Clitic Left Dislocated Numerals:
Split scope and lower bound interpretation

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1 Introduction: Inverse scope & CLLD

Numerical expressions have been analysed in different ways reflecting their different interpretations (Barwise and Cooper 1981, Krifka 1998, Landman 2003, 2004, Kennedy 2015 a.o.). In this work, I discuss the scope behavior Clitic Left Dislocated (CLLD-ed) numerals in Greek which at first sight seems mysterious. In particular, whereas a CLLD-ed indefinite can only take wide scope (surface), CLLD-ed numerals can be interpreted in the scope of the universal quantifier (inverse), as shown in (1a) vs. (1b):

(1) a. Kapjo vivlio to diavase kathe mathitis.
Some book IT.CL read.PERF.PAST.3SG every student.NOM.
'Some book, every student read it.'
✓ Surface: *There is some book such that every student read this book.*
✗ Inverse: *For every student there is a possibly different book that he read.*

b. Dio vivlia ta diavase kathe mathitis.
two books THEM.CL read.PERF.PAST.3SG every student.NOM.
'Every student read two books.'
✓ Surface: *There are two books such that every student read these two books.*
✓ Inverse: *For every student there are two (or more) possibly different books that he read.*

As it has been long observed in the literature, CLLD-ed phrases obligatorily take wide scope (Cinque 1990, Iatridou 1995, Alexiadou & Anagnostopoulou 1998, Alexopoulou 2008 a.o.). Alexopoulou & Kolliakou (2002) explicitly argue that CLLD-ed numerals in Greek cannot take narrow scope. However, experimental work in progress shows that there is a clear contrast between CLLD-ed indefinites and numerals in the acceptability of inverse scope, not attested in sentences without CLLD. Crucially,the sentences are episodic, so the inverse scope cannot be due to a generic interpretation (Alexopoulou 2008). I argue that this is due to *split scope* between the numeral and the noun phrase (NP). Specifically, the numeral takes scope above the universal quantifier whereas the NP is in its scope. This twist is possible under Kennedy's (2012, 2015) analysis of numerals as quantifiers over degrees.

2 Experimental evidence: Numerals vs. plain indefinites

Following the observation in (1), we tested inverse scope with a CLLD-ed indefinite (*kapjos* 'some') (**Exp**eriment 1) vs. a numeral (**Exp**eriment 2). In Exp1, 30 Greek adult monolingual speakers were presented with a truth judgment task where they were asked whether a sentence could describe a picture. The sentences varied with respect to the syntactic role of the CLLD-ed indefinite (subject (2) vs. object (3)) and they were recorded to ensure a CLLD intonation. Notice that in the case of the indefinite subject (2) the only clue that there is CLLD is intonation since there is no overt clitic. The pictures varied with respect to their scope (surface vs. inverse) and they involved diagrams with arrows matching the agent(s) with the theme(s). Stimuli involved 20 sentence-picture pairs (5 items per condition) plus 33 fillers.

(2) Kapjos ipurgos sinantise kathe epihirimatia.
some minister.NOM met every entrepreneur.
'Some minister met every entrepreneur'

(3) Kapjo vivlio to diavase kathe mathitis.
some book IT.CL read every student.NOM.
'Some book, every student read it.'

Surface: 1Min → 3Ents	**Cond(ition) 1**
Inverse: 3Mins → 3Ents	**Cond(ition) 2**
Surface: 3Stu → 1book	**Cond(ition) 3**
Inverse: 3Stu → 3books	**Cond(ition) 4**

Experiment 2 is exactly the same modulo substituting the indefinite with the numeral *dio* 'two' (with the necessary adjustments in diagrams). So far, we have tested 20 speakers but the difference in the

acceptability of inverse scope is indicative for the contrast in (1a-1b). The acceptance rate of surface scope is high in both experiments (*Exp1*: 92% in **Cond1** and 85% in **Cond3** - *Exp2*: 90% in **Cond1** and 85% in **Cond3**). However, acceptability of inverse scope varies significantly in the two experiments. In *Exp1*, with the indefinite, speakers only accepted inverse scope 11% of the times in both conditions (**Cond2&4**). In *Exp2*, with the numeral, on the other hand, in **Cond4** the acceptance rate is 55%. In **Cond2** the acceptance rate is much lower (but still higher than in Exp1), 27%. Although, the collection of the data and the analysis of the results is still in progress, we observe a significant difference in the inverse scope acceptability between the two experiments. In order to double-check results from previous experiments which showed that the indefinite *kapjos* tolerates inverse scope in other environments, we used the exact same design as in *Exp1* with the same pictures but with broad-focus intonation and indeed we found that speakers accepted inverse scope readings 57% of the times in **Cond2** (28 participants). Since plain indefinites (like numerals) generally allow inverse scope readings, the question remains as to what differentiates numerals from plain indefinites when they are CLLD-ed.

3 Split scope: numerals as quantifiers over degrees

Preserving the idea in Alexopoulou & Kolliakou (2002) that CLLD-ed numerals in Greek take wide scope, we argue that the contrast between (1a-1b) can be explained if we take the numeral to have split scope with the noun phrase as it has been proposed by Kennedy & Stanley (2009), Kennedy (2013), Kennedy (2015). Under this view the numeral is CLLD-ed but the noun phrase is interpreted in object position, licensing an inverse scope interpretation. According to Kennedy's (2013, 2015) analysis of numerals as quantifiers over degrees, a numeral, e.g. *two*, is true of a property of degrees if the maximum number that satisfies the property is two (4a).

(4) a. $[\![\text{two}]\!]_1 = \lambda D_{\langle d,t\rangle}.max\{n|D(n)\} = 2$

b. $[\![(1b)]\!] = max\{n|\forall y.\exists x.[student(y) \wedge read(x)(y) \wedge books(x) \wedge \#(x) = n]\} = 2$

However, the meaning in (4a), despite deriving the split scope, fails to account for the lower-bounded inference which seems to be obligatory in all cases where there is inverse scope. The reading we need is that no student read less than two books whereas (4b) conveys that no student read more than two books. We discuss different possibilities which allow a low bound interpretation but still preserving a split scope analysis. The obligatoriness of the low-bound reading is accounted for by the semantics and pragmatics of CLLD-ed constructions which seem to pattern with English sentences involving a Rise-Fall-Rise (RFR) accent. RFR-intonation (and CLLD-ed structures) invoke *uncertainty* or inferences for incomplete information (see e.g. Bolinger (1982), Ward and Hirschberg (1985) and Büring (2003), Constant (2012) for a critical explanation) yielding the most informative upper-bounded reading inappropriate in this context.

Finally, we need to explain the lower acceptability of inverse scope in **Cond2** (27%) as opposed to **Cond4** (55%) in *Exp2*. Since this is the condition of the CLLD-ed subject for which there is no overt clitic to signal CLLD, it is possible that speakers interpret the prosodic pattern in different ways. In order to further test this hypothesis, we are currently designing a new experiment which differs only in providing a context facilitating CLLD. The prediction is that the acceptability of inverse scope will increase for numerals in both conditions (subject + object) but not for indefinites, where inverse scope is unavailable.

Selected References

Alexopoulou, D. & D. Kolliakou. 2002. On Linkhood and Clitic Left Dislocation. *Journal of Linguistics 38*, 193-245. • **Constant, N.**. 2012. English Rise-Fall-Rise: A study in the Semantics and Pragmatics of Intonation Linguistics and Philosophy 35(5):407442. • **Kennedy, C**. 2015. A "de-Fregean" semantics (and neo-Gricean pragmatics) for modified and unmodified numerals, 1-44. *Semantics and Pragmatics 8* • **Kennedy, C. & J. Stanley**. 2009. On average. *Mind 118*, 583-646.