Prosodic Features with Semantic Interpretation[1]

Irurtzun, A. & Etxeberria, U.
EHU-U. BASQUE COUNTRY & LEHIA
{fvbirsva, fvbetotu}@vc.ehu.es

Abstract

The ambiguity between the distributive and the collective reading of a sentence with a universal quantifier in subject position and an existential quantifier in direct object position disappears when the quantifier in the QP subject is focused. This focalization effect holds in a number of natural languages. After accounting for the Spanish data with experimental study this paper offers an explanation for them based on the semantic composition of these QPs and their plural denotation in terms of contextual Covers (Schwarzschild (1996), Brisson (1998)), and an analysis of focus semantics in terms of 'Alternative Semantics' (Rooth (1985, 1992)).

1 Introduction; presentation of the data

The sentence in (1a), with the Quantifier Phrase (QP) 'todos-N' (all N) in subject position and the QP 'un-N' (one N) in direct object position, can obtain two different interpretations derived from the scopes that the quantifiers get: (i) DISTRIBUTIVE (each member of the set of 'chicas' (girls) is the agent of an event of singing a song (specific or non-specific)) and (ii) COLLECTIVE (all the set of 'chicas' is the only agent of a single event of singing).

    (1)   a. Todas las   chicas cantaron   una canción.
               all D-pl girl-pl sing-past one song
               'All the girls sang one song.'
                     √ DISTRIBUTIVE
                     √ COLLECTIVE

Contrary to (1a), in the sentence (1b), the focalization of the Quantifier (Q) of the QP subject removes the collective reading leaving as the only possibility the distributive interpretation[2].

    (1)   b. [TODAS]$_F$ las   chicas cantaron una canción.
               all   D-pl girl-pl sing-past one song
               'ALL the girls sang one song.'
                     √ DISTRIBUTIVE
                     * COLLECTIVE[3]

[2] This phenomenon is also observed in typologically and genetically non-related languages like Basque, English or French (see Etxeberria & Irurtzun (2004)).

2 Experiments

With regards to the data in (1a-b), we conducted a production and perception experiment in order to fix the exact degree of emphasis and change in the interpretation of both examples. For the production experiment we prepared a questionnaire with a real-like conversation where the minimal pair of sentences of (1a) and (1b) with the same linearization (#todas^las^chicas^cantaron^una^cancion#) were inserted in disambiguating contexts. Ten native speakers of the variety of Spanish spoken in the Basque Country were required to read the target text in a real-like way and their productions were recorded in a DAT recorder and analysed with the PitchWorks software developed by SciconR&D (version 8.3). The results of the production experiment show a clear systematic pattern whereby in a unambiguously collective reading (see Fig. 1) the nuclear stress appears in the N 'canción' whereas the Q 'todas' is associated to a prenuclear pitch accent whose F0 peak is delayed or late aligned into the accented syllable ('to-'); thus, it is analysable with the L*+H autosegmental label proposed by Face (2002) for Madrid Spanish[4]. In these sentences, the F0 reaches the highest point in the N 'chicas' of the QP subject. On the other hand, the sentence in the unambiguously distributive environment (Fig 2) was systematically uttered with an early focus on the Q (something intentionally triggered by the experimental design) and with a strict alignment of the peak within the accented syllable followed by a sharp fall. This tune is followed by a postfocal pitch compression up to the final noun[5]. Again, the tune in the focalized Q could be accounted for with the L+H* autosegmental label proposed by Face (2002) as one of the strategies to denote early focus in Madrid Spanish; however, we will remain agnostic as to referring the real label for these pitch accents.
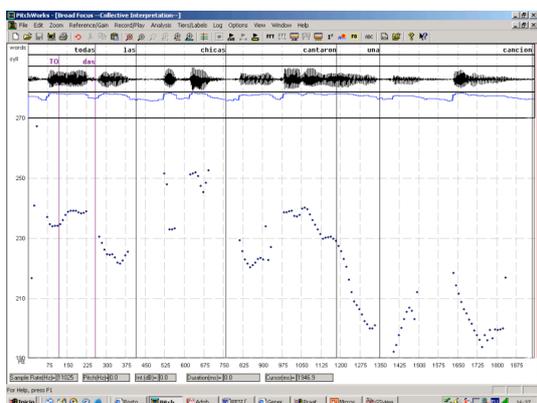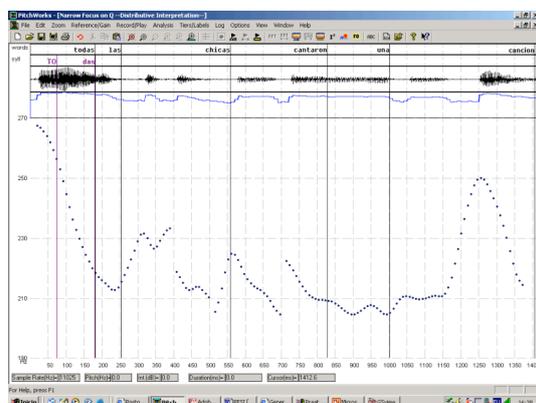
Fig 1, collective interpretation	Fig 2, distributive interpretation

Having fixed the tune structure of the sentences of (1a-b), we designed a perception experiment where 10 other subjects had to give semantic interpretation judgements when hearing the target real-like utterances of the production experiment (filler sentences were introduced between the actual targets). The task was designed so that when hearing a sentence the subjects had to choose among a set of five possible options for the context where the sentence could have been uttered. The contexts were the following: (1) Collective reading, (2) Distributive reading, (3) Equally plausibly 1 or 2, (4) Potentially both 1 and 2, but preference for 1, and (5) Potentially both 1 and 2, but preference for 2. The results, surprisingly enough,

---

[3] The insertion of a collectivizer adverb like 'together' would make a Spanish sentence like (1b) pragmatically odd. On the other hand, in German, a language that does not remove the collective interpretation in sentences like (1b) (despite it is the preferred one), the insertion of a collectivizer adverb forces a necessarily collective interpretation (thanks to Angelika Kratzer for pointing this out to us).

[4] Besides this compatibility, it is very difficult to fix the actual label for the prenuclear accent since the lexical entry for the universal quantifier in Spanish is just disyllabic, and furthermore it has two stops (and these segments have the inherent suprasegmental property of rising the F0 (see Silverman (1986) for discussion)).

[5] The sharp rise in F0 in this word is due to emphasis indirectly related to the focus structure.

showed a fair agreement in the interpretation of the utterances: whereas the sentence of (1a) was interpreted as 3 (100% of agreement among subjects), the sentence in (1b) was unambiguously interpreted as 2, the distributive reading, by 80% of the subjects and as 5 (preference for the distributive) by the other 20%.
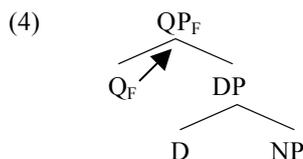
3 Focal structure

For a correct characterization of the data in (1a-b) it is necessary to specify which focal structure is responsible for the different denotations of these two sentences. The possible focal structures of the QP in examples (2a-e) [6] show that the loss of the collective interpretation only occurs when the focused element is just the quantifier.

> (2)   a. [Todas las chicas]$_F$ cantaron una canción.
>   √ DISTRIBUTIVE
>   √ COLLECTIVE
>   b. Todas las [chicas]$_F$ cantaron una canción.
>   √ DISTRIBUTIVE
>   √ COLLECTIVE
>   c. Todas [las chicas]$_F$ cantaron una canción.
>   √ DISTRIBUTIVE
>   √ COLLECTIVE
>   d. Todas [las]$_F$ chicas cantaron una canción.
>   √ DISTRIBUTIVE
>   √ COLLECTIVE
>   e. [Todas]$_F$ las chicas cantaron una canción. (=1b)
>   √ DISTRIBUTIVE
>   * COLLECTIVE

We will assume (following Sánchez (1991)) that the basic structure of the Spanish QP 'todas las chicas' is the one in (3a) (or the bare phrase structure in (3b), following Chomsky (1994))[7]:

> (3a)   QP
>   /   \
>   Q   DP
>   /   \
>   D   NP
>
> (3b)   todas
>   /   \
>   todas   las
>   /   \
>   las   chicas

According to this phrase structure, a focal structure theory based on the Nuclear Stress Rule (NSR) and focus projection (*e.g.* Selkirk (1995)) predicts that the [+F] featured Q will be able to project its [+F] feature up to the maximal projection.

> (4)   QP$_F$
>   ↗   \
>   Q$_F$ DP
>   /   \
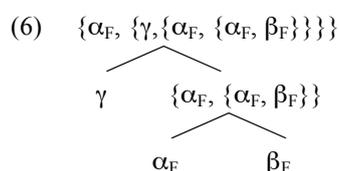>   D   NP

---

[6] We will not consider the discontinuous focal structures. See Irurtzun (2004) for an analysis.
[7] This structure is analogous to the structure of the strong Basque QPs. See Etxeberria (2004) for a detailed discussion of the facts.

Notwithstanding, the adoption of such a theory would make it impossible to explain the data in (2a) and (2b) without the stipulation of a projection axiom so that the [+F] feature in (4) does not project to the maximal projection it heads. As a consequence, and in order to avoid this problem we will assume the Derivational Approach to the Focus Structure proposed in Irurtzun (2003). According to this theory, the [+F] feature is potentially assigned to distinct tokens of the numeration and 'projected' derivationally by means of Merge. In other words, when an element α and an element β undergo Merge both of them bearing the [+F] feature, the new syntactic/set theoretic object (following Chomsky (1994)) will also bear the [+F] feature.

(5) $\{\alpha_F, \{\alpha_F, \beta_F\}\}$

$\alpha_F \qquad \beta_F$
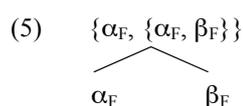
In that way, when an element/set of [+F] features is merged with an element that does not bear the [+F] feature itself, the new syntactic/set theoretic object will not be a set that contains only [+F] featured elements and the focus of the sentence will be the set that contains just [+F] featured material (*i.e.*, $\{\alpha_F, \{\alpha_F, \beta_F\}\}$):

(6) $\{\alpha_F, \{\gamma, \{\alpha_F, \{\alpha_F, \beta_F\}\}\}\}$

$\gamma \qquad \{\alpha_F, \{\alpha_F, \beta_F\}\}$

$\alpha_F \qquad \beta_F$

The adoption of this system makes it possible to construct the different F-structure possibilities depending directly on the elements selected by the numeration.

In the case at hand (1b), it allows us to fix the focus structure in narrow syntax by the insertion of just one [+F] featured token (the Q 'todas'). This will allow us to predict the semantic type of the focus ($<<e,t>,<<e,t>, t>>$) since the focus structure will be the result of the bottom-up syntactic composition (in the case of (1b) it will be trivial since the only element entering the derivation with a [+F] feature will be the Q 'todas' and accordingly, that will mark the focus structure and its semantic type). We will take again the issue of the semantic type when we talk about the focal alternatives in section 5.

4 Pluralities and Maximality

The analysis we want to put forward for sentences like (1b) is based on the plural denotation of the NPs, and the semantic contribution of the [+F] quantifier.

4.1 Pluralities

According to Schwarzschild (1996) or Brisson (1998, 2003), plural Determiner Phrases (DP) are associated with contextual covers that divide the set denoted by the plurality in different lattices. For instance, the sentence in (7a) will have the Logical Form offered in (7b)

(7)   a. Las chicas cantaron una canción. (The girls sang one song)
        b. $\forall x[x \in [[Cov_i]] \ \& \ x \subseteq [[the \ girls']] \rightarrow x \in [[sing \ one \ song']] \ ]$

This Logical Form, depending on the contextual assignment of the cover for the plurality 'chicas' permits making reference to:

(i)   *atomic individuals* when the context assigns I to Cov_i (Distributive reading)
(ii)   *total plurality* when the context assigns K to Cov_i (Collective reading)
(iii)   *subpluralities* when the context assigns to Cov_i
        - J (Distributive non-maximal), or
        - L (Collective non-maximal)

Universe = {a, b, c, s, t, {a, b}, {a, c}, {a, s}, {a, t}, {a, s, t}}
Plurality: [[*chicas*']] = {a, b, c}
Covers: I = {{a}, {b}, {c}, {s, t}}
             J = {{a}, {c}, {b, s, t}}
             K = {{a, b, c}, {s, t}}
             L = {{a, b}, {c, s, t}}

4.2 Maximality

One of the clear advantages of the lattice structure is that it allows us to explain the effects produced by maximality in plural sets. This is exactly what happens in examples (1a-b), repeated here for convenience[8]:

(8)   a. Todas las chicas cantaron una canción. (=1a/b)
         b. $\forall x[x \in [[Cov_i]] \,\&\, x \subseteq [[\text{the girls'}]] \rightarrow x \in [[\text{sing one song'}]]]$

The Q ('todas' in (8a)) interacts with the context and eliminates the non-maximal possibilities J and L for the Cov_i, introducing the maximality effect that only makes available the I and K possibilities:

(i)   *atomic individuals* when the context assigns I to Cov_i (Distributive reading)
(ii)   *total plurality* when the context assigns K to Cov_i (Collective reading)

Universe = {a, b, c, s, t, {a, b}, {a, c}, {a, s}, {a, t}, {a, s, t}}
Plurality: [[*chicas*']] = {a, b, c}
Covers: I = {{a}, {b}, {c}, {s, t}}
             J = ~~{{a}, {c}, {b, s, t}}~~
             K = {{a, b, c}, {s, t}}
             L = ~~{{a, b}, {c, s, t}}~~

In the case of (8) some of the plural covers that appeared in (7) are eliminated due to the insertion of Q 'todas', which lexically denies the non-maximal subpluralities. Thus, by mere lexical composition, the only possible interpretations for 'todas las chicas' will be the distributive maximal and the collective maximal.

As we have already seen in sections 1 and 2, the focalization of the Q eliminates the collective maximal cover; and as a consequence, the only available cover will be the maximal distributive (*atomic individuals*). This is something we explain in the next section.

5 Semantic contribution of the focus

The Alternative Semantics approach for focus (Rooth 1985, 1992) proposes that a phrase receives two model-theoretic interpretations at LF: (i) the Ordinary Semantic Value (OSV noted as $[[\phi]]^O$), the simple

---

[8] The semantic contribution of the focus has not been taken into consideration in this representation for expositive reasons. See section 5.

result of a standard bottom-up semantic composition, and (ii) the Focus Semantic Value (noted as $[[\phi]]^F$), a set of propositions formed by the OSV and those propositions obtainable from the OSV by making a substitution of the focus phrase by other alternatives available in the discourse that match the focus phrase in semantic type (something that with the adoption of the focal structure theory proposed by Irurtzun (2003, 2004) can be accomplished without any stipulations).

A sentence like (9a) would have a LF with the two denotations offered in (9b):

(9a)   [Euridice]$_F$ drinks vodka.
(9b) $[[\phi]]^O$: [[Euridice drinks vodka]]
        $[[\phi]]^F$: {[[Euridice drinks vodka]], [[Ibon drinks vodka]], [[Adam drinks vodka]]...}

For the data this paper is interested in, repeated here as (10), the generalization that can be extracted is that the Q [+F] computes COVER alternatives and chooses that of *atomic individuals*.

(10a)   [TODAS]$_F$ las chicas cantaron una canción. (=1b)
(10b) $[[\phi]]^O$: [[All the girls sang one song]]
        $[[\phi]]^F$: {[[All the girls sang one song]], [[some girls sang one song]], [[most girls sang one song]]...}

The election of the atomic individuals cover derives from the fact that the pluralities of the set of 'chicas' in (10) are restricted in two ways:

1-LEXICALLY: The Q 'todas' combined with the plurality [[*chicas'*]] eliminates the non-maximal possibilities J and L for the OSV.
        I = {{a}, {b}, {c}, {s, t}}
        J = ~~{{a}, {c}, {b, s, t}}~~
        K = {{a, b, c}, {s, t}}
        L = ~~{{a, b}, {c, s, t}}~~
2-BY FOCUS: [+F] on Q raises alternative values for Q (the *subplural* COVs).
        I = {{a}, {b}, {c}, {s, t}}
        J = {{a}, {c}, {b, s, t}} ◄
        K = {{a, b, c}, {s, t}}   — Focus Alternatives
        L = {{a, b}, {c, s, t}} ◄

The Mismatch among OSV and FSV eliminates subpluralities since the OSV negates lexically some of the covers that appear as alternatives in the FSV when focusing the Q.

$[[\phi]]^O$= {   I = {{a}, {b}, {c}, {s, t}} $[[\phi]]^F$= {   I = {{a}, {b}, {c}, {s, t}}
        ~~J = {{a}, {c}, {b, s, t}}~~   J = {{a}, {c}, {b, s, t}}
        K = {{a, b, c}, {s, t}}   K = {{a, b, c}, {s, t}}
        ~~L = {{a, b}, {c, s, t}}~~   }   L = {{a, b}, {c, s, t}}   }

Therefore, the deletion of covers J-L, due to the lexical meaning of 'todas', will only allow for the choice of the COV of *atomic individuals* since K entails (J-)L and the lexical deletion of the subpluralities (J-)L of the OSV eliminates the *total plurality* K in the selection of alternatives of the FSV:

iff   K ∝ J-L,
then   I = {{a}, {b}, {c}, {s, t}}
               J = ~~{{a}, {c}, {b, s, t}}~~
               K = ~~{{a, b, c}, {s, t}}~~
               L = ~~{{a, b}, {c, s, t}}~~

REFERENCES

Baltazani, M. (2002). *Quantifier Scope and the Role of Intonation in Greek.* PhD. Diss.: UCLA.

Brisson, C. (1998). *Distributivity, Nonmaximality, and Floating Quantifiers.* PhD. Diss.: Rutgers University.

Brisson, C. (2003). 'Plurals, *All*, and the Nonuniformity of Collective Predication'. *Linguistics and Philosophy* 26, 129-184.

Buring, D. (1997). *The Meaning of Topic and Focus -- The 59th Street Bridge Accent.* London: Routledge.

Carlson, G. (1998). "Thematic Roles and the Individuation of Events", in S. Rothstein (ed.), *Events and Grammar.* 35-51. Dordrecht: Kluwer.

Chomsky, N., 1994, "Bare Phrase Structure", in G. Webelhuth (ed.), *Government and Binding Theory and The Minimalist Program,* Oxford: Blackwell.

Davidson, D. (1967). "The logical form of action sentences", *The Logic of Decission and Action.* 81-95, Pittsburgh: University of Pittsburg Press. N. Rescher (ed.)

Etxeberria, U. (2004) (in press). "Do All Quantifiers Behave the Same Way Compositionally?". *Selected Proceedings of 1st WoSS*, Vitoria: ASJU. Irurtzun, A. & U. Etxeberria (eds.)

Etxeberria, U. & A. Irurtzun. (2004) (in press). "Focus on the Scope of Quantifiers", *Selected Proceedings of 1st WoSS*, Vitoria: ASJU. Irurtzun, A. & U. Etxeberria (eds.)

von Fintel, K., 1994, *Restrictions on Quantifier Domains*, PhD. Diss.: UMass.

Fox, D. (1995). "Economy and Scope". *Natural Language Semantics* 3, 283-341.

Gil, D. (1995). "Universal Quantifiers and Distributivity". *Quantification in Natural Language*: Kluwer. 321-362. E. Bach, E. Jelinek, A. Kratzer & B. H. Partee (eds.).

Herburger, E. (2000). *What Counts: Focus and Quantification.* Cambridge (Mass.): MIT Press.

Irurtzun, A. (2003). "A Derivational Approach to the Focus Structure". Talk delivered at *Approaching Asymmetry at the Interfaces*. Université de Québec à Montréal: Montréal.

Irurtzun, A. (2004) (in press). "The Locus of [+F]ocus". *Selected Proceedings of 1st WoSS*, Vitoria-Gasteiz: ASJU. Irurtzun, A. & U. Etxeberria (eds.)

Martí, L. (2003). *Contextual Variables*, PhD. Diss.: UConn.

Rooth, M. (1985). *Association with Focus.* PhD. Diss.: UMass.

Rooth, M. (1992). "A Theory of Focus Interpretation". *Natural Language Semantics* 1. 75-116.

Sánchez, C. (1991). *La Cuantificación Flotante y Estructuras Conexas.* PhD. Diss.: U. Complutense.

Schwarzschild, R. (1996). *Pluralities.* Dordrecht: Kluwer.

Selkirk, L. (1995). "Sentence Prosody: Intonation, Stress, and Phrasing", in John A. Goldsmith (ed.), *The Handbook of Phonological Theory.* 550-569. Cambridge, MA, and Oxford, UK: Blackwell.

Silverman, K. (1986). 'F0 Segmental Cues Depend on Intonation: The Case of The Rise after Voiced Stops', *Phonetica* 43, 76 – 91.