A New Look on Distributivity and Universal Quantifiers in Chinese and Its Implications

1. Problem This study offers a novel and unified account for several long-standing puzzles wrt distributivity and universal quantifiers in Chinese. Chinese has two distinct lexical elements with universal quantificational force: mei (‘every’) and dou. The co-occurrence between them has called into question the standard generalized quantifier wisdom, which says EVERY and its ilk are quantifiers of type <et, <et, t>>. Puzzle I (P1): It needs to be explained why Chinese sometimes allows two higher-ordered universal quantifiers in a sentence (cf. (1a-b)). One of the prevailing solutions to this problem is not to analyze mei as a quantifier of <et, <et, t>> but a determiner of type <et, e->. Lin (1998), for instance, treats mei to be a union operation and dou to be a generalized distributor (henceforth Lin’s solution (LS)).

LS first fails to explain why in (1a), the sentence is bad without dou. Moreover, it is not always the case that mei cannot independently function as a universal quantifier. As H (1996, 2005) notices it, when there is an indefinite or reflexive object NP, dou becomes optional (cf. (2a-b)) (Puzzle II (P2)). Obviously, LS fails P2. Noticing the contrast between (3a) and (3b-c), Huang proposes (Huang’s solution (HS)): mei is a Skolemized universal quantifier and it requires a lexically overt variable within its scope to license this Skolemized quantification; dou is a sum operator over events.

HS is successful albeit highly stipulative to capture the contrast between (3a) and (3b-c) but fails another puzzle (Puzzle III (P3)): subject-object asymmetry. In contrast to subject positions, ‘mei-cl NP’ could appear in object positions irrespective of the absence/presence of dou (cf. (4)). The naturalness of ‘mei-cl NP’ in object positions is unexpected under Huang’s analysis: since in (4), the universally quantified object cannot scope over the subject, how mei is licensed becomes a mystery.

A more comprehensive scrutiny of the data might indicate the following pattern about the (co-)occurrence between mei and dou: dou is obligatory when ‘mei-cl NP’ occur in subject positions and (a) there is a definite object NP (or a proper noun) within its scope (cf. (3b-c)); or (b) the VP is intransitive (cf. (1a)) (henceforth Puzzle IV (P4)).

2. Proposal I assume the distributive quantification induced by EVERY has a portmanteau semantic structure, viz. it has two semantic components, a universal quantification plus a matching functional quantification, which contributes distributivity (cf. Gil ’95). A matching function π that takes members from the restriction of the universal quantifier and matches them with an existentially introduced variable from the nuclear scope of the quantifier is independently needed (cf. Barwise ’79, de Swart ’93, Rothstein ’95). When events are included, the mapping denotes three possible relations (D: domain of individuals; E: domain of events): (a) π: D®; (b) π: E®; (c) π: E®. EVERY in Chinese has two incarnations, namely, mei and dou, and there is a division of labor between them, which correspond to the three mappings (cf. Luo (2008)). Compositionally, mei is a universal quantifier plus a matching function from D into D, while dou is a universal quantifier plus the matching function from D into E or E into E (cf. (5) and (6)). Type- logically, mei is of type <e, <et, t>> (cf. Matthewson ’03) while dou could be either of <e, <et, t>> or <s, <et, t>> (s: type of events). π is a contextually-restricted free variables over functions.

3. Discussion & Analysis First, the proposal offers a ready explanation for P2: the weak indefinite provides an existentially introduced variable to license the matching function. Compositionality issue: how to properly combine a transitive verb of type <e, <et>> and an indefinite (of type <e, <et, t>>)? English and Chinese satisfy this requirement in a different way. Chinese employs Predicate Restriction, a mode of composition which takes the property argument (of type <e, <et>>) as a restrictive modifier of the predicate (cf. C & L (2004)), while English uses the choice function (CF) which maps a property argument onto entities that have the property (cf. inter alia R (1997, 2006), kratzer (1998), Winter (2004)). But after existential closure (EC), both the mechanisms would yield a semantic category of type <e> to combine with the transitive verb (cf. (7)). This analysis has an extra benefit: it explains why the weak indefinites in Chinese always take the narrow scope. As for the contrast between (3a) and (3b-c), it could be easily seen that there is an individual constant (denoted by definite NPs or proper nouns), the sentence will be always false according to the definition of the matching function. It is this semantic violation that results in the unacceptable of the sentences like (3b-c) without dou. (Discussion: Let D1= {a, b, c}, D2 = {u}; π: DxD = {<a, u>,<b, u>,<c, u>}, ! contradicting the definition of π). Second, what is the semantic status of mei when dou is present? Is mei still a universal quantifier of higher type in object positions? (P1 & P3) I assume that, being a determinerless language, Chinese has an extra (covert) iota-operation (I-operation), an operation that turns a quantificational element into a referential one. This operation renders (type-lower) mei to be a universal determiner of type <et, e->, which denotes the function from a set to the maximal i-sum of the members of that set (cf. Link 1998 etc.). This extra I-operation provides a solution to P1 and P3. The remaining tricky problem is when to apply this extra operation. Since the type-shifting operations are costly (Chierchia 1998, Reinhart 2006), I assume that the I-operation is subject to Economy Constraint (EC): Use the I-operation only as a last resort to satisfy interpretability. Discussion: if mei in object positions is interpreted as a distributive quantifier, since QR is not an option for Chinese, we would face an interpretability problem. The last resort, namely, to interpret mei as a definite-article-like determiner would escape this interpretability problem. Similarly,
when mei occurs with dou, another higher-ordered universal quantifier, not to interpret mei as a universal quantifier would also avoid the problem. Obviously, no violation of Principle of Interpretability (H & K 1998: 49) arises if we interpret mei as a universal determiner in these cases. There is also some empirical evidence in support of this idea. We predict that when mei functions as the universal quantifier (a real quantificational element), it cannot be referred back in an inter-sentential discourse. (8a) shows that the subject ‘mei-cl NP’ in a sentence with an indefinite object NP but without dou cannot be referred back; (8b) indicates ‘mei-cl NP’ in a sentence with dou could be referred back by a plural pronoun but not a singular one. Naturally, we expect ‘mei-cl NP’ in object positions could be referred back (cf. (8c)). The contrast between (8a) on one hand and (8b-c) on the other indicates that mei could live on two domains, with EC (last-resort) as the regulating rule between them. The proposed analysis offers a straightforward explanation for the unacceptability of sentences with ‘mei-cl NP’ subjects and intransitive VPs or constant individual-denoting NPs without further stipulation: the sentences are interpretable (thus EC nullifies the recourse to the last-resort I-operation) but violate the semantic requirement of portmanteau distributive quantification. P4 is related to P1. In (3b) with dou, mei is a universal determiner and dou the quantifier with a matching function from D into E (π: D->E (x∈{a, c, e}, 1)). (9) shows the I-operation and the logical form of (3b) with dou. Mutatis mutandis, we could derive the other cases under P4. So far, however, the proposed analysis has been over-generating wrt (3a), where dou is optional. A solution has already been suggested in the literature (H & K 05). There is a crucial semantic difference between the sentence with dou and the one without dou. (10a) and (10b) are the logical forms of the sentences respectively. The contrast between (11a) and (11b) underscores this semantic difference (in parallel to (8a) vs. (8b)).

(1a) Mei-ge tongxue (dou) xihuan yige song. ’Every man likes a song.’
(1b) Mei-ge tongxue (dou) xihuan yige song. ’Every student likes a song.’
(2a) Mei-ge tongxue (dou) xihuan yige song. ’Every classmate likes a song.’
(2b) Mei-ge tongxue (dou) xihuan yige song. ’Every student likes his own song.’
(3a) Mei-ge nanren (dou) xihuan yige song. ’Every man likes a song.’
(3b) Mei-ge nanren (dou) xihuan yige song. ’Every student likes a song.’
(4a) Mei-ge nanren (dou) xihuan yige song. ’Every classmate likes a song.’
(4b) Mei-ge nanren (dou) xihuan yige song. ’Every student likes his own song.’

Selected References