}'(x)\wedge\mathsf{car}'(y)\wedge\mathsf{own}'(x,y)\wedge\mathsf{see}'(e,i,y)]$

These data is not captured by the NDC either.

3.3 Infinitivals

Negative non-finite subordinate clauses contain the verb *peidio*:

(33) a. (Mi) geisiodd Gwyn ateb y cwestiwn.
PRT tried Gwyn answer the question 'Gwyn tried to answer the question.'

b. (Mi) geisiodd Gwyn beidio (ag) ateb y cwestiwn.
PRT tried Gwyn NEG with answer the question 'Gwyn tried to answer the question.'

Dim and n-words may only occur if *peidio* is present.

(34) a. (Mi) geisiodd Gwyn beidio (â) newid dim.
PRT tried Gwyn NEG with change NEG 'Gwyn tried not to change (at all).'

b. * (Mi) geisiodd Gwyn newid dim.
PRT tried Gwyn change NEG

(35) a. (Mi) geisiodd Gwyn beidio (â) gweld neb.
PRT tried Gwyn NEG with see no one 'Gwyn tried to see no one.'

b. * (Mi) geisiodd Gwyn gweld neb.
PRT tried Gwyn see no one 'Gwyn tried to see no one.'

In these examples the n-words do not change in form, position or function. Therefore we do not assume that they are different from n-words that occur in finite sentences. Furthermore the pattern seems to apply to all verbs. This suggests that we are observing a systematic property of non-finite verbs in Welsh. We formulate the following principle for Welsh:

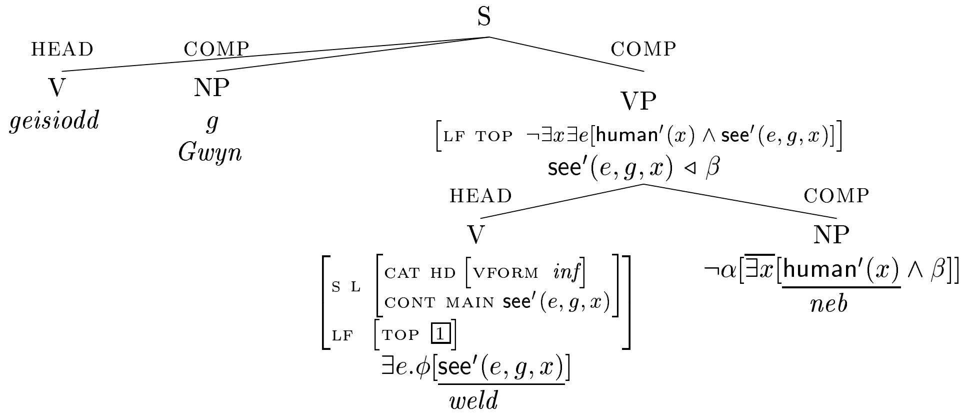
(36) NON-FINITENESS POLARITY PRINCIPLE (NFPP):

For every non-finite verb v in Welsh:
The TOP value of v does not contain a negation that has scope over the MAIN value of v.

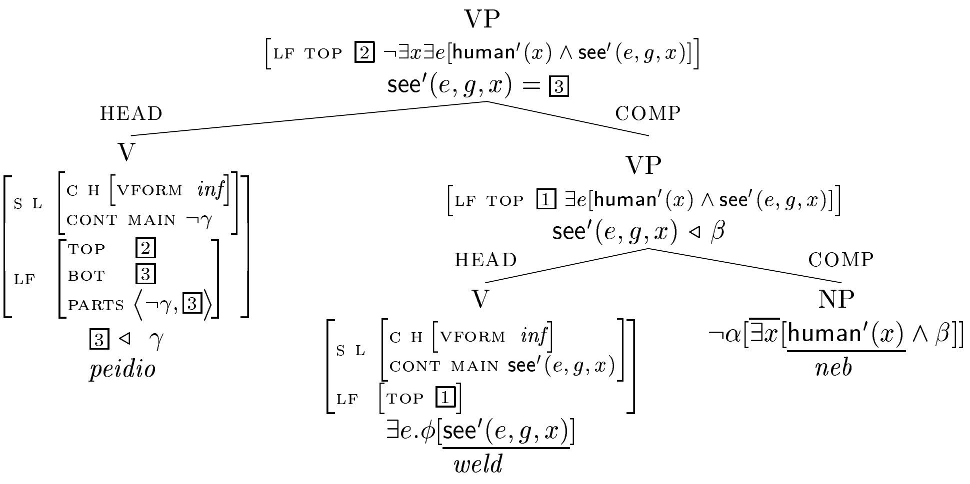
In RSRL:

$$\left[\text{S L CAT HD}\ \begin{bmatrix} \textit{verb} \\ \text{VFORM}\ \textit{inf}\ \textbf{or}\ \textit{imp} \end{bmatrix}\right] \Rightarrow \mathbf{E}\boxed{1}\ \mathbf{E}\boxed{2}\ \mathbf{not}\ \mathbf{E}\boxed{3} \left(\begin{array}{l} \begin{bmatrix} \text{S L CONT}\ [\text{MAIN}\ \boxed{1}] \\ \text{LF}\ [\text{TOP}\ \boxed{2}] \end{bmatrix} \\ \&\ \boxed{3}[\textit{negation}] \\ \&\ \boxed{3} \triangleleft \boxed{2} \\ \&\ \boxed{1} \triangleleft \boxed{3} \end{array} \right)$$

(37) The hypothetical structure of the ungrammatical sentence in (35b):



(38) Structure of the non-finite VP in (35a):



This analysis presupposes that a negation that is introduced within a clause may not take scope outside of it.

4 Further Data

So far, we have not used the collocation component of the grammar in our account of the Welsh data. This component is, however, needed to capture more subtle data.

Borsley (2001) notes that *byth* and *erioed* (*never*) do not give rise to double negation readings and have special affirmative uses.

(39) Dydy Mair byth yn gweithio.
NEG-is Mair never PROG work 'Mair never works.'

(40) Sketch of the lexical entry of negative *byth*:

$$\boxed{0}\begin{bmatrix} \text{S L} & \begin{bmatrix} \text{CAT} & [\text{HD } \textit{adverb}] \\ \text{CONT} & \begin{bmatrix} \text{INDEX} & t \\ \text{MAIN} & \boxed{1}\ \mathsf{time}'(t) \end{bmatrix} \end{bmatrix} \\ \text{LF} & \begin{bmatrix} \text{TOP} & \boxed{2}\ \exists t[\alpha \wedge \beta] \\ \text{BOT} & \boxed{1} \\ \text{PARTS} & \langle \boxed{1}, \boxed{2}, t, [\alpha \wedge \beta], \neg\gamma \rangle \end{bmatrix} \\ \text{COLL} & \langle \boxed{3} \rangle \end{bmatrix} \begin{array}{l} \& \boxed{1} \triangleleft \alpha \\ \& \boxed{2} \triangleleft \gamma \end{array}$$

& $\boxed{3}$ dominates a sign $\boxed{4}$ which is the smallest complete V projection that dominates $\boxed{0}$ such that:

if $\boxed{4}$ dominates another sign $\boxed{5}$ ($\boxed{5} \neq \boxed{0}$)
that has a negation on its PARTS list which has scope over the MAIN value of $\boxed{4}$,

then $\boxed{4}$ dominates a sign $\boxed{6}$ ($\boxed{6} \neq \boxed{0}$)
such that $\neg\gamma$ is on its PARTS list.

Note that negative *byth* can occur as the only n-word in a sentence containing *dydy*.

(41) Ma' Sioned yn gweithio yn y llyfrgell byth.
is Sioned PROG work in the library ever 'Sioned still works in the library.'

(42) Sketch of the lexical entry of affirmative *byth*:

$$\boxed{0}\begin{bmatrix} \text{S L} & \begin{bmatrix} \text{CAT} & \begin{bmatrix}\text{HD} & \textit{adverb}\end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{INDEX} & t \\ \text{MAIN} & \boxed{1}\ \mathsf{time}'(t) \end{bmatrix} \end{bmatrix} \\ \text{LF} & \begin{bmatrix} \text{TOP} & \boxed{2}\ \exists t[\alpha \wedge \beta] \\ \text{BOT} & \boxed{1} \\ \text{PARTS} & \left\langle \boxed{1}, \boxed{2}, t, [\alpha \wedge \beta] \right\rangle \end{bmatrix} \\ \text{COLL} & \left\langle \boxed{3} \right\rangle \end{bmatrix} \ \&\ \boxed{1} \triangleleft \alpha$$

& $\boxed{2}$ is not in the scope of a negation in the TOP value of $\boxed{3}$.

References

Borsley, Robert D. (2001). Syntax and Semantics of Welsh Negation. Handout to a talk given at the *5th CLAIRE Workshop*, Tübingen, December 2001.

Butler, Christopher S. (1985). *Systemic Lingistics: Theory and Application*. Batsford, London.

Jones, Bob Morris (2000). The negative word *dim* in informal Welsh. Unpublished paper, University of Wales Aberystwyth. URL: `http://users.aber.ac.uk/bmj/Ymchwil/Neg/negation0.html`.

Richter, Frank (2000). A Mathematical Formalism for Linguistic Theories with an Application in Head-Driven Phrase Structure Grammar. Dissertation, Universität Tübingen, Version of April 28th, 2000.

Richter, Frank, Sailer, Manfred, and Penn, Gerald (1999). A Formal Interpretation of Relations and Quantification in HPSG. In G. Bouma, E. Hinrichs, G.-J. M. Kruijff, and R. T. Oehrle (Eds.), *Constraints and Resources in Natural Language Syntax and Semantics*, pp. 281–298. CSLI Publications.

Sailer, Manfred (2000). Combinatorial Semantics and Idiomatic Expressions in Head-Driven Phrase Structure Grammar. Dissertation, Eberhard-Karls-Universität Tübingen, Version of June 29th, 2000.