Classifiers are not for nouns (but for numerals) – evidence from Chinese

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Introduction: Since Chierchia (1998) (see also Krifka 1995; among many others), it has been widely assumed that classifiers (henceforth CL) for semantic reasons are obligatory in Chinese. However, this paper shows that the claim is not completely correct and offers two novel observations. First, Chinese classifiers are systematically optional in certain degree constructions, as illustrated in a positive construction (1), the comparative (2) and the superlative (3).

(1) Liubei mai-le **hen-duo** (ke) pinguo.
Liubei buy-ASP POS-many/much CL apple
'Liubei bought a lot of apple(s).'

(2) Liubei bi Caocao mai-le **geng-duo** (ke) pinguo.
Liubei than Caocao buy-ASP COMP-many/much CL apple
'Liubei bought more apple(s) than Caocao.'

(3) Zhe-xie-ren dangzhong, Liubei mai-le **zui-duo** (ke) pinguo.
These-CL-people among Liubei buy-ASP SUP-many/much CL apple
'Among these people, Liubei bought more apple(s) than anyone else did.'

Second, the optionality of Chinese classifiers is not a free variation. It is observed that the presence/ absence of classifiers lead to a variation in the dimension of measurement. Without CL, the relevant dimension of measurement can be either cardinality or others obeying monotonicity such as weight or volume. In contrast, with CL, the dimension has to be cardinality and other dimensions such as weight or volume are impossible. This is not only true for a conceptual count noun like *pingguo* 'apple', but also for a conceptual mass noun like *mi* 'rice' (as shown in (4)).

(4) Liubei bi Caocao zhua-le **geng**-duo (li) mi.
Liubei than Caocao grab-ASP COMP-many/much CL rice
With CL: 'Liubei grabbed more grains of rice than Caocao.' cardinality; #weight/ #volume
Without CL: 'Liubei grabbed more rice than Caocao.' cardinality; weight/ volume

Similar variation in the dimension of measurement seems also attested in English (e.g., Bale and Barner 2009, Wellwood 2014, 2015), though not exactly the same (cardinality is ruled out in 5a).

(5) a. John has more rock than Mary. #cardinality; weight
b. John has more rocks than Mary. cardinality; #weight

The linguistics facts above raise several important questions concerning the relation between measurement and classifiers: **(i)** what is the role of classifiers in the measurement constructions? **(ii)** How is measurement connected with classifiers? **(iii)** How and why does the variation in the dimension of measurement show up? The central proposal of this paper is two-fold: **(i)** individual classifiers do not encode a measure function; they impose restrictions on the denotation of nouns. **(ii)** A covert measurement operator M-OP exists in Chinese, responsible for the measurement.

Measurement with CL: For purposes of illustration, I assume that **(i)** the semantics of Chinese bare nouns denote kind terms and can be shifted to a set of instances instantiating the kind via the $^{\cup}$ operator (Chierchia 1998). **(ii)** The semantics of an individual classifier creates partitions over the denotation of nouns and requires those instances in the cover to be atomic (cf. Chierchia 1998, 2010); **(iii)** a covert measurement operator M-OP relates individuals to degrees along a contextually-valued dimension *c*, obeying monotonicity (Rett 2014, Solt 2015); **(iv)** the semantics of quantity adjectives such as *duo* 'many, much' induces a higher order measurement (Rett 2014, 2018); **(v)** the semantics of a *pos*-morpheme requires the relevant degrees to exceed a certain contextually-given threshold d_s (Kennedy 1997); **(vi)** an existential closure ∃ closes the individual

variable in the nominal domain. Below, (6) presents the semantics of M-OP and (7) provides the semantics of the quantity adjective and that of the *pos*-morpheme (cf. Grano 2012).

(6) $[\![\text{M-OP}]\!]^{c} = \lambda P_{<e,\,t>}.\lambda d_{<d>}.\lambda z_{<e>}.[P(z) \wedge \mu_{c}(z) = d]$

(7) a. $[\![duo]\!] = \lambda d_{<d>}.\lambda D_{<d,\,t>}.\mu(D) = d$

b. $[\![POS]\!]^{g} = \lambda D'_{<d,\,t>}.\exists d'[D'(d') \wedge d' > d_{s}]$

With these assumptions, (8) presents the LF and (9) shows some crucial pieces of the semantic computation, when (1) is interpreted with the presence of CL.

(8) LF: [**POS** [λ2 [d_2-**duo** [λ1 [Liubei bought [∃ [d_1-**M-OP** [**CL** apple]]]]]]]]

(9) a. $[\![\text{pingguo}]\!]^{w} = \lambda x_{<e>}.{}^{\cup}\text{apple}_{w}(x)$

b. $[\![\text{ke}]\!]^{w} = \lambda P_{<e,\,t>}.\lambda x_{<e>}.\exists S[\prod(S)(x) \wedge \forall s{\in}S \rightarrow P(s) \wedge \text{atom}(s)]$

c. $[\![(1)]\!]^{w,\,c,\,g} = 1$ iff $\exists d'[\mu\,(\lambda d.\ \exists z[\text{Liubei bought } z \wedge \mu_{c}(z) = d \wedge \underline{\exists S[\prod(S)(z) \wedge \forall s{\in}S \rightarrow {}^{\cup}\text{apple}(s) \wedge \text{atom}(s)]}]) = d' \wedge d' > d_{s}]$

In (9), given that the set of instances in the cover *S* is defined in terms of atomicity (by the contribution of CL), cardinality is thus the only possible dimension of measurement for M-OP. This explains the variation in the dimension of measurement with the presence of CL.

Measurement without CL: With the same assumptions, (10) presents the LF and (11) shows the semantics, when (1) is interpreted without the presence of CL.

(10) LF: [**POS** [λ2 [d_2-**duo** [λ1 [Liubei bought [∃ [d_1-**M-OP** [apple]]]]]]]]

(11) $[\![(1)]\!]^{w,\,c,\,g} = 1$ iff $\exists d'[\mu(\lambda d.\ \exists z[\text{Liubei bought } z \wedge {}^{\cup}\text{apple}(z) \wedge \mu_{c}(z) = d]) = d' \wedge d' > d_{s}]$

In (11), when the set of instances is not restricted to be atomic (i.e., (1) is computed without CL), there are two possibilities for the relevant dimension of measurement. One possibility is that M-OP induces a monotonic measurement on the instances; this is the case where the relevant dimension is weight or volume. The other possibility is that (1) is uttered in a context where the measuring unit is specified, and the set of instances is defined over atomicity relative to the level of the measuring unit (as the case with CL): the relevant dimension is cardinality.

Implications: If on the right track, the current analysis makes three implications: **(i)** the presence of a covert measure operator cuts across the typology between classifier languages like Chinese and non-classifier languages like English. Individual classifiers do no induce measurement, but impose restrictions on the denotation of nouns (the input for the measurement); **(ii)** Classifiers are not for nouns, but for numerals. The fact that Chinese classifiers can be syntactically optional seriously challenges the view that Chinese nouns are 'registered" as kind-terms and require classifiers for their predicative meanings (i.e., unable to have a predicative meaning without the help of CL). In contrast, the current analysis is more sympathetic to the view that classifiers are obligatory because of the presence of numerals (Krifka 1995, Bale and Coon 2014). **(iii)** Chinese classifiers do not encode a measure function (contra Krifka 1995), given the fact that the relevant measurement *remains active*, irrespective of whether Chinese classifiers are syntactically present or absent in degree constructions. Finally, two findings of this study are worth highlighting. First, the presence of plural morphology and that of CL play a similar role in restricting the dimension of measurement to cardinality. Second, the relevant dimension of measurement for Chinese nouns (analyzed as mass nouns in Chierchia 1998) can be either cardinality or other dimensions obeying monotonicity (see also Lin & Schaeffer 2018 for experimental evidence); but such interpretational flexibility does not hold for English mass nouns (see (5)), even with cases of contextual coercions discussed in Chierchia (2010) and Rothstein (2010).

Extensions: In the full version of this talk, I further explain **(i)** why Chinese classifiers are obligatory in the presence of numerals; **(ii)** why some nouns like *jiaju* 'furniture' do not

participate in the pattern; **(iii)** the relation between the covert M-OP and other types of classifiers, such as container phrases (e.g., cups/ boxes) and measure expressions (e.g., kilo/ liter).

References: **[1]** Bale, A. & D. Barner. 2009. The interpretation of functional heads: using comparatives to explore the mass/count distinction. **[2]** Chierchia, G. 2010. Mass nouns, vagueness and semantic variation. **[3]** Krifka, M. 1995. Common nouns: a contrastive analysis of English and Chinese. **[4]** Rett, J. 2014. The polysemy of measurement.