Syntactic cues for mass/count expectation in Mandarin Chinese[1]

Panpan Yao, Linnaea Stockall
Queen Mary University of London

Cheng & Sybesma (1998) argue that Mandarin Chinese has a grammatical mass/count distinction, contra Chierchia (1998) and Krifka (1995). They distinguish massifiers from count-classifiers and show that nominal phrases with massifiers have specific structures: the modification marker '*de*' can be inserted after the massifier (1a) but not the count-classifier (2a), and certain adjectives (e.g. big and small) can be added before or after the massifier (1b, 1c), but can only occur before the count-classifier (2b, 2c).

Massifier (e.g. *'dui'* pile)	**1a.** *san dui (de) shizi* Three CL-pile *de* pebble 'Three piles of pebbles' **1b.** *san xiao dui shizi* Three small CL-pile pebble 'Three small piles of pebbles' **1c.** *san dui xiao shizi* Three CL-pile small pebble 'Three piles of small pebbles'	**Count-classifier (e.g. *'ge'* unit)**	**2a.** *wu ge (*de) pingguo* Five CL de apple 'Five apples' **2b.** **wu xiao ge pingguo* Five small CL apple 'Five small apples' **2c.** *wu ge xiao pingguo* Five CL small apple 'Five small apples'

Offline forced choice categorisation tasks manipulating only the classifier (Li, Barner, & Huang, 2008; Cheung, Li, and Barner, 2010, 2012) support the claim of Cheng & Sybesma (1998) that speakers use classifiers to generate mass/count interpretations. However, it remains unclear whether other elements of complex nominal phrases (e.g. adjective/classifier order, '*de*') also contribute to the mass/count interpretation, and how speakers make use of these potential cues to interpret nominal phrases in real time.

Borer (2005) proposes that there is no lexically encoded mass/count distinction; elements are interpreted as mass or count by virtue of being placed in some syntactic structures. If this is the case, then we could assume that putting the same classifiers, adjectives and nouns in different syntax structures (e.g. the adjective is either before or after the classifier, with or without the presence of '*de*') would cause different interpretations (either count or mass) of different structures.

Our experiment uses eye-tracking to examine how Mandarin speakers parse complex mass/count nominal phrases with neutral classifiers, manipulating adjective/classifier order, the presence of 'de', and comparing typically mass (e.g. sand) vs. typically count (e.g. fan) nouns. All the sentences used in our experiment share the same structure, i.e. 'there is an A in B, B is …', in which A is the critical nominal, and all of the sentences were considered grammatical by native Mandarin speakers. Table 1 shows examples of the sentences with different structures but the same classifier, adjective and count noun; mass nominal sentences share the same combination of elements. Nouns were matched for their number of characters,

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number of strokes/character, and lexical frequency, and were normed for count vs. mass typicality in a rating questionnaire (n=10).

If speakers only use the classifier to generate mass/count meaning, as claimed by Cheng & Sybesma (1998), we would expect participants' reading time to be the same in all conditions, since different structures share the same classifier. However, if mass/count interpretation is decided by the syntactic structure of the nominal phrases, as proposed by Borer (2005), we would expect the participants' reading time difference in accordance with the different sentence structures: Adj+Cl order should make count nouns unexpected, which would cause longer reading time on count nouns.

We found a significant effect of Cl/Adj order on count noun 1stFix durations: count nouns were fixated for longer following an Adj+Cl sequence than the reverse, exactly as predicted. There was no effect of Cl/Adj order on mass nouns. This effect was consistent with the Adj +Cl order being rapidly used by MC speakers as a cue to construct a mass nominal interpretation, which then induced processing delays when a typically count nominal was encountered. However, we also found a significant effect of '*de*' on 1stFix durations for both mass and count nouns: the presence of '*de*' decreased fixation durations by the same magnitude for all nouns, independent of typical noun interpretation. This facilitatory effect was numerically larger for count nouns following the disprefered Adj+CL order than for all other pairwise comparisons, suggesting '*de*' may play a more complex role in modulating the interpretation of complex Mandarin nominals than previous research indicates.

<table>
<tr><th>Table 1 Examples of material</th><th colspan="2">Interest Regions (each colour represents one IR)</th></tr>
<tr><td rowspan="4">Hezi li zhuang ZHE yi
Box inside put ZHE one</td><td>ba xiao/da shanzi,
Cl small/big fan,</td><td rowspan="4">na hezi shi hong se de.
that box is red colour DE.</td></tr>
<tr><td>xiao/da ba shanzi,
small/big Cl fan,</td></tr>
<tr><td>ba xiao/da de shanzi,
Cl small/big de fan,</td></tr>
<tr><td>Xiao/da ba de shanzi,
Small/big Cl de fan,</td></tr>
<tr><td colspan="3">'There is a small (big) fan/ There are a small (big) handful of fans in the box, the box is red. '</td></tr>
</table>

References

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