The Semantics of *yue* in Mandarin Chinese: an implication for the argument structure of verbs

**Introduction.** Li and Carlos (2011) observe that *yue* in Mandarin Chinese marks not only a type of comparative structure that corresponds to the *-er …-er* (or ‘the more… the more’) construction in English (i.e., the comparative correlative), but also a structure that corresponds to the ‘*-er and –er*’ (or *more and more*) construction (i.e., iterative comparative), exemplified in (1) and (2).

(1) Zhangsan pao-de *yue*₁ duo, ta (jiu) pao-de *yue*₂ kuai.

   run-de *much* he (then) run-de *fast*

   ‘The more Zhangsan ran, the faster he went.’

(2) Zhangsan *yue*₁ pao *yue*₂ kuai.

   run *fast*

   ‘Zhangsan ran faster and faster.’

The key difference between the comparative correlative in (1) and the iterative comparative in (2) lies in that the first *yue* in (1) precedes a gradable adjective, *duo* ‘many’, whereas the first *yue* in (2) precedes a non-gradable verb, *pao* ‘to run’. (1) and (2) are truth-conditionally distinct: (2) expresses a necessarily temporal reading that (1) does not have. Given the scenario in (3), (1) is intuitively true, but (2) is not, because the former describes a correlation between the amount of Zhangsan’s running and his speed, while the latter expresses a correlation between Zhangsan’s running and time: his speed increases over time.

(3) Scenario: Zhangsan runs on treadmill every day. When he runs 5 miles, he sets his speed at 5 mph; when he runs 4 miles, he sets his speed at 4 mph; when he runs 3 miles; he sets his speed at 3 mph.

In view of the semantic distinction between (1) and (2), Li and Carlos propose that non-gradable verbs such as *run* possess a time argument but lack a degree argument (e.g., 4a), while adjectives possess a degree argument but lack a time argument (e.g., 4b). On this analysis, when *yue*₁ in (2) composes with the VP projection *Zhangsan pao*, it returns a set of pairs of running situations ordered based on their temporal precedence, as shown in (5).

(4) a. \[[pao]\] = \(\lambda x.\lambda t.\lambda s. (run(x)(t)(s))\)

b. \[[duo]\] = \(\lambda x.\lambda d.\lambda s. (x)(t)(s)\)

(5) \[[yue₁, Zhangsan pao ]\] = \[[yue]\][[[Zhangsan pao]]]

\[= [\lambda P_{\lt, \lt, \gt, \gt} \lambda s₁\lambda s₂\exists t₁\exists t₂[P(t₁)(s₁) \land P(t₂)(s₂) \land t₂ > t₁]] (\lambda s. run(Zhangsan)(t)(s))\]

\[= \lambda s₁\lambda s₂\exists t₁\exists t₂[run(Zhangsan)(t₁)(s₁) \land P(Zhangsan)(t₂)(s₂) \land t₂ > t₁]\]

Although this analysis successfully captures the semantic distinction between the iterative comparative and the comparative correlative, it leaves several important questions open. One of them is: why it is the case that adjectives cannot take a time argument? (See Lin (2009) argues for an opposite view.)

**Analysis.** In this talk, we propose an alternative analysis that accounts for the semantic difference between (1) and (2) without stipulating an extra degree or temporal argument for non-
gradable verbs. This analysis is built upon the idea that events can be ordered based on the part-whole relation (<) like degree intervals on a degree scale, as shown below.

(6)  

a. Event Scale  
\[
\begin{array}{c}
\{ e_1 \} \\
\{ e_2 \} \\
\{ e_3 \}
\end{array}
\rightarrow
\]

b. Degree Scale  
\[
\begin{array}{c}
\{ I_1 \} \\
\{ I_2 \} \\
\{ I_3 \}
\end{array}
\rightarrow
\]

(6a) is an event scale consisting of an ordering relation, a dimension (e.g., Zhangsan’s running) and events that share the same initial point, like intervals. We define a function, \(\text{Extension} (<_{\text{ext}})\), to captures the relation that holds among events (and intervals) on the scales, as shown below:

(7) \(e'\) is an \textit{extension} of \(e\) (\(e <_{\text{ext}} e'\)) iff \(e'\) and \(e\) share the same starting point and \(e\) is a part of \(e'\).

We argue that \textit{yue} is ambiguous between the semantics in (8a) and (8b). When it combines with a VP projection, it creates a set of pairs of situations ordered based on the extension relation of situations (e.g., 9b). When it combines with an adjectival or an adverbial projection, it creates a set of pairs of situations ordered based on the extension relation of degree intervals (e.g., 9d). (2) has the truth-conditions in (10e), which says: for every pair of situations of Zhangsan’s running \(s_1\) and \(s_2\), if \(s_2\) is an extension of \(s_1\), \(s_2\) is related to speed \(I_1\); \(s_2\) is related to speed \(I_2\); \(I_2\) is an extension of \(I_1\).

(8)  

a. \(\text{[[yue]]} = \lambda P_{<_x, >} \lambda s_1 \lambda s_2 [P(s_1) \land P(s_2) \land s_1 <_{\text{ext}} s_2]\) \hspace{1cm} \text{Non-gradable}

b. \(\text{[[yue]]} = \lambda P_{<_x, >} \lambda s_1 \lambda s_2 \exists I_1 I_2 [P(I_1)(s_1) \land P(I_2)(s_2) \land I_1 <_{\text{ext}} I_2]\) \hspace{1cm} \text{Gradable}

(9)  

a. \(\text{[[pao]]} = \lambda x \lambda s \text{run}(x)(s)\)

b. \(\text{[[yue}, \text{Zhangsan pao]]} = \lambda s_1 \lambda s_2 [\text{run}(\text{Zhangsan})(s_1) \land \text{run}(\text{Zhangsan})(s_2) \land s_1 <_{\text{ext}} s_2]\)

c. \(\text{[[kuai]]} = \lambda I_1 \lambda s \text{fast}(I_1)(s)\)

d. \(\text{[[yue} \text{2 kuai]]} = \lambda s_1 \lambda s_2 \exists I_1 I_2 [\text{fast}(I_1)(s_1) \land \text{fast}(I_2)(s_2) \land I_1 <_{\text{ext}} I_2]\)

e. \(\forall \text{Zhangsan yue pao yue kuai}] = \forall s_1 s_2 [\text{run}(\text{Zhangsan})(s_1) \land \text{run}(\text{Zhangsan})(s_2) \land s_1 <_{\text{ext}} s_2] \rightarrow \exists I_1 I_2 [\text{fast}(I_1)(s_1) \land \text{fast}(I_2)(s_2) \land I_1 <_{\text{ext}} I_2]\)

Our analysis predicts that in the iterative comparative the VP following \textit{yue} \textsubscript{1} must have cumulative reference, as the property it denotes holds for situations that stand in a part-whole relation. This prediction is indeed borne out. The example in (10) shows that a transitive verb cannot take a ‘quantized’ object, such as 3 apples.

(10)  

\text{Zhangsan yue chi 'pingguo' san ge pingguo, yue gaoxing.}  
\hspace{2cm} \text{eat apple 3 cl apple happy}
\hspace{2cm} \text{‘Zhangsan becomes happier and happier.}  