

# Epistemic Containment and the distribution of quantifiers

Michaël Gagnon & Alexis Wellwood  
*University of Maryland*

Can quantifiers ‘bind their trace across an epistemic modal’ (the Epistemic Containment Principle [ECP] of [1])? Since [2], [3] it is often assumed that quantificational expressions undergoing the Quantifier Rule (QR) are scopally rather free in their clause. More recent work offers a different perspective ([4], [5], [6], [7]). We consider the unusual pattern of behavior of quantificational NPs (QNPs) and epistemic modals (EMs), adding to the literature that suggests the syntax imposes strict constraints on the relative scope of quantifiers.

Consider a scenario in which we are certain that some of the relevant students have left for the semester, and certain that some have not, but for any given student we do not know which have left. [1] reports that the sentence *every student may have left* can only mean that *it’s possible that all the students have left*, which is false in our scenario. The ECP as a constraint on LF representations is meant to capture this data, yet the account faces empirical challenges, since QNPs headed by *each* do not respect it: *each student may have left* can mean that for each student  $x$ , it is possible that  $x$  left, which is true in our scenario.

[6] provide a number of tests that reveal the differential ability of the distributive universal quantifiers *each* and *every* to take scope w.r.t. other quantificational expressions in a given structure. Applying these tests, we demonstrate to what extent quantifiers subject to the putative ECP pattern with *every*. We identify a structural location in the syntactic hierarchy for EMs and suggest that EMs can bind QNPs of the *every* but not the *each* variety. In this, we extend the discussion of [8] and [9] on quantificational modals binding individual variables to a new class – that of *set variables* (e.g. [5]). *each*, unlike *every*, bears a strong [+Distributive] feature which must be checked at a position higher than the EM.

Thus, we adopt a classification of QNPs, where scope possibilities are determined by the interaction of the feature make-up of the quantifier classes with an articulated clausal topology. *Every* takes scope by being bound by a higher operator, while *each* takes scope by movement. Since *each* may bind its trace above EMs, this casts doubt on the existence of the ECP as a constraint on QR.

[1] von Stechow & Iatridou (2003). Epistemic containment. *Linguistic Inquiry*, 34, 173-198. [2] May (1977). *The grammar of quantification*. Ph.D. dissertation, MIT. [3] May (1985). *Logical form: Its structure and derivation*. Cambridge, MA: MIT Press. [4] Hornstein (1995). *Logical Form: from GB to Minimalism*. Cambridge, MA: Blackwell. [5] Szabolcsi (1997). Strategies for scope taking. In *Ways of scope taking*, Szabolcsi (Ed.), 109-154. Boston: Kluwer. [6] Beghelli & Stowell (1997). Distributivity and negation: the syntax of *each* and *every*. In *Ways of scope taking*, Szabolcsi (Ed.), 71-107. Kluwer. [7] Bruening (2001). QR obeys superiority: frozen scope and ACD. *Linguistic Inquiry*, 32, 233-273. [8] Lewis. (1975). Adverbs of quantification. In *Formal semantics of natural language*, Keenan (Ed.). Cambridge U P. [9] Heim (1982). *The semantics of denite and indenite Noun Phrases*. Ph.D. dissertation, UMass.