Prosody tracks cyclic movement: evidence from Italian *wh*-questions

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1. *Introduction*. In several languages, successive-cyclic movement of a *wh*-phrase leaves a syntactic or morphological reflex in intermediate positions (see Abels 2012, Citko 2014). Phonological evidence for cyclic movement has been provided from tonal alternations in Kikuyu (Clements 1984, Haïk 1990) and in Asante Twi/Akan (Korsah & Murphy 2015). In this paper, we argue that also prosody is sensitive to the derivational history of a *wh*-phrase: we show that in Italian, an intonational language, the prosodic computation tracks the intermediate steps of *wh*-movement in the phase edges.

2. *NPA assignment in direct wh-questions*. Marotta (2001, 2002) showed that in Italian direct *wh*-questions, the nuclear pitch accent (NPA) is never assigned to bare *wh*-elements (except for *perché* 'why'), even though these should qualify as focus (as noted by Ladd 1996): NPA is assigned to the lexical verb adjacent to the *wh*-element.

In order to investigate the placement of NPA in *wh*-questions, we carried out a production experiment in which 10 native speakers of Tuscan Italian read out 12 pairs of stimuli like (1a,b), featuring short and long-distance *wh*-movement, along with 24 fillers.

(1) a. [$_{CP}$ A chi   hai [$_{vP}$ detto   *t* [$_{CP}$ che ti   hanno   [$_{vP}$ rubato la macchina]]]]?
               to who have.2SG said   that you.DAT have.3PL   stolen the car?
          'To whom did you tell to that your car was stolen?'

    b. [$_{CP}$ A chi   ti   ha [$_{vP}$ detto   [$_{CP}$ che   hanno [$_{vP}$ rubato *t* la macchina]]]]?
               to who you.DAT have.3SG said   that have.3PL stolen   the car?
          'From whom did s/he tell you they stole the car?'

The stimuli in each pair were preceded by a short description of the context. to control for information structure, in each pair the description was identical for both stimuli. We collected,
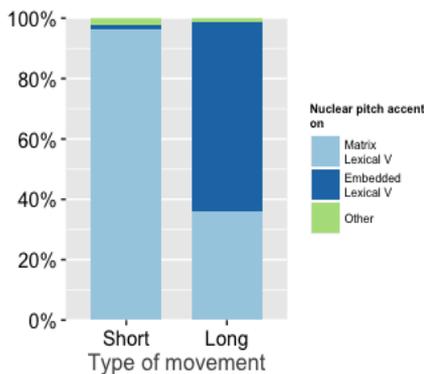

Fig. 1 Experiment 1: NPA distribution.

ToBI-transcribed, and analysed a total of 478 target sentences: 10 speakers x 12 items x 2 conditions (short/long movement) x 2 disfluency-free repetitions (when available). The main results are reported in Fig.1. A mixed model revealed that NPA is significantly more likely (p<.001) to occur on the embedded verb in case of long-distance movement (1b) than in short-distance movement (1a). This evidence shows that the placement of NPA is sensitive to the derivational history of the *wh*-element: NPA can (optionally) be assigned to the embedded verb only if the *wh*-element has been extracted from the embedded clause.

3. *A first hypothesis: The External Merge position*. A first logical possibility is that NPA assignment targets the External Merge position of the *wh*-phrase. Assuming that the *wh*-phrase is inherently focal, NPA should fall on the tail of the *wh*-chain but, since it cannot be assigned to a trace, it is 'passed on' to the adjacent element, i.e. the lexical verb. This hypothesis violates the widespread assumption that traces are invisible at PF (see Nespor & Vogel 1986, a.o.), and moreover, it cannot account for the possible assignment of NPA to the matrix verb in long *wh*-extraction (1b). In order to rule it out, we carried out a second production experiment. The stimuli included 7 pairs of sentences featuring two syntactic

conditions: *wh*-extraction of a noun complement (2a) and of a verbal complement (2b); the two sentences in each pair were introduced by the same context description.

(2) a. Di chi hai   comprato [un   romanzo *t*] nella   nuova   libreria?
       of who have.2SG bought   a   novel   in-the new   book shop
       'By whom did you buy a novel in the new book shop?'

    b. A   chi hai   comprato *t* [un romanzo]   nella   nuova   libreria?
       to whom have.2SG bought   a   novel   in-the new   book shop
       'To whom did you buy a novel in the new book shop?'

12 native speakers of Italian read out the stimuli. We analysed 336 target sentences (7 items x 2 conditions x 2 repetitions x 12 speakers). Our results show that under extraction of the noun complement, NPA is never assigned to the N head, which is adjacent to the External Merge position of the *wh*-PP. In both conditions, NPA falls on the lexical verb. This leads us to discard the hypothesis that NPA is assigned to the External Merge position of the *wh*-phrase.

4. Tracing back the syntactic derivation: Phase edges. We propose a different account. Firstly, we assume that *wh*-movement stops over in the edge of every vP and CP phase in between the External Merge position and the final landing site (see Abels 2012 for discussion) and that a phase head shares the wh/focal feature with a *wh*-phrase in the edge. Crucially, this holds for each intermediate landing site, as manifested for vP by *wh*-agreement phenomena in Chamorro (Chung 1994, 1998) and by soft mutation in Welsh (Willis 2000), and for CP by Complementizer alternations in Irish (McCloskey 2001). Secondly, at the prosodic level, we assume that functional elements tend to resist NPA assignment (see Selkirk 1984, a.o.). With these assumptions, there is no need to postulate that traces are directly visible to prosody.

In case of short movement (1a), the *wh*-phrase moves through the edge of the matrix vP and lands in the edge of the matrix CP. By feature-sharing, the wh/focal feature is also specified on v° and C°. Note that head-movement can only raise into C° the auxiliary, a functional element; therefore, the only lexical element endowed with the relevant feature is the verb in the matrix v° and NPA targets this position. In case of long extraction (1b), the wh/focal feature is present in the edge of CP and vP both in the matrix and in the embedded clause. In the light of the above reasoning, NPA can be assigned either to the lexical verb in the matrix vP or to the lexical verb in the embedded vP. This optionality can be captured by assuming that the wh/focal feature on the intermediate landing sites may be disregarded by the prosodic computation. When the *wh*-phrase is a noun complement (2a), N° does not bear the wh/focal feature since it is not a phase head: hence it is not eligible for NPA. In both (2a) and (2b), the only lexical element able to bear NPA is once again the head of vP, i.e. the lexical verb. The distribution of NPA cannot be accounted for within the cyclic spell-out framework: in a bottom-up derivation of (1a) nothing could prevent the default assignment of NPA to the rightmost element in the vP which doesn't contain any occurrence of the wh/focal feature. In order to capture the observed distribution of NPA, prosody must operate on a global representation, as independently required to account for the final high boundary tone.

Time permitting, we will also discuss the results of a third production experiment on lexically restricted *wh*-elements and *perché* ('why'), and show how our proposal can be extended to account for their different behaviour with respect to NPA assignment.

Abels (2012), *Phases*, de Gruyter. **Chung (1994)**, Wh-Agreement and "Referentiality" in Chamorro, *Linguistic Inquiry* 25. **Citko (2014)**, *Phrase Theory,* CUP. **Clements (1984)**, Principles of tone assignement in Kikuyu. In *Autosegmental Studies in Bantu Tone*, Clements, G. N. & Goldsmith J. (eds.), Foris. **Korsah & Murphy (2015)**, Tonal reflexes of successive-cyclic movement in Asante Twi. Talk given at NELS 46. **McCloskey (2001)**, The morphosyntax of wh-extraction in Irish, *Journal of Linguistics* 37.