ELSEVIER

The view from *yue*: Chinese comparative correlatives

Chen-Sheng Luther Liu

Department of Foreign Languages and Literatures, National Chiao Tung University,
1001 Tahsueh Road, Hsinchu 300, Taiwan

Abstract

The Chinese comparative correlative involves a quantificational tripartite structure. The mapping between its syntactic tree structure and the corresponding quantificational tripartite structure is subject to the Revised Extended Mapping Hypothesis. Semantically, the correlative degree adverb *yue* 'more' functions to regulate a relationship between a pair of degree/quantity variables and a comparison relation. The relationship between these two variables is subject to the condition: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa. These two degree/quantity variables 'directly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more' must be associated with two 'corresponding' variables (syntactically or semantically) predicated by the same predicate, respectively. These two 'corresponding' variables are those that are 'indirectly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. The type of predicate modified by the adverb *yue* 'more' provides further information to help identify the nature of the 'indirect' variables (i.e. individuals, times or worlds).
© 2008 Elsevier B.V. All rights reserved.

Keywords: Comparative correlatives; Degree arguments; Individual-level predicates; Quantity arguments; Quantificational tripartite structure; Revised Extended Mapping Hypothesis; Stage-level predicates; Typology

1. Introduction

In Chinese, there are many pairs of correlative words serving to connect clauses together into compound or complex sentences. The *yue . . . yue* 'more . . . more' pair is such a case that makes it impossible for the clauses to be independent sentences, as shown by examples in (1) (Chao, 1968; Ding et al., 1979; Li and Thompson, 1981; Xing, 1985, 2001; McCawley, 1988; Zhao, 1999; Hsiao and Tsao, 2002).

(1) a.   Pingguo yue   tian, yue   haochi.
          Apple   more sweet more delicious
          'The sweeter an apple is, the more delicious it is.'
     b.   *Pingguo yue   tian.
          Apple   more sweet
     c.   *Yue   haochi.
          More delicious

Interestingly, example (1a) (henceforth the *yue . . . yue* 'more. . . more' construction) can be rewritten as a condition without much loss of meaning, as (2a) illustrates.[1]

(2) a.   Pingguo ruguo/yaoshi yue   tian,   jiu   yue   haochi.
          Apple   if   more sweet then more delicious
          'If an apple is sweeter, then it will be more delicious.'
     b.   Ruguo/Yaoshi Zhangsan lai,   Lisi jiu bu hui lai.
          If/If   Zhangsan come, Lisi then not will come
          'If Zhangsan comes, then Lisi will not come.'

However, as the interpretation of (1a) indicates, if there is a positive difference in sweetness between the two apples, then there must be a corresponding or resulting positive difference in deliciousness between the two apples (Chao, 1968; Fillmore, 1987; McCawley, 1988; Hsiao and Tsao, 2002). So, the *yue . . . yue* 'more . . . more' construction differs from (2b) (henceforth the *ruguo*-conditional) in that in the former a comparison must be made in each clause while it is not necessary in the latter. Besides, these two constructions at least still differ from each other in the following ways: First, the *yue . . . yue* 'more . . . more' construction may describe an on-going situation or a past event while the *ruguo*-conditional cannot, as the contrast between (2b) and (3a–b) illustrates (Xing, 2001:379–380).

(3) a.   Keren yue lai,   yue duo, cai keneng hui bu gou.
          Guest more come more more food possible will not enough
          'The more cumulative the reference property of the guest's coming event is, the larger the amount of guests is. It is possible that the food will not be enough.'
     b.   Zuotian   ta yue piping   wo, wo jiu yue shengqi, suoyi wo jintian bu
          Yesterday he more criticize I   I   then more angry   so   I today   not
          gen ta jianghua.
          with he speak
          'The more cumulative the reference property of his criticizing me event was, the angrier I was. So, I do not want to talk with him today.'

Second, syntactically the *ruguo*-conditional might consist of two clauses bound together by the correlative word *ruguo* 'if' and *jiu* 'then': the antecedent (i.e. the *ruguo*-clause) and the consequent clause, and there always exists a causal relation between these two clauses. However, the same does not always obtain in the *yue . . . yue* 'more . . . more' construction. Syntactically, the *yue . . . yue* 'more . . . more' construction allows the smallest clause involving the first

---

[1] Abbreviations used in this paper include—ASP: aspect markers; BEI: the passive marker; CL: classifiers; and DE: the verbal suffix or marker for modifying phrases like genitive phrases, relative clauses, and noun complement clauses.

   Because of space limit, cases involving *yue-lai-yue* 'more-come-more' will not be discussed in this paper. Please see Chao (1968), McCawley (1988:187), Hsiao and Tsao (2002) and Liu (2008) for discussion.

occurrence of the adverb *yue* 'more' to occur as a relative clause while the *ruguo*-clause cannot occur as a relative clause, as the contrast between (4a) and (4b) shows.

(4)   a.   [$_{CP}$ [$_{NP}$ [$_{CP}$ Yue da de] pingguo] [$_{AP}$ (jiu) yue haochi]]
            More   big DE apple   then more delicious
            'The bigger an apple is, the more delicious it is.'
   b.   *[[$_{NP}$ [$_{CP}$ Ruguo/Yaoshi chidao de] ren] [$_{VP}$ jiu hui bei chufa]].
            If/If   late   DE person   then will BEI punish

More importantly, it is not necessary for the relationship between the two clauses containing the correlative adverb *yue* 'more' to be a causal one. For instance, in (5a), it is hard for us to say that there exists a causal relation between the size of an apple and its sweetness, and similarly in (5b) it is not necessary for a small car to be cheap.

(5)   a.   Pingguo yue da, yue tian.
            Apple   more big more sweet
            'The bigger an apple is, the sweeter it is.'
   b.   Chezi yue xiao, yue pianyi.
            Car   more small more cheap
            'The smaller a car is, the cheaper it is.'

Hence, in the *yue . . . yue* 'more . . . more' construction, the syntactic and semantic relationship between the smallest clauses containing the correlative adverb *yue* 'more' is not made explicit; that is to say, clauses involved are simply juxtaposed to show the correlative nature of the adverb *yue* 'more'. So, we shall dub the *yue . . . yue* 'more . . . more' construction the Chinese comparative correlative rather than the Chinese comparative conditional.[2]

     The purpose of this paper is to argue that the Chinese *yue . . . yue* 'more . . . more' comparative correlative, which contains an (implicit) adverb of quantification, involves a quantificational tripartite structure by concentrating on the following questions. First, how do we map its syntactic tree structure, especially cases like (4a), to the corresponding quantificational tripartite structure? Second, what is the semantics of the correlative degree adverb *yue* 'more'?[3] Third, why does the predicate of Chinese comparative correlatives, as (7a–e) show, display the unboundedness effect?

---

[2] An anonymous reviewer points out to us that the Chinese comparative correlative allows the counterfactual reading by providing example (i). Among 31 native speakers whom the author consulted, 25 accept (i) as being grammatical, and 6 as being with one question mark.
(i)   Ni zuotian dao-de   yue zao, jintian jiu keyi zou-de   yue zao.
    You yesterday arrive-DE more early today then can leave-DE more early
    'Yesterday, the earlier you arrived, the earlier you can leave today.'
   However, we cannot say for certain whether the Chinese comparative correlative is a counterfactual or not because another reviewer points out that example (ii) is unacceptable. Among 31 informants, 22 say (ii) is ungrammatical, and the other 9 say it is with two question marks.
(ii) *Zuotian ruguo ta yue ma wo, wo jiu yue shengqi.
    Yesterday if   he more scold I   I   then more angry
    'Yesterday, if he scolded me more, I would get more angry.'
   So, we shall leave this issue open (see Beck, 1997:238; Culicover and Jackendoff, 1999:545).
[3] Since the author is a syntactican whose knowledge of formal semantics is not good enough to provide a formal definition (i.e. denotation) for the correlative adverb *yue* 'more', in this paper the semantics of the correlative adverb *yue* 'more' will be described in plain English.

Fourth, why are Chinese comparative correlatives, for example (14), subject to the anti-c-command constraint (Hsiao and Tsao, 2002)? Fifth, how can we identify the nature of the variables (i.e. individuals, worlds, or times) compared along the scale denoted by the predicate modified by the adverb *yue* 'more' (see (10a–c))? Sixth, how does Chinese differ from English in building comparative correlatives?

This paper proceeds as follows: section 2 begins with a general discussion on the syntax and semantics of Chinese comparative correlatives, and then the questions that any analysis on Chinese comparative correlatives has to deal with will be pointed out. In section 3, we shall briefly introduce as preliminary Beck's (1997) proposal on the English/German comparative correlative, especially the semantics of the German comparative correlative morpheme *je* 'the', and then some remarks will be made. In section 4, the proposal will be propounded first, and then some empirical and theoretical consequences will be discussed. Section 5 is a typological study on how Chinese differs from English in building comparative correlatives. In section 6, a brief comparison with Lin (2007) along with some remarks is provided, and finally the conclusion will be stated in section 7.

2. Characteristics of Chinese comparative correlatives

According to Chao (1968:121), in Chinese comparative correlatives like (6), if there is a positive difference in how father A and B differ from each other in height, then there must be a corresponding or resulting positive difference in how their children differ from each other in height. More noteworthy is that these two difference degrees are somehow related to each other.

(6)　　　Fuqin yue　gao, xiaohai (jiu) hui yue　gao.
　　　　　Father more tall　child　　then will more tall
　　　　　'The taller a father is, the taller his kid is.'

Given this property, Hsiao and Tsao (2002:812–813) claim that the Chinese comparative correlative is a proportional correlative in which the two difference degrees are functionally dependent on each other (Quirk et al., 1985:999–1000).[4] However, we find example (6) is intuitively correct under the following scenario: Suppose that father B is 5 cm taller than father A and father B's kid is 2 cm taller than father A's; father C is 5 cm taller than father B, and father C's kid is 3 cm taller than father B's; that is, even though the two difference degrees in Chinese comparative correlatives are somewhat related to each other, it is not necessary for them to be functionally dependent on each other (Beck, 1997:245). Thus, the Chinese comparative correlative is not a proportional correlative.

Second, the situation type of predicate in Chinese comparative correlatives must be unbounded such as a state, an activity, or a derived multiple-event consisting of repeated achievement or semelfactive events, as the contrast between (7a–e) and (7f) illustrates (Hsiao and Tsao, 2002:827).[5,6]

---

[4] Quirk et al. (1985:999–1000) take a similar view for the English comparative correlative.

[5] The grammaticality of (7b) immediately questions Hsiao and Tsao's (2002:821) claim that the first correlative adverb *yue* 'more' in Chinese comparative correlatives modifies quantifiable unbounded situations, including scalar states and quantifiable activities/semelfactives, but the second one can only modify a scalar state. Besides, examples containing achievement and semelfactive verbs are not examined in Hsiao and Tsao (2002).

[6] An anonymous reviewer provides (7e) and points out to us that a verb modified by the correlative adverb *yue* 'more' might co-occur with the aspect marker *–guo* (Among 31 informants, 24 accept (7e) as a grammatical

(7) a. Nuhaizi yue da, (jiu) yue piaoliang. (state)
    Girl more big then more beautiful
    'The older a girl is, the more beautiful she will be.'

  b. Ni yue zui (ta), ta yue pao. (activity)
    You more chase he/she, he/she more run
    'The more cumulative the reference property of your chasing-him event is, the more cumulative the reference property of his running event is.'

  c. Men yue qiao, yue xiang. (semelfactive)
    Door more knock more loud
    'The more cumulative the reference property of your knocking-at-the-door event is, the louder it will be.'

  d. Shibing yue si, yue duo. (achievement)
    Soldier more die more more
    'The more cumulative the reference property of the soldier's dying event is, the larger the amount of dead soldiers is.'

  e. Yue jian-guo da shimian de ren, yue qianxu.
    More see-ASP impressive scene DE person more modest
    'The more cumulative the reference property of one's seeing the impressive scene is, the more modest one is.'

  f. *Ni yue chi-wan, duzi yue bao. (accomplishment)
    You more eat-finish stomach more full

The unboundedness effect leads us to expect the predicate modified by the adverb *yue* 'more' not to co-occur with an aspect marker that expresses perfectivity (i.e. it indicates that an event is

---

sentence, and the other 7 accept it as one with one question mark). Cases like (7e) can be accounted for by the following two ways: First, the experiential aspect marker *–guo* indicates that an event has been experienced with respect to some reference time. Although not all kinds of experiences might be repeatable, some are allowed to be. So, we might say that, similar to (7d), in which the event denoted by the achievement verb *si* 'die' is repeatable so that a derived multiple-event consisting of repeated achievement events is obtained, in (7e) the event denoted the VP *jian-guo da shimian* 'see-ASP impressive scene' (i.e. the experience of seeing the impressive scene) is also repeatable, as (i) shows.

(i) Zhangsan jian-guo wushu-ci de da shimian.
  Zhangsan see-ASP incalculable DE impressive scene
  'The number of impressive scenes that Zhangsan has seen is incalculable.'

 That is to say, a derived activity might be obtained in (i). So, the experiential aspect marker *–guo* can occur in (7e). This assumption gets supported from the fact: the aspect marker *–guo* cannot co-occur with the adverb *yue* 'more' in (ii), where the predicate *de mazhen* 'have the measles' is unrepeatable, as the ungrammaticality of (ii) illustrates.

(ii) *Yue de-guo mazhen de ren, shenti yue cha.
   More have-ASP measles DE person body more bad
 'The more cumulative the reference property of one's having the measles event is, the worse his/her health condition is.'

 Since a person can never have the measles twice in his/her life, the predicate *de mazhen* 'have the measles' is unrepeatable. Hence, the experiential aspect marker *–guo* is not allowed in (ii). Thus, it is possible for the experiential aspect marker *–guo* to co-occur with the adverb *yue* 'more' if the predicate is repeatable. The other alternative to why the aspect marker *–guo* can occur in (7e) is that it is the object NP *da shimian* 'impressive scene' with an unbounded scale along the degree of *impressiveness* that makes the predicate *jian-guo da shimian* 'see-ASP impressive scene' atelic. So, the aspect marker *–guo* is allowed in (7e).

bounded temporally, spatially, or conceptually), for example the aspectual suffix *–le*. The fact indeed bears out this expectation, as the contrast between (8a) and (8b) shows.[7,8]

(8)   a.   *Ni yue chufa-le ta,   ta yue tiaopi.
           You more punish-ASP her/him, s/he more naughty
      b.   Ni yue duo-zhe ta,   ta   yue huaiyi ni.
           You more hide-ASP him/her he/she more suspect you
           'The more cumulative the reference property of your hiding yourself from
           him/her event is, the more he/she will suspect on you.'

Another consequence of the unboundedness condition shown by the predicate of Chinese comparative correlatives is that the negation marker *bu* 'not' can appear in Chinese comparative correlatives but the negation marker *mei* 'not' cannot, as the contrast between (9a) and (9b) illustrates.

(9)   a.   Xiaohaizi yue bu tinghua,   (jiu) yue bu gai   li   ta.
           Child   more not well-behaved then more not should care him/her
           'The worse a child behaves, the less we should care about him/her.'
      b.   *Zhangsan yue mei chouyan, ni yue bu gai   mai yan   song ta.
           Zhangsan more not smoke   you more not should buy cigarette give him

According to Lin (2003a), the distribution of the Chinese negation marker *bu* 'not' and *mei* 'not' is aspectually sensitive. The negation marker *bu* 'not' aspectually selects as complement a stative situation that requires no input of energy in order to obtain that situation while the negation marker *mei* 'not' aspectually selects a dynamic and bounded event as complement. So, the ungrammaticality of (9b) results from violation of the unboundedness condition shown by the predicate of Chinese comparative correlatives.[9]

---

[7] For the notion of perfectivity, we resort to Bohnemeyer and Swift (2001) and Lin (2003b). Following Bohnmeyer and Swift's (2001) concept of event realization, Lin (2003b), along the line of Liu (1988), analyzes the verbal *–le* as a realization operator, and formally defines its meaning as follows: An event *e* denoted by *P* is realized if and only if a subevent *e'* of *e* that also falls under *P* is included with the topic time, as illustrated in (i).

(i) $[[le]] = \lambda P \lambda t_2 \lambda e \exists e'[P(e) \wedge P(e') \wedge e' \leq_E e \wedge \tau(e') \subseteq t_2 \wedge t_2 \leq \tau(e_{pro})]]$

More precisely, when *P* is telic, *e'* is equivalent to *e*, hence entailing that *e* is perfective. However, when *P* is atelic, *e'* can be a proper subpart of *e* or is equivalent to *e*. As a consequence, *e* is not necessarily included within the topic time and hence is not necessarily perfective. In spite of this, if the focus is only on the subpart *e'* of *e*, it still can be claimed that *e'* is perfective, because *e'* is included within the topic time.

[8] However, in contrast with progressive aspect marker *–zhe*, the progressive marker *zai* 'at' is incompatible with *yue* 'more'.

(i)   *Pingguo, ni yue zai chi, yue xiang.

We suggest that *zai* 'at' and *yue* 'more' both operate on the event structure that they modify, and compete the same adverbial position related to the event structure. So, the complementary distribution between *zai* 'at' and *yue* 'more' makes (i) ungrammatical.

[9] Interestingly, if the focus verb *shi* 'is' is inserted in-between the correlative adverb *yue* 'more' and the negated predicate (i.e. *mei chouyan* 'not smoke'), (9b) becomes acceptable, as (i) shows.

(i)   Zhangsan yue shi mei chouyan, ni yue bu gai   mai yan   song ta.
     Zhangsan more is not smoke   you more not should buy cigarette give him
     'The more cumulative the reference property of Zhangsan's not smoking event is,
     the more prohibited to buy cigarette for him you are.'

Third, the semantic interpretation of Chinese comparative correlative (10a–c) can be roughly formulated as (11a–c), in which we always have universal quantification over pairs and parts of the pair can be worlds as in (11a), individuals as in (11b), or times as in (11c) (Beck, 1997:236–237).[10]

(10) a. Zhangsan zhunbei-de yue hao, ke   jiu jiao-de   yue hao.
          Zhangsan prepare-DE more good lecture then teach-DE more good
          'The better Zhangsan is prepared, the better his lecture is.'
      b. Nuhaizi yue da, yue   piaoliang.
          Girl   more big more beautiful
          'The older a girl is, the more beautiful she is.'
      c. Tianqi yue re, shui he-de   yue duo.
          Weather more hot water drink-DE more more
          'The hotter it is, the more water people will drink.'

(11) a. $\forall w_1, w_2$ [Zhangsan is better prepared in w_2 than in w_1] $\rightarrow$ [Zhangsan lectures better in w_2 than in w_1].
      b. $\forall x, y$ [girl(x) & girl(y) & x is older than y] $\rightarrow$ [x is more beautiful than y].
      c. $\forall t_1, t_2$ [It was hotter at t_2 than at t_1] $\rightarrow$ [People drink more water at t_2 than at t_1].

As (11a–c) illustrate, the first clause always enters into the restriction in a way the same as the *if*-clause in conditionals does, and the nuclear scope is provided by the second clause. These semantic characteristics lead us to suggest that the Chinese comparative correlative involves an (implicit) adverb of quantification and universal quantification seems to be default. The following two facts further work in concert to suggest that Chinese comparative correlatives involve unselective binding: (A) Since universal quantification in Chinese comparative correlatives can be overwritten by an overt adverb of quantification, it is plausible for us to suggest that the quantificational force of Chinese comparative correlatives comes from an adverb of quantification which takes the first clause as its first argument and the second clause as its second argument, and (B) the number of variables quantified may be different. These facts are exemplified by (12a–c)–(13a–b), respectively.

The same also obtains in cases containing the aspect marker –*le*, as shown by (ii).

(ii) Fanren   yue *(shi) he-le   jiu, yue rongyi naoshi.
      Criminal more is   drink-ASP wine more possible make-trouble
      'The more cumulative the reference property of the criminals' drinking event is,
       the more likely for them to make trouble it is.'

  Since the focus verb *shi* 'is' has a function of adjusting one's attention or the camera lens to make something or some event into a clear image. An image is a picture formed in a mind, or a picture formed of an object in front of a mirror or lens such as a picture formed on the film inside a camera or one's reflection in a mirror. Hence, an image can be considered a state. Seen in this light, we suggest that the focus verb *shi* 'is' functions to turn the negated predicate in (i) (i.e. *mei chouyan* 'not smoke') into a state; therefore, (i) becomes acceptable. As the same reasoning, the grammaticality of (ii) gets explained.

[10] The first clause of (10b) in fact is ambiguous between one in which different girls are compared along the age-scale and the other in which different spatio-temporal 'regions' of the same girl are compared with each other along the age-scale. Please see footnote (19) for further discussion (Kratzer, 1986).

(12)   a.   Nuhaizi tongchang yue   da, yue   piaoliang.
            Girl   always   more old more beautiful
            'The older a girl is, the more beautiful she usually is.'
       b.   Nuhaizi daoduo yue   da, yue   piaoliang.
            Girl   mostly more old more beautiful
            'In most cases, the older a girl is, the more beautiful she is.'
       c.   Nuhaizi youshihou yue   da, yue   piaoliang.
            Girl   sometimes more old more beautiful
            'Sometimes, the older a girl is, the more beautiful she is.'

(13)   a.   Nuhaizi yue   gao, yue   piaoliang, (jiu) yue   rongyi bei   xuanshang.
            Girl   more tall more beautiful then more easy   BEI select
            'If a girl is taller and more beautiful, then it is easier for her to be
            selected.'
       b. $\forall$x, y [girl(x) & girl(y) & x is taller than y & x is more beautiful than y] $\rightarrow$ [x
            is easier to be selected than y is].

Based on these facts, it is not unreasonable for us to say that Chinese comparative correlatives
involve an (implicit) adverb of quantification and unselective binding. Such a semantic property
of the Chinese comparative correlative immediately drives us to the following questions. (A)
How do we map the syntactic tree structure of Chinese comparative correlatives, especially cases
like (4a), to its corresponding quantificational tripartite structure? (B) What is the semantics of
the correlative degree adverb *yue* 'more'? (C) How can we identify the nature of the variables (i.e.
individuals, worlds, or times) compared with each other along the scale denoted by the predicate
modified by the adverb *yue* 'more' (see (10a–c))?

   Fourth, based on the ill-formedness of examples like (14), Hsiao and Tsao (2002:820–822)
suggest that the Chinese comparative correlative is subject to the anti-c-command constraint:
A correlative adverb *yue* 'more' cannot c-command another one that follows it in the linear
order.

(14)   *Zhangsan yue   xihuan [NP [S yue   gui   de] dongxi].
        Zhangsan more like   more expensive DE thing

   Fifth, as Culicover and Jackendoff (1999:554–556) point out, English comparative correlatives
appear to have an internal structure involving a long-distance dependence between the com-
parative phrases at the front and a gap within the CP, and the gaps in the two clauses (i.e. CPs)
indeed show the typical constraints (i.e. island constraints) on long-distance dependence, as
example (15a–c), taken from Culicover and Jackendoff (1999:555), illustrate.

(15)   a.   [The more counterexamples]$_i$ Mary say that Bill has helped Fred to discover t$_i$,
            the less I believe her. (long-distance dependence)
       b.   *[The more food]$_i$ Mary knows a man that eats t$_i$, the poorer she gets. (CNPC)
       c.   *[The fatter]$_i$ he goes to a doctor when he gets t$_i$, the more he eats. (CED)

However, Chinese examples like (16a–c) not only allow long-distance dependence but are also
granted immunity from island constraints if the adverb *yue* 'more' is assumed to covertly move to
the initial position of the clause.

(16) a. Ni-de shouru yue gao, [renmen hen ziran-de jiu hui renwei [ni-de shui
          Your income more high people very naturally then will think   your tax
          hui yue gao]].
          will more high
          'The more income you get, the more tax people will rightly think that you will
          pay.'

      b. [CP [IP [NP [CP Yue ai   piaoliang de] nuhaizi] [VP chi-de yue   shao]]]. (CNPC)
          More   love beautiful DE girl   eat-DE more less
          'The more a girl cares about her beautifulness, the less she eats.'

      c. Ren   yue jianjue, [[zai yue   jiankun de shihou], [yue neng kefu
          People more constant at   more difficult DE moment more can overcome
          kunnan]]. (CED)
          difficulty
          'If people are more constant, they are more likely to overcome difficulties
          when they are under more difficult situations.'

This typological difference between Chinese and English in building comparative correlatives hence becomes a question that any theory on Chinese comparative correlatives cannot evade.

Thus far, we have listed the major syntactic and semantic characteristics of Chinese comparative correlatives. No analysis on Chinese comparative correlatives is plausible unless the following questions are well handled. (A) How do we map the syntactic tree structure of Chinese comparative correlatives into its corresponding quantificational tripartite structure? (B) What is the semantics of the correlative degree adverb *yue* 'more'? (C) Why does the predicate of Chinese comparative correlatives display the unboundedness effect? (D) Why are Chinese comparative correlatives, for example (14), subject to the anti-c-command constraint? (E) How can we identify the nature of the variables (i.e. individuals, worlds, or times) compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'? (F) How does Chinese differ from English in building comparative correlatives?[11]

Before proposing our analysis for Chinese comparative correlatives, we shall briefly introduce as preliminary Beck's (1997) semantic analysis on English/German comparative correlatives, especially the semantics of the German comparative correlative morpheme *je* 'the', and then some remarks will be provided.

3. Preliminary: Beck (1997) and some remarks

Beck (1997:234) follows von Fintel (1994) in analyzing German comparative correlatives like (17a) as conditional constructions; that is, (17a) has a syntactic structure as in (17b), in which the *je*-clause 'the-clause' (when the sentence starts with it) is in the same position as a left-dislocated element, presumably adjoined to CP.

(17) a. Je   schneller Hans rennt, umso schneller wird er mude.
          The   faster   Hans runs, the faster   gets he tired
          'Hans will get tired faster, the faster he runs.'

      b. [CP [CP [DegP je [Deg' schneller]] [C' Hans rennt]] [CP [DegP umso [Deg' schneller]]
          [C' wird er mude]]]

---

[11] Since Hsiao and Tsao (2002) as well as McCawley (1988) do not provide any analysis for the characteristics of Chinese comparative correlatives pointed out by them, we shall not have any remarks on them here.

In other words, the subordinate clause and the main clause are sentential projections, presumably CPs, and semantically each of them contains a comparative. Their specifier positions (i.e. [Spec, CP]) contain the *je*-phrase 'the-phrase' and the *umso/desto*-phrase 'the-phrase', respectively.[12] Beck (1997:234) further suggests that the same presumably holds for English *the*-phrases (Thiersch, 1982).

As Beck (1997:236–237) further argues, the semantic interpretations of (18a–c) can be roughly formulated as (19a–c), in which we always have universal quantification over pairs and parts of the pair can be worlds as in (19a), individuals as in (19b), or times as in (19c).

(18)   a.   Je   besser Otto vorbereitet ist, desto besser wird sein Referat werden.
              The better Otto prepared   is the   better will his talk   become
              'The better Otto is prepared, the better his talk will be.'
        b.   Je   schleimiger ein Anwalt asussieht, desto ergolgreicher ist er.
              The slimy-er   an attorney look   the   successful-er is he
              'The slimier an attorney looks, the more successful he is.'
        c.   Uli war umso muder, je   heiber es war.
              Uli was the   tired-er the hotter it was
              'The hotter it was, the more tired Uli was.'

(19)   a. $\forall w_1, w_2$ [Otto is better prepared in w_2 than in w_1] $\rightarrow$ [Otto's talk is better in w_2 than in w_1].
        b. $\forall x, y$ [attorney(x) & attorney(y) & x looks slimier than y] $\rightarrow$ [x is more successful than y].
        c. $\forall t_1, t_2$ [It was hotter at t_2 than at t_1] $\rightarrow$ [Uli was more tired at t_2 than at t_1].

(19a–c) imply that the global structure of these interpretations is that of a conditional. The subordinate clause always enters into the restriction, similarly to the *if*-clause in conditionals, while the nuclear scope is provided by the matrix clause. More interestingly, in comparative correlatives as well as in other conditional sentences, universal quantification seems to be a default because universal quantification can be overwritten by an overt adverb of quantification (Beck, 1997:238).

(20)   a.   Meistens ist ein Kletterer umso besser, je   starker   erist.
              Mostly   is a   climber   the   better the stronger he is
              'The stronger a climber is, the better he usually is.'
        b.   Otto ist ein Mathebuch umso langweiliger, je   dicker es ist.
              Often is a   math book the   boring-er   the fatter it is
              'A math book is frequently the more boring, the fatter it is.'
        c.   Meistens war Otto umso muder, je   heiber es war.
              Mostly   was Otto the   tired-er the hotter it was
              'The hotter it was, the more tired Otto usually was.'

So, Beck (1997:239) suggests that the quantificational force comes from an (implicit) adverb of quantification, which takes the subordinate clause as its first argument, and the matrix clause as

---

[12] Although Beck (1997) claims that in English/German comparative conditionals the comparative conditional morpheme, for example the German *je* 'the', is pied-piped along with the comparative morpheme *–er* at LF, she does not touch the issue about overt movement in English/German comparative conditionals.

its second argument. Since the comparison in the subordinate clause of (18a) (repeated as (21a)), for instance, is between Otto's preparedness in two different worlds, the meaning of (21a), under Beck's (1997) analysis, is given in (21b).[13]

(21)   a.   Je besser Otto vorbereitet ist, …..
            'The better Otto is prepared, ….'
    b. $\exists d$ [d > 0 & the max d_1 [well(d_2, λx [prepared$_{w2}$(x)])(Otto)] = d + the max
            d_1 [well((d_1, λx [prepared$_{w1}$(x)])(Otto)]]

Given this, Beck (1997:248) suggests that the comparative conditional morpheme *je* 'the' in (21a) denotes a relation between a pair of possible worlds, the comparative morpheme *–er* and a relation between worlds and degrees, as shown by (22).[14]

(22)   [[je']](w$_1$, w$_2$)([[-er']])(D$_{<s, <d, t>>}$) iff $\exists d$ [d > 0 & [[-er']](D(w$_1$))(d)(D(w$_2$))]

Namely, the *je*-relation 'the-relation' holds just in case there is a difference degree d such that the relation denoted by the comparative conditional morpheme holds between the relational argument applied to the first world in the pair, the difference degree d and the relational argument applied to the second world. So, the transparent LF of (21a) is like (23).

(23)   [$_{CP}$ [$_{DegP}$ je + -er]$_i$ [$_{C'}$ Otto ist t$_i$ gut vorbereitet]]
    'je'(w$_1$, w$_2$)(-er')($\lambda w \lambda d$ [well(d, λx [prepared$_w$(x)])(Otto)]'

Assuming this, Beck (1997:249) gives (18a) a complete LF like (24a) with the semantic interpretation as in (24b) (Wold, 1991).

(24)   a.   [$_{CP}$ [$_{CP}$ [$_{DegP}$ je'(w$_1$, w$_2$) + -er']$_i$ [$_{C'}$ Otto ist t$_i$ gut vorbereitet]] [$_{CP}$ [$_{DegP}$ je'(w$_1$,
            w$_2$) + -er']$_i$ [$_{C'}$ Otto's Referat wird t$_i$ gut werden]]]
            '$\forall$(λw_1, w$_2$ [je'(w$_1$, w$_2$)(-er')($\lambda w \lambda d$ [well(d, λx [prepared$_w$(x)])(Otto)]))(λw_1,
            w$_2$ [je'(w$_1$, w$_2$)(-er')($\lambda w \lambda d$ [good$_w$(d, Otto's_talk)])])'
    b.   [[$\forall$(λw_1, w$_2$) [je'(w$_1$, w$_2$)(-er')($\lambda w \lambda d$ [well(d, λx [prepared$_w$(x)])(Otto)])])
            (λw_1, w$_2$ [je'(w$_1$, w$_2$)(-er')($\lambda w \lambda d$ [good$_w$(d, Otto's_talk)])])]]]
            iff
            $\forall w_1$, w$_2$ [$\exists d$ [d > 0 & the max d_2 [well(d_2, λx[prepared$_{w2}$(x)])(Otto)] = d + the
            max d_1 [well(d_1, λx [prepared$_{w1}$(x)])(Otto)]] $\Rightarrow$ $\exists d'$ [d' > 0 & [[the max d_2
            [good$_{w2}$(d$_2$, Otto's_talk)] = d' + the max d_1 [good$_{w1}$(d$_1$, Otto's_talk)]]]

Although Beck (1997) carries the study of comparative correlatives one step further, the overall picture of syntax and semantics of comparative correlatives, especially that of Chinese comparative correlatives, is much more complex. First, according to Beck's (1997) analysis, the syntactic tree structure of English/German comparative correlatives is split into a tripartite

---

[13] Beck (1997:242–243) has as preliminary a maximal degree approach, similar to von Stechow (1984) and Heim (1985), to the semantics of comparatives. For example, the meaning of (i) is represented as in (ii).
(i)   John is three centimeters taller than Bill (is tall).
(ii)   The max d_2 [tall(d_2, John)] = 3 cm + the max d_1 [tall(d_1, Bill)].
[14] Beck (1997) says that the same obtains for the English comparative correlative (Thiersch, 1982).

representation, and the antecedent clause enters into the restrictive domain while the consequent clause the nuclear domain; namely, English/German comparative correlatives always consist of an antecedent and a consequent clause, as (25) shows.

(25)   The harder he worked, the hungrier he got.

However, the same does not always hold in Chinese comparative correlatives, as (26a–b) illustrate.

(26)   a.   [$_S$ [$_{NP}$ [$_S$ Yue tian   de] pingguo] [$_{AP}$ (jiu) yue   haochi]].
                 More   sweet DE apple   then more delicious
                 'The sweeter an apple is, the more delicious it is.'
         b.   [$_{NP}$ [$_S$ Yue hao   de] shu] [$_S$ (jiu) yue   duo ren   kan].
                 More   good DE book   then more more people read
                 'The better a book is, the more people will read it.'

Namely, the Chinese comparative correlatives can be a sentence with a complex NP (i.e. an NP modified by a relative clause) subject, or a topic-comment construction in which the topic NP is modified by a relative clause.

Second, like its English counterpart, the Chinese *yue ... yue* 'more ... more' comparative correlative involves quantification over a pair of variables, and parts of the pair can be individuals, worlds, or times. However, Beck (1997) fails to provide a mechanism through which we can predict when the parts of the pair are individuals, worlds, or times.

In the following, for the sake of readers' friendliness, we shall briefly introduce as preliminary our analysis first, and following this are the details of the proposal.

4. Analysis

In a nutshell, my proposal is as follows: The Chinese comparative correlative contains an (implicit) adverb of quantification and involves a quantificational tripartite (i.e. the restrictive domain-nuclear scope) structure. The mapping between its syntactic tree structure and the corresponding quantificational tripartite structure is subject to a revised version of Tsai's (2001) Extended Mapping Hypothesis. The correlative adverb *yue* 'more' semantically functions to regulate a relationship between a pair of degree/quantity variables and a comparison relation (Doetjes, 1997). Since the adverb *yue* 'more' implies a comparison, occurrence of the adverb *yue* 'more' induces a pair of degree/quantity variables which are 'directly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. The relationship between these two variables is subject to the condition: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa. Semantically, a relation denoted by the correlative adverb *yue* 'more' must be identified either as the restrictive domain or the nuclear scope of a quantificational tripartite structure; therefore, a 'restrictive-domain-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more') must co-occur with a 'nuclear-scope-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more'), and vice versa. The two degree/quantity variables 'directly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more' must be associated with

two 'corresponding' variables (syntactically or semantically) predicated by the predicate modified by the adverb *yue* 'more', respectively. These two 'corresponding' variables can be considered the variables that are 'indirectly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. The type of predicate modified by the adverb *yue* 'more' provides further information to help identify the nature of the two 'indirect' variables (i.e. individuals, times or worlds).

4.1. The syntax-semantics mapping process

As we have pointed out, the Chinese comparative correlative, containing an (implicit) adverb of quantification, involves a quantificational tripartite structure. Since there is no overt grammatical marker to introduce either the restrictive domain or the nuclear scope in Chinese comparative correlatives, we suggest that, in the simplest case of Chinese comparative correlatives, the first clause is mapped into the restrictive domain and the second one into the nuclear scope of the quantificational tripartite structure. Hence, example (1a), repeated as (27a), has a quantificational tripartite structure like (27b) (Kamp, 1981; Heim, 1982).

(27)   a.   [$_{CP}$ [$_{CP}$ Pingguo yue   tian], [$_{CP}$ Pro (jiu) yue haochi]].
               Apple   more sweet   then more delicious
               'The sweeter an apple is, the more delicious it is.'
    b. $\forall$x, y [apple(x) & apple (y) & x is sweeter than y] $\rightarrow$ [x is more delicious than y].

However, one important question we have to answer at this point is how to identify the quantificational tripartite structure for Chinese comparative correlatives like (26a–b), repeated as (28a–b).

(28)   a.   [$_{S}$ [$_{NP}$ [$_{S}$ Yue tian de] pingguo]] [$_{AP}$ (jiu) yue haochi]].
               More   sweet DE apple   then more delicious
               'The sweeter an apple is, then the more delicious it is.'
    b.   [$_{Topic/NP}$ [$_{S}$ Yue hao de] shu], [$_{Comment/S}$ yue duo ren   kan].
               More   good DE book   more more people read
               'The better a book is, the more people read it.'

We suggest that the syntactic tree structure of cases like (28a–b) can be mapped into its corresponding quantificational tripartite structure by assuming a revised version of Tsai's (2001:132) Extended Mapping Hypothesis (Kamp, 1981; Heim, 1982; Diesing, 1992).[15]

---

[15] Tsai (2001:132) formulates the Extended Mapping Hypothesis as follows (Diesing, 1992:10):

(i)   Extended Mapping Hypothesis
    a.   Mapping applies cyclically, and vacuous quantification is checked derivationally.
    b.   Material from a syntactic predicate is mapped into the nuclear scope of a mapping cycle.
    c.   Material from XP immediately dominating the subject chain of a syntactic predicate (excluding that predicate) is mapped outside the nuclear scope of a mapping cycle. A subject chain is an A-chain with its tail in a subject position.
    d.   Existential closure applies to the nuclear scope of a mapping cycle.

(29) Revised Extended Mapping Hypothesis[16]

    a.   The first clause (i.e. CP) immediately dominated by the top CP is mapped into the restriction while the second the nuclear scope; otherwise,

        i.   Material from a syntactic predicate is mapped into the nuclear scope in a Chinese comparative correlative, and

        ii.   material from XP immediately dominating the subject chain of a syntactic predicate (excluding that predicate) is mapped outside the nuclear scope in a Chinese comparative correlative. A subject chain is an A-chain with its tail in a subject position.

    b.   Given the correlative nature of the adverb *yue* 'more', at least one occurrence of the adverb *yue* 'more' must be found in the restriction and the nuclear scope of the quantificational tripartite structure to ensure that a comparison is made in either domain.

In (28a), the material from AP (i.e. *yue haochi* 'more delicious') is mapped into the nuclear scope and material from IP (excluding AP) into the restrictive domain (i.e. *yue tian de pingguo* 'more sweet DE apple'). In a topic-comment construction like (28b), the whole IP counts as a complex predicate with the null operator (semantically a lambda operator) as its open place. Thus, the quantificational tripartite structures of (28a–b) are as in (30a–b), respectively.

(30) a. $\forall x, y$ [apple(x) & apple(y) & x is sweeter than y] → [x is more delicious than y].

      b. $\forall x, y$ [book(x) & book(y) & x is better than y] → [the number of people who read x is more than that of those who read y].

As (30a) indicates, Chinese comparative correlatives seem to involve a relation between a pair of variables, a comparison relation and a relation between variables and degrees. This is immediately reminiscent of Beck's (1997) proposal on the semantics of the German comparative conditional morpheme *je* 'the'.

4.2. The semantics of the correlative adverb yue

According to Beck (1997:248), the German comparative conditional morpheme *je* 'the' has a denotation like (31).

(31) $[[je']](x_1, x_2)([[-er']])(D_{<s, <d, t>>})$ iff $\exists d$ [d > 0 & [[-er']](D(x_1))(d)(D(x_2))]

---

[16] The semantic relationship between the restrictive domain and the nuclear scope of a quantificational tripartite structure is not necessary to be a causal one. For instance, in example (i) it is not necessary for 'x is a person' to cause x to drink.

(i)   Everyone drinks.

      '$\forall x$ [x is a person] → [x drinks].'

Besides, Condition (29b), as we shall suggest, can be derived from the semantics of the correlative adverb *yue* 'more'. For sentences like (ii), which consists of more than two clauses, there are more than one way of mapping between the syntactic tree structure and the quantificational tripartite structure.

(ii)   Tianqi yue re, han liu-de   yue duo, shui he-de   yue duo.

      Weather more hot sweat perspire-DE more more water drink-DE more more

      a.   'If it gets hotter, people perspire more and drink more.'

      b.   'If it gets hotter and people perspire more, then people drink more.'

The mapping indeed depends on the semantic interpretation, meaning that which part(s) is (or are) considered the restriction. However, at least one clause must be mapped into the restriction and at least one the nuclear scope; otherwise, the sentence will be ungrammatical.

Namely, [[je']] has three arguments: a pair of variables, the comparative morpheme –*er*, and the function $D_{<s,<d, t>>}$. However, neither definite article (e.g. the English *the*) nor overt comparative morpheme exists in Chinese. Hence, it is impossible for us to say the Chinese comparative correlative morpheme *yue* 'more' has a denotation the same as what Beck (1997) suggests for the German *je* 'the'.

Based on the semantic interpretation of examples like (28a) (i.e. (30a)), we suggest that semantically the correlative adverb *yue* 'more' functions to regulate a relationship between a pair of degree/quantity variables and a comparison relation. More precisely, since the adverb *yue* 'more' implies a comparison, occurrence of the adverb *yue* 'more' induces a pair of degree/quantity variables. These two variables are further compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. Moreover, the relationship between these two variables must be subject to the condition: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa. To derive the correlative nature of the adverb *yue* 'more', we suggest that a relation denoted by the correlative adverb *yue* 'more' must be identified either as the restrictive domain or the nuclear scope of a quantificational tripartite structure. Hence, a 'restrictive-domain-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more') must co-occur with a 'nuclear-scope-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more'), and vice versa (see example (ii) of footnote (16)). The two degree/quantity variables 'directly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more' are further associated with two 'corresponding' variables (syntactically or semantically) predicated by the predicate modified by the adverb *yue* 'more', respectively. These two 'corresponding' variables thereby can be considered the variables that are 'indirectly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. Furthermore, the type of predicate modified by the adverb *yue* 'more' provides information to help identify the nature of the two 'indirect' variables (i.e. individuals, times or worlds).

One point that we cannot ignore at this point is the question of how the type of predicate modified by the correlative adverb *yue* 'more' provides information to help identify the nature of the 'indirect' variables. According to Doetjes (1997:115), there are two different scalar argument positions: the scalar *q*-position (quantity) and the *g*-position (grade). The *q*-position is associated to the *r*-position (reference) in the grid of an NP to reflect the reference properties of the noun, or to the *e*-position (event) in the grid of a VP to express the reference properties of the event (e.g. *They ran a lot* does not imply that there were many people who ran, but that there was a lot of running taking place). The *g*-position is found in scalar adjectives, and θ-bound by elements such as *so, as* and *how* (von Stechow, 1984; Higginbotham, 1985; Heim, 1985; Zwarts, 1992; Kennedy and McNally, 2005). As Doetjes (1997) further suggests, VPs modified by a degree quantifier may contain either a scalar *q*-position or a *g*-position. Stage-level VPs contain a *q*-position and in some cases also a *g*-position, while individual-level VPs only contain a *g*-position. For ease of exposition, in the following we shall use the degree argument and the quantity argument to represent the *g*-position and the *q*-position, respectively.

On the one hand, if what the adverb *yue* 'more' modifies is a gradable individual-level predicate, for example the adjective *tian* 'sweet' or the stative verb *xihuan* 'like', what the correlative adverb *yue* 'more' interacts with is the degree argument of the gradable individual-level predicate. Since occurrence of the adverb *yue* 'more', as we have argued, induces a comparison between two variables, two degree arguments related to the gradable individual-level predicate will be induced. Given that an individual-level predicate does not change spatio-

temporally, these two degree variables cannot be understood as two different degree values related to a singular subject NP that denotes an entity. Instead, they can only be considered two degree arguments, each belonging to a different entity predicated by the individual-level predicate, as illustrated by the contrast between (32a–b) and (32c).

(32) a. Zhe-zhong pingguo yue tian, yue haochi.
          This-kind apple   more sweet more delicious
          'The sweeter this kind of apples is, the more delicious it is.'
      b. Pingguo yue   tian, yue haochi.
          Apple   more sweet more delicious
          '∀x, y [apple(x) & apple (y) & x is sweeter than y] → [x is more delicious than y].'
      c. *Zhe-ke pingguo yue tian, yue haochi.
          This-CL apple   more sweet more delicious

To put it another way, what are 'indirectly' compared with each other in cases involving a gradable individual-level predicate, for example (32a–b), are two different entities, namely individuals (i.e. apples).

On the other hand, whenever the predicate modified by the correlative adverb *yue* 'more' is a stage-level predicate, what interacts with the adverb *yue* 'more' is the quantity argument of the verb. For example, in (33) it is the quantity argument of the stage-level predicate *pao* 'run' that interacts with the adverb *yue* 'more'.

(33) Zhangsan yue pao, yue   kuai.
      Zhangsan more run more fast
      'The more cumulative the reference property of Zhangsan's running event is, the faster he is.'

Since occurrence of the adverb *yue* 'more' implies a comparison, two quantity arguments will be induced in (33). In addition, the property of a stage-level predicate might change along the spatio-temporal axis; therefore, these two different quantity arguments might each belong to a different spatio-temporal region or sausage of the same entity because an individual can be viewed as spatio-temporal regions or sausages, composed of stages or time-slices (Carlson, 1977; Hinrichs, 1985). So, in (33) what are 'directly' compared with each other are two different quantity arguments (or variables), each associated with a different spatio-temporal region of the subject NP *Zhangsan*.

Although almost all speakers tend to have a preference for the reading in which two spatio-temporal regions of the same entity are compared with each other along some scale in cases involving a stage-level predicate, another reading in which two different degree/quantity variables, each belonging to a different entity, are compared is still acceptable to them. For instance, the (b) reading is intuitively acceptable for (34) under the following scenario[17]:

---

[17] Even though for most speakers the reading in which two different entities are compared along some scale is preferred in cases involving the relative clause modification, the reading in which two different spatio-temporal regions of the same entity are compared along the same scale is still acceptable for them if an appropriate scenario is provided. Sentence (i) provides an example.

(i) [NP [CP Yue mang de] ren]   yue   rongyi wang-dong-wang-xi.
     More   busy DE people more easy   forget-east-forget-west
a. 'If a person is busier, then it is easier for him/her to be forgetful.'
b. 'The busier a person gets, the easier for him to get forgetful it is.'

(34)   Ren   yue   mang, jiu yue   rongyi wang-dong-wang-xi.
       People more busy   then more easy   forget-east-forget-west
       a.   'The busier a person gets, the easier it is for him to get forgetful.'
       b.   'If person x is busier than person y, then it is easier for x to be forgetful than it is
            for y.'

Suppose Zhangsan is the chair of Department of Linguistics while Lisi is Dean of Academic Affairs at the same university. Everyday, Lisi is much busier than Zhangsan, and Lisi, as busy as a bee, is always a person more forgetful than Zhangsan. So, what are 'indirectly' compared with each other in the (b) reading are two different individuals. We suggest the ambiguity shown by examples like (34) might result from the possibility of having a stage-level predicate like *mang* 'busy' used as an individual-level predicate under an appropriate context.

For examples like (10c), repeated as (35a), what the adverb *yue* 'more' modifies is a stage-level scalar adjective, namely *re* 'hot.

(35)   a.   Tianqi yue re, shui he-de   yue duo.
            Weather more hot water drink-DE more more
            'The hotter it is, the more water people will drink.'
       b. $\forall t_1, t_2$ [It was hotter at t_2 than at t_1] $\rightarrow$ [People drink more water at t_2 than at t_1].

Here, two degree variables are induced, and each belongs to a different spatio-temporal region of 'the weather' because of the stage-level status of the adjective *re* 'hot'. These two spatio-temporal regions somewhat can be understood as two different time variables pragmatically. Thus, (35a) has a rough semantic representation as in (35b), in which what are 'indirectly' compared with each other are two different time variables bound by the unselective operator.

Assuming such an analysis, the semantic interpretation of the first clause of (36), in which the gradable adjective *hao* 'good' occurs as the V-*de* complement and the subject NP denotes a single entity (i.e. *Zhangsan*), can be derived as follows (Huang, 1988).

(36)   Zhangsan zhunbei-de yue hao, ke   jiu jiao-de   yue hao.
       Zhangsan prepare-DE more good lecture then teach-DE more good
       'The better Zhangsan is prepared, the better his lecture is.'

In the first clause of (36), the adverb *yue* 'more' interacts with the gradable adjective *hao* 'good'; therefore, two different degree arguments are induced because of the comparison relation implied by the adverb *yue* 'more'. However, the subject NP *Zhangsan* denotes a singular definite entity rather than two different entities. So, we would expect (36) to be ungrammatical, contrary to fact. The crucial factor that rescues (36) from being ungrammatical is the stage-level status of the main predicate *zhunbei-de* 'prepared-DE' of the first clause. Since the 'property' of a stage-level predicate can change spatio-temporally, it is possible for us to get two different spatio-temporal regions of the individual *Zhangsan* (i.e. two 'duplicates' of *Zhangsan* in two different possible worlds) in (36). And each different possible world is associated with a different degree argument. So, the comparison in the first clause of (36) becomes possible, and the semantic interpretation of (36) can be roughly represented as in (37).

Originally, Zhangsan was the chair of Department of Linguistics, and was appointed as Dean of Academic Affairs recently. So, Zhangsan becomes much busier than he was, and now he is as busy as a bee everyday. Given this, Zhangsan becomes more forgetful than before after he was appointed as Dean of Academic Affairs.

(37) $\forall w_1, w_2$ [Zhangsan is better prepared in w_2 than in w_1] → [Zhangsan lectures better in w_2 than in w_1].

   One of the central assumptions of our proposal (i.e. for every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa) immediately excludes the possibility of having the adverb *yue* 'more' modify a predicate that denotes a bounded event. Take (38a) as example:

(38)   a.   *Ni yue chi-wan, duzi   yue bao. (accomplishment)
                You more eat-finish stomach more full
         b.   Ni yue chi, duzi   jiu hui yue bao. (activity)
                You more eat stomach then will more full
                'The longer you keep eating, the fuller you will feel.'

The accomplishment (i.e. bounded-event-denoting) predicate *chi-wan* 'eat-finish' implies a 'bounded' quantity of the event denoted by *chi-wan* 'eat-finish'. Existence of such a 'bounded' quantity immediately violates the constraint: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa, because there does not exist another quantity 'larger' than it. Therefore, (38a) is ungrammatical. So, the unboundedness effect becomes a natural consequence of our analysis (see (7a–f) repeated as (39a–f)).[18]

(39)   a.   Nuhaizi yue da, (jiu) yue piaoliang.   (state)
                Girl   more big then more beautiful
                'The older a girl is, the more beautiful she will be.'
         b.   Ni yue zui (ta),   ta   yue pao.   (activity)
                You more chase he/she, he/she more run
                'The more cumulative the reference property of your chasing-him event is, the more cumulative the reference property of his running event is.'
         c.   Men yue qiao, yue xiang.   (semelfactive)
                Door more knock more loud
                'The more cumulative the reference property of your knocking-at-the-door event is, the louder it will be.'
         d.   Shibing yue si, yue duo.   (achievement)
                Soldier more die more more
                'The more cumulative the reference property of the soldier's dying event is, the larger the amount of dead soldiers is.'
         e.   Yue jian-guo da   shimian de ren,   yue qianxu.
                More see-ASP impressive scene   DE person more modest
                'The more cumulative the reference property of one's seeing the impressive scene is, the more modest one is.'
         f.   *Ni yue chi-wan, duzi   yue bao.   (accomplishment)
                You more eat-finish stomach more full

---

[18] One alternative to explain the ungrammaticality of (38a) is to have the successive-stage of the accomplishment *chi-wan* 'eat-finish' (i.e. *chi* 'eat') as presupposition, and the natural final point (i.e. *wan* 'finish') as focus. Given focus on the final point, the temporal schema of accomplishments can be considered a single point rather than a 'scale'. Hence, accomplishments are incompatible with the correlative adverb *yue* 'more'.

Thus, along a line similar to Beck (1997), we have the semantic interpretation of (40a) roughly represented by (40b) though we do not think the denotation of the adverb *yue* 'more' is the same as what Beck (1997) suggests for the German *je* 'the'.[19]

(40)   a.   Pingguo yue tian, yue haochi.
            Apple   more sweet more delicious
            'The sweeter an apple is, the more delicious it is.'

       b. $\forall x, y$ [apple(x) & apple(y) & $\exists d$ [d > 0 & the max d_2 [d_2-sweet(x)] = d + the max d_1 [d_1-sweet(y)]] $\Rightarrow$ $\exists d'$ [d' > 0 & the max d_4 [d_4-delicious(x)] = d' + the max d_3 [d_3-delicious(y)]]]

At this point, we would like to pause and consider the semantic interpretation of Chinese comparative correlatives in some more detail. In fact, the type of interpretation we suggest is rather weak because of the following reason: If there is a positive difference in how apple *x* and *y* differ from each other in sweetness, then there must be a corresponding or resulting positive difference in how they differ in deliciousness (see Thiersch, 1982; Fillmore, 1987; McCawley, 1988; Beck, 1997). So, nothing is said about the respective size of the differences, nor is the relation between them addressed. The two difference degrees should somehow be related to each other: either they might be identical, or proportional, or the second one should be functionally dependent on the first. Our analysis is weak because we do not have the notion ''corresponding (or resulting)'' clearly defined. As we have indicated in examples like (6), the differences in question can be very irregular. In addition, the author is a syntactican whose knowledge of formal semantics is not good enough to give a formal definition for ''corresponding (or resulting)''. We shall leave it for further research.

4.3. The empirical and theoretical consequence

The analysis proposed has the following empirical and theoretical consequences. To put it concretely, the question of why examples like (14), repeated as (41a), are subject to the anti-c-command constraint gets explained well. Under our analysis, example (41a) has a quantificational tripartite structure like (41b), in which the restrictive domain does not contain any occurrence of correlative adverb *yue* 'more'.

(41)   a.   *[$_S$ [$_{NP}$ Zhangsan] [$_{VP}$ yue xihuan [$_{NP}$ [$_S$ yue gui   de] shu]]].
            Zhangsan   more like   more expensive DE book

       b.   *$\forall x, y$ [Zhangsan] $\rightarrow$ [book(x) & book(y) & Zhangsan likes x more than y & x is more expensive than y].

As we have argued, the correlative nature of the adverb *yue* 'more' requires a relation denoted by the adverb *yue* 'more' to be identified either as the restrictive domain or the nuclear scope of a

---

[19] In Chinese, some adjectives, besides their individual-level status, also have inchoative use, for example the adjective *da* 'become big' in (i), and hence function as a stage-level predicate in some cases. So, we would predict the subject NP predicated by this type of adjective might be a singular definite (or specific) NP.

(i)   Zhe-ge xiaohai yue da, yue tiaopi.
    This-CL child   more big more naught
    'The older this child gets, the more naughty he is.'

As the same reasoning, the ambiguity shown by (10b) is explained.

quantificational tripartite structure; that is, a 'restrictive-domain-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more') must co-occur with a 'nuclear-scope-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more'), and vice versa. However, as the quantificational tripartite structure (41b) indicates, no adverb *yue* 'more' is found in the restrictive domain; therefore, the correlative nature of the adverb *yue* 'more' is not satisfied. Hence, (41a) is ungrammatical.[20]

5. A typological perspective on comparative correlatives

According Quirk et al. (1985:999–1000, 1111), English comparative correlatives may be introduced by *as*, with or without *so* (formal), or by the fronted correlative *the . . . the* followed by comparative forms, as shown by (42a–b), respectively.

(42)   a.   As they worked harder, (so) they became hungrier.   (merge)
        b.   The harder they worked, the hungrier they became.   (movement)

The fronting of the comparative element, as Quirk et al. (1985:1111) suggest, results in the kind of syntactic ordering found in relative and *wh*-interrogative clauses.

Following von Fintel (1994) and Beck (1997), we analyze the English comparative correlative like (42a) as a correlative construction with a syntactic structure in which the *as*-clause (or the antecedent clause) is in the same position as a left-dislocated element, as shown by (43) (Culicover and Jackendoff, 1999; den Dikken, 2005).

(43)   [CP [CP As they worker harder], [CP (so) they became hungrier]].

We further suggest that, on the one hand, in (43) *as* and *so* are merged in [Spec, CP] of the antecedent and the consequent clause, respectively, to satisfy the requirement of the [EPP] feature of C (i.e. complementizer) (Chomsky, 2001). On the other hand, in (42b), whose Lexical Array does not contain *as* and *so*, the correlative *the* in the antecedent clause moves to [Spec, CP] in a PF pied-piping manner by dragging along with it the comparative form *harder* and the correlative *the* in the consequent clause does so by moving together with the comparative form *hungrier* to fulfill the requirement of the [EPP] feature of C. The assumption that English comparative correlatives like (42b) involve PF pied-piping gets further support from the long-distance dependence between the comparative phrase at the front and the gap within the CP and the island constraints on long-distance dependence, as illustrated by (44a) and (44b), respectively (Culicover and Jackendoff, 1999:555).

(44)   a.   [The more counterexamples]$_i$ Mary say that Bill has helped Fred to discover t_i, the less I believe her. (long-distance dependence)
        b.   *[The more food]$_i$ Mary knows a man that eats t_i, the poorer she gets. (CNPC)
        c.   *[The fatter]$_i$ he goes to a doctor when he gets t_i, the more he eats.   (CED)

---

[20] Alternatively, the ungrammaticality of (41a) can be explained as follows: As we have suggested, one of the most important characteristics of Chinese comparative correlatives is that a comparison must be made both in the restrictive domain and the nuclear scope of the quantificational tripartite structure. The comparison either in the restrictive or in the nuclear domain is possible only when a predicate modified by the adverb *yue* 'more' occurs inside. Since no adverb *yue* 'more' is found in the restrictive domain of (41b), the comparison in the restrictive domain cannot be made. Hence, (41a) is ungrammatical.

Assuming this, we would expect the island effect not to appear in examples like (42a), in which the antecedent clause and the consequent clause, instead of being introduced by a fronted comparative phrase, are introduced by *as* and *so*, respectively. This expectation indeed is borne out by the grammaticality of (45a–c).[21]

(45) a. As Mary says that Bill has helped Fed to discover more counterexamples, (so) I believe her less.
      b. As Mary knows a man that eats more food, (so) she gets poorer.
      c. As he goes to a doctor when he gets fatter, he eats more.

Thus, we would like to suggest that in English there are two types of comparative correlatives: One does not involve overt movement; for such type of comparative correlatives, the antecedent clause is introduced by the correlative subordinator *as* while the consequent clause is optionally introduced by *so*. The other type involves overt movement (i.e. PF pied-piping) in a way that in each clause the correlative *the* moves by dragging along with it a comparative form. No matter which type it is, an English comparative correlative always consists of two clauses: the 'antecedent' and the 'consequent' clause.

On the other hand, the Chinese comparative correlative syntactically is similar to the English *as ... more/-er ... (so) ... more/-er* comparative correlative in that neither of them involves overt movement. This immediately explains why Chinese comparative correlatives as well as the English *as ... more/-er ... (so) ... more/-er* comparative correlative do not show the island effect, as the grammaticality of (46a-c) illustrates.

(46) a. Ni-de shouru yue gao, [renmen hen ziran-de jiu   hui renwei [ni-de shui
          Your income more high people very naturally then will think   your tax
          hui yue   gao]].
          will more high
          'The more income you get, the more tax people will rightly think that you will pay.'
      b. [IP [NP [CP Yue ai   piaoliang de] nuhaizi] [VP chi-de yue   shao]]. (CNPC)
          More   love beautiful DE girl   eat-DE more less
          'The more a girl cares about her beautifulness, the less she eats.'
      c. Ren   yue jianjue, [[zai yue   jiankun de shihou], [yue neng kefu
          People more constant at more difficult DE moment   more can overcome
          kunnan]]. (CED)
          difficulty
          'If people are more constant, they are more likely to overcome difficulties
          when they are under more difficult situations.'

Although the Chinese comparative correlative is the same as the English *as ... more/-er ... (so) ... more/-er* comparative correlative in not involving overt movement, they still differ from each other in the following aspects: First, the English *as ... more/-er ... (so) ... more/-er* comparative correlative differs from the Chinese comparative correlative in that the former consists of two (or more) clauses, the antecedent and the consequent clause; however, it is not necessary for the latter to do so (see (28a–b) repeated as (47a–b)).

---

[21] The grammatical judgment of (45a-c) comes from my informants: Jennifier Bryne (from USA) and Magar Etmekdjian (from Australia) (personal communication).

(47) a. [$_S$ [$_{NP}$ [$_S$ Yue tian   de] pingguo] [$_{AP}$ (jiu) yue   haochi]].
          More   sweet DE apple   then more delicious
          'The sweeter an apple is, then the more delicious it is.'

      b. [$_{Topic/NP}$ [$_S$ Yue hao   de] shu], [$_{Comment/S}$ yue   duo ren   kan].
          More   good DE book   more more people read
          'The better a book is, he more people read it.'

The Chinese comparative correlative can be a sentence with a complex NP (i.e. an NP modified by a relative clause) subject, a topic-comment construction in which the topic NP is modified by a relative clause, or a sentence consisting of two clauses.

Second, the English comparative correlative morpheme occurs as one of the following (discontinuous) allomorphs: *the … -er* form in which *–er* occurs as a suffix to adjectives or adverbs as in (48a–b), *the more* form followed by adjectives or adverbs as in (48c–d), the prenominal quantifier *the more* co-occurring with nominal expressions as in (48e), or the pronominal *the more* as in (48f).

(48) a. The older I get, the happier I am. (adjective)
      b. The harder she worked, the more progress she made. (adverb)
      c. The more reliable it is, the more expensive it is. (adjective)
      d. The more frequently you dance, the more beautifully you dance. (adverb)
      e. The more air there is inside the tyre, the harder it is pressed together.
          (prenominal quantifier)
      f. The more John smokes, the more inspiration he gets. (pronominal)

However, the Chinese comparative correlative morpheme *yue* 'more', categorically being a degree adverb without any allomorphs, can only co-occur with adjectives, adverbs or verbs.

Third, as McCawley (1988:183) points out, a Chinese comparative correlative of comparative is often acceptable but its English counterpart is not, as the contrast between (49a) and (49b) shows.

(49) a. Ta yue   bi   wo qiang, wo yue gandao zihao.
          He more than I   strong I   more feel   proud
          '*The stronger he is than me, the prouder I will feel.'
      b. *The stronger he is than me, the prouder I will feel.

This typological difference in fact results from the fact that the Chinese comparative correlative morpheme *yue* 'more' occurs in a position different from the position that degree adverbs compatible with comparatives like (50a–b) do, for example *geng* 'more' and the empty degree adverb *deg*.[22,23]

---

[22] According to Lu and Ma (1985), Chinese degree adverbs can be divided into two types: The strong type including degree adverbs like *geng* 'more', *gengjia* 'more and more', and *yuefa* 'more and more', and the weak type containing degree adverbs like *shaowei* 'rather', *duoshao* 'ratherish' and *luewei* 'slightly' (Zhang, 2002). This semantic distinction is exemplified by how the following comparatives differ from each other in interpretation.
(i)   Zhangsan bi   Lisi geng/gengjia/yuefa   qiangzhuang.
      Zhangsan than Lisi more/more and more/more and more strong
      'Zhangsan is stronger than Lisi is, and both Zhangsan and Lisi are quite strong.'
(ii) Zhangsan bi   Lisi shaowei/duoshao/luewei qiangzhuang *(yi-dianer).
      Zhangsan than Lisi rather/ratherish/slightly   strong   a little bit
      'Zhangsan is slightly stronger than Lisi is, and actually both Zhangsan and Lisi are not so strong.'

(50)   a.   Zhangsan (*geng) bi   Lisi (geng) gao.
                Zhangsan   more than Lisi more tall
                'Zhangsan is taller than Lisi, and both Zhangsan and Lisi are quite tall.'
        b.   Zhangsan bi   Lisi *deg* gao.
                Zhangsan than Lisi tall
                'Zhangsan is taller than Lisi.'

Thus, it is possible for the adverb *yue* 'more' and the empty degree adverb *deg* to co-occur in Chinese comparative correlatives in a way that the former precedes while the latter follows the *bi*-phrase 'than-phrase'; (49a), thereby, is grammatical. However, in English the –*er* component of the (discontinuous) comparative correlative morpheme *the . . . -er* happens to appear in a position the same as the ordinary comparative marker –*er* does (see (48a–b)). This makes an English comparative correlative of comparative such as (49b) impossible.

6. Remark on Lin (2007)

Lin (2007) proposes a formal semantic analysis for the Chinese *yue . . . yue* 'more . . . more' comparative correlative by treating this construction as one which involves quantificational tripartite structure and having all the meanings of it derived through a comparison of degrees which relate to different or same individuals (Lewis, 1975; Heim, 1982). More precisely, as Lin (2007:188) suggests, in the simplest case of Chinese *yue . . . yue* 'more . . . more' comparative correlatives like example (51), the first clause is mapped to the restriction of a possibly covert quantifier and the second clause to the nuclear scope of the logical form in which the two degree adverbs *yue's* 'more's' are adjoined to the restriction and the nuclear scope, respectively, and later (the possibly empty) *jiu* 'then' is adjoined to the top of the nuclear scope, as (52) illustrates.

Example (i) implies that Lisi is quite strong but (ii) implies that Lisi is not so strong. In contrast with (i)–(ii), example (iii) does not have any implication about whether Lisi is strong or not.
(iii)   Zhangsan bi   Lisi qiangzhuang.
        Zhangasan than Lisi strong
        'Zhangsan is stronger than Lisi is.'
Given this, we suggest that in (iii) there exists an empty degree adverb that has neither the strong nor the weak implication (i.e. *deg*), and call comparatives like (iii) the neutral comparative. Furthermore, the ungrammaticality of (iv)–(v) leads us to suggest that the comparative correlative morpheme *yue* 'more' can only occur in neutral comparatives.
(iv) *Zhangsan yue   bi   Lisi geng qiangzhuang, wo yue   gaoxing.
        Zhangsan more than Lisi more strong   I   more happy
(v) *Zhangsan yue   bi   Lisi shaowei qiangzhuang yi-dianer, wo yue   shangxin.
        Zhangsan more than Lisi rather   strong   a little bit I   more sad
    The reason why (iv) and (v) are ungrammatical might be related to the semantics of the degree adverb *yue* 'more'. As we have suggested, the adverb *yue* 'more' requires the relationship between variable x_1 and x_2 to be subject to the condition: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa. In other words, in (iv) the adverb *yue* 'more' allows the degree value of x_1 on the strength-scale to be within the 'very strong', the 'strong', or the 'not-so-strong' range. This property immediately conflicts with the semantic properties of the strong-type adverb *geng* 'more'. Hence, (iv) is ungrammatical. As the same reasoning, the ungrammaticality of (v) also gets explained.
[23] We further suggest that the empty degree adverb *deg* appears behind the *bi*-phrase 'than-phrase' by analogy with the degree adverb *geng's* 'more' occurring after the *bi*-phrase (see (50a–b)).

(51)   Ni   yue   shengqi, ta (jiu) yue   gaoxing.
         You more   angry   he then more happy
         'The more angry you are, the happier he is.'

(52) $[_{CP} \forall [_{CP} \text{ yue } [_{IP} \text{ ni shengqi}] [_{CP} \text{ jiu } [\text{yue } [_{IP} \text{ ta gaoxing}]]]]]$

Assuming Doetjes's (1997) proposal that adjectives have an additional degree argument and verbs also have an additional degree or quantity argument, Lin (2007:188–189) develops the idea that the adverb *yue* 'more' is a degree adverb adjoined to a VP/AP to indicate an increasing degree of the property denoted by the degree or quantity argument of VP/A, and suggests that the main semantic function of the degree adverb *yue* 'more', in its simplest case, is to compare two degree arguments and to claim that one degree in the situation s_1 is greater than the other degree in situation s_2. In short, the argument of *yue* 'more' is a relation between a degree and a situation with the form $\lambda g \lambda s.P(g)(s)$ of type $<d, <s, t>>$; whenever the adverb *yue* 'more' takes such an argument, the $<d, <s, t>>$ expression in question will apply to a different degree and situation variable twice, producing two propositions and claiming that one degree in a situation is greater than the other degree in another situation, as is shown in (53).

(53) $[[yue]] = \lambda P_{<d, <s, t>>}\lambda g_1 \lambda g_2 \lambda s_1 \lambda s_2 [P(g_1)(s_1) \wedge P(g_2)(s_2) \wedge g_2 > g_1]$

Since the semantic type of the argument of *yue* 'more' is so flexible that it can be a relation between individuals, degrees, and situations, the different cases, as Lin (2007:189) argues, can be unified under one generalization as proposed in (54), where each α stands for a semantic type.

(54) $[[yue]] = \lambda P_{<\alpha 1, < \ldots <d, \ldots <\alpha n, <s, t>>>>>}\lambda \alpha_1 ' \lambda \alpha_1 '' \ldots \lambda d_1 \lambda d_2 \ldots \lambda \alpha_n ' \lambda \alpha_n '' \ldots \lambda s_1 \lambda s_2$
         $[P(\alpha_1 ') \ldots (d_1) \ldots (\alpha_n ') (s_1) \wedge P(\alpha_1 '') \ldots (d_2) \ldots (\alpha_n '') (s_2) \wedge d_2 > d_1]$

As for the relation between degree arguments in different clauses, Lin (2007:190–192) argues that the degree arguments in the first and those in the second clauses are linked by the adverb *jiu* 'then' through a pragmatically determined relation R from which the causation meaning is derived. Hence, the Chinese *yue . . . (jiu) yue* 'more . . . (then) more' comparative correlative as a whole has a syncategorematic meaning as in (55).

(55) $[[Qadv]](yue\text{-}P)(jiu \; yue\text{-}Q)$
         $= Qadv \; \alpha_1 ', \alpha_1 '' \ldots d_1, d_2 \ldots \alpha_n ', \alpha_n '', s_1, s_2 [P(\alpha_1 ') \ldots (d_1) \ldots (\alpha_n ') (s_1) \wedge P(\alpha_1 '')$
         $\ldots (d_2) \ldots (\alpha_n '') (s_2) \wedge d_2 > d_1]$
         $\Rightarrow \exists d_3, d_4, s_3, s_4 [s_1 \leq s_3 \wedge s_2 \leq s_4 \wedge R(<d_1, s_1>, <d_3, s_3>) \wedge R(<d_2, s_2>,$
         $<d_4, s_4>) \wedge Q(\alpha_1 ') \ldots (d_3) \ldots (\alpha_n ') (s_3) \wedge (\alpha_1 '') \ldots (d_4) \ldots (\alpha_n '') (s_4) \wedge d_4 > d_3]$

In (55), the condition $R(<d_1, s_1>, <d_3, s_3>)$ is intended to mean that the degree d_1 in the situation s_1 has a relation R to the degree d_3 in the situation s_3. Since the relation R may give rise to a causation meaning, the meaning obtained is that the degree d_1 in the situation s_1 has caused the degree d_3 in the situation s_3. So, example (56) has a logical form like (57) under Lin's (2007) formal semantic analysis to the Chinese *yue . . . yue* 'more . . . more' comparative correlative.

(56)   Pingguo yue da, jiu yue haochi.
        Apple   more big then more delicious
        'The bigger an apple becomes, the more delicious it is.' (stage-level
        interpretation of *big*)

(57)   [[$_{CP}$ ∀ *yue pingguo da jiu yue* ~~pingguo~~ *haochi*]]
        =   ∀x, g_1, g_2, s_1, s_2[[big'(x:apple'(x))(g_1)(s_1) ∧ big'(x:apple'(x))(g_2)(s_2) ∧ $g_2 > g_1$]
        ⇒∃g_3, g_4, s_3, s_4[$s_1 \leq s_3$ ∧ $s_2 \leq s_4$ ∧ R(<g_1, s_1>, <g_3, s_3>) ∧ R(<g_2, s_2>, <g_4, s_4>)
            ∧ delicious' (x:apple'(x))(g_3)(s_3) ∧ delicious'(x:apple'(x))(g_4)(s_4) ∧ $g_4 > g_3$]

One further point that we cannot ignore is: the Chinese *yue … yue* 'more … more' comparative correlative, as indicated, shows two important properties in their interpretation: First, when the subject NP is a bare noun and the predicate is an individual-level property, the construction can compare the different degrees of that individual-level property only with respect to different individuals but not with respect to the same individual. Second, when the subject NP is a bare noun and the predicate is a stage-level property, the construction tends to compare the different degrees of the stage-level property with respect to the same individual instead of a comparison of different individuals. Lin (2007:201) further reinterprets these two generalizations as follows:

(58)   A.   When the subject NP is a bare noun and the predicate is a stage-level
              property, a treatment of the bare noun subject as a type e free variable is
              necessary prior to an analysis of it as a predicative expression of type <e, t>.
        B.   When the subject NP is a bare noun and the predicate is an individual-level
              property, the bare noun subject must be analyzed as a predicative expression of
              type <e, t>.

These two reinterpreted generalizations above, as Lin (2007:201) argues, need not be stipulated and can be derived from Partee's (2004:204–205) general processing strategy for noun phrase interpretation as well as of the constituent structure of the sentences.

(59)   There is a general processing strategy of trying lowest types first, using higher
        types only when they are required in order to combine meanings by available
        compositional rules.

Since a NP consisting of a bare noun can be analyzed either as a free variable of type e or as a predicative expression of type <e, t>, the type e meaning of bare noun subjects, according to the processing strategy in (59), should be tried first when they are combined with their predicates. In contrast, the <e, t> meaning of a bare noun NP is forced only when a combination of the bare noun subject and the predicate by a special composition rule like (60), as suggested by Lin (2007:196), is required.

(60)   If a noun phrase translates as λx[N(x)] and a predicate AP translates as
        λxλgλs.AP(x)(g)(s), then [[NP AP]] translates as λxλgλs[N(x) ∧ AP(x)(g)(s)].

One implication of this proposal is that the general processing strategy reflects the degree of difficulty in processing the interpretation of a sentence; that is, the less costly a strategy is, the easier it is to process the sentence using that strategy. As Lin (2007) says, this implication gets

supported by example (61), which is ambiguous between the same-individual and the different-individual reading and the former is the dominating reading.

(61)   Ren yue mang, jiu yue rongyi shengbing.
         Man more busy then more easy get-sick
         a.   'The busier a man gets, the easier it is for him to get sick.' (same individual)
         b.   'If x is busier than y, it is easier for x to get sick than it is for y.'
                (different individuals)

In the following, we shall first point out how our analysis is similar to and different from Lin (2007), and then some remarks on his formal semantic analysis to the Chinese *yue . . . yue* 'more . . . more' comparative correlative will be provided.

On the one hand, a comparison between our proposal and Lin (2007) can be done according to the following aspects: First, we both suggest that the Chinese *yue . . . yue* 'more . . . more' comparative correlative contains an (implicit) adverb of quantification and involves a quantificational tripartite structure.

Second, assuming Doetjes's (1997) proposal that adjectives have an additional degree argument and verbs also have an additional degree or quantity argument, both analyses suggest that, in the simplest case, the main semantic function of the degree adverb *yue* 'more', which is adjoined to a VP/AP to indicate an increasing degree of the property denoted by the VP/AP, is to compare two degree arguments and to claim that one degree . . . is greater than the other degree . . .. Both of us also indicate that the argument of the degree adverb *yue* 'then' is not always a relation between a degree and a situation. It can also be a relation between individuals, degrees, and situations. Given the flexibility shown by the semantic type of the argument of *yue* 'more', Lin (2007:189) suggests that the different cases can be unified under one single generalization as in (54), where each α stands for a semantic type. However, we advance the idea that the type of predicate modified by the degree adverb *yue* 'more' (i.e. the stage- or individual-level) provides information to help identify the semantic type of the argument of *yue* 'more'.

Third, although our analysis is similar to Lin (2007) in suggesting that, in the simplest case of the Chinese *yue . . . yue* 'more . . . more' comparative correlative, the first clause is mapped to the restriction of a (covert) quantifier and the second clause to the nuclear scope, but in cases where the first *yue* 'more' is inside a relative clause and the second *yue* 'more' modifies the main predicate, the subject NP is mapped to the restriction and the VP to the nuclear scope, we further propose the Revised Extended Mapping Hypothesis as a general rule to regulate the mapping between the syntactic tree structure of the Chinese *yue . . . yue* 'more . . . more' comparative correlative and its corresponding quantificational tripartite structure (see (29)).

Fourth, the scope of data we have studied is larger than what Lin (2007) has done. We clearly point out there are two different types of comparative correlatives in English, as illustrated by (62a–b), respectively.

(62)   a.   The harder they worked, the hungrier they became.
         b.   As they worked harder, (so) they became hungrier.

One like (12a) involves overt movement in a way that the correlative *the . . . the* move by dragging along with them comparative forms, while the other does not involve overt movement. We further

suggest that syntactically the Chinese *yue . . . yue* 'more . . . more' comparative correlative is similar to the English *as . . . more/-er . . . (so) . . . more/-er . . .* comparative correlative in that neither of them involves overt movement.

On the other hand, however insightful Lin's (2007) formal semantic analysis to the Chinese *yue . . . yue* 'more . . . more' comparative correlative is, there remain some holes in it. First, Lin (2007:185) suggests that it is the degree adverb *yue* 'more' that alone should be responsible for what *the* and *more/-er* together do in the English *the more/-er . . . the more/-er* comparative correlative. If so, why does the Chinese *yue . . . yue* 'more . . . more' comparative correlative not involve overt movement as the English *the more/-er . . . the more/-er* comparative correlative does? Under our analysis, if assuming that there is no covert comparative morpheme in the Chinese *yue . . . yue* 'more . . . more' comparative correlative, then we can say that the degree adverb *yue* 'more' alone is responsible for what *as/so* and *more/-er* together do in the English *as . . . more/-er . . . (so) . . . more/-er . . .* comparative correlative rather than what *the* and *more/-er* work in concert to do in the English *the more/-er . . . the more/-er* comparative correlative. Therefore, the question of why the Chinese *yue . . . yue* 'more . . . more' comparative correlative does not involve overt movement as the English *the more/-er . . . the more/-er* comparative correlative does will not be a problem for our analysis.

Second, Lin (2007:188) suggests that the two degree adverb *yue's* 'more's' are adjoined to the restriction and the nuclear scope, respectively, in logical form of the Chinese *yue . . . yue* 'more . . . more' comparative correlative. Assuming so, Lin (2007) would expect examples like (63a–b) to be ungrammatical, contrary to fact.

(63) a. [IP [NP [CP Yue ai   piaoliang de] nuhaizi] [VP chi-de yue   shao]].   (CNPC)
          More   love beautiful DE girl   eat-DE more less
          'The more a girl cares about her beautifulness, the less she eats.'
      b. Ren   yue jianjue, [[zai yue jiankun de shihou], [yue neng   (CED)
          People more constant   at more difficult DE moment more can
          kefu   kunnan]].
          overcome difficulty
          'If people are more constant, they are more likely to overcome difficulties
          when they are under more difficult situations.'

As Tsai (1994) convincingly argues, in Chinese non-referential adjuncts cannot be extracted from islands in LF; therefore, adjunction of the degree adverb *yue* 'more' to the restriction or the nuclear scope in (63a–b) will violate the complex NP constraint (i.e. CNPC) and the condition on extraction domain (i.e. CED), respectively. So, Lin's (2007) analysis will be seriously challenged by the fact that (63a–b) are grammatical.

Third, as we both indicate, the Chinese *yue . . . yue* 'more . . . more' comparative correlative shows two important properties in their interpretation: First, when the subject NP is a bare noun and the predicate is an individual-level property, the construction can compare the different degrees of that individual-level property only with respect to different individuals but not with respect to the same individual. Second, when the subject NP is a bare noun and the predicate is a stage-level property, the construction tends to compare the different degrees of the stage-level property with respect to the same individual instead of a comparison of different individuals. These two generalizations, as Lin (2007:201) argues, need not be stipulated and can be derived from Partee's (2004:204–205) general processing strategy for noun phrase interpretation of trying lowest types first, using higher types only when they are required in order to combine

meanings by available compositional rules. Adopting such a strategy, Lin (2007) would predict that if a *yue . . . yue* 'more . . . more' comparative correlative is ambiguous between the same- and the different-individual reading, the same-individual reading is always the dominating one. However, this is not always correct. Consider the semantic interpretations of (64).

(64)   Qiqiu   yue xiao, yue bu rongyi fei-qilai.
        Balloon more small more not eay   fly-up
        a.   'If balloon x is smaller than balloon y, it is harder for x to fly to the sky than it is
              for balloon y.' (different individuals)
        b.   The smaller a balloon gets, the harder it is for it to fly to the sky.'
              (same individual)

Intuitively, (64) is ambiguous between the same- and the different-individual reading, and what is crucial here is that the dominating reading is the different-individual reading rather than the same-individual one. So, the intension of trying to derive the two generalizations, as (58A–B) state, needs further consideration.

Fourth, Lin (2007:204) points out that the complex NP version of the normal comparative correlative, for example (65), is used to compare the different degrees of some property of the same individual. In order to explain such a property shown by the complex NP version of the Chinese *yue . . . yue* 'more . . . more' comparative correlative, Lin (2007:205) develops the free variable analysis (i.e. the type e analysis of indefinites) as a way to deal with the semantic interpretation of the complex NP version of comparative correlatives and argues that this analysis applies only to the full indefinite NP.

(65)   [$_{CP}$ [$_{IP}$ [$_{NP}$ [$_{CP}$ Yue jinzhang de] [$_{N'}$ xuesheng]] [$_{I'}$ jiu   yue   rongyi kao-de
        More   nervous DE   student   then more easy   take-exam-DE
        bu hao]]].
        not good
        'Students who are more nervous are more likely to do bad in their exams.'

Since *xuesheng* 'students' in (65), as Lin (2007) argues, at most constitutes an N', the free variable analysis is inapplicable here. Thus, only the reading in which different individuals are compared with respect to their degrees of nervousness is available. However, as we have pointed out in footnote (17), empirically the fact is much more complicated. For example, sentence (i) in footnote (17), repeated as (66), allows both the same- and the different-individual reading.

(66)   [$_{NP}$ [$_{CP}$ Yue mang de] ren] [$_{I'}$ yue   rongyi wang-dong-wang-xi]]].
        More   busy DE people more easy   forget-east-forget-west
        a.   'If person x is busier than person y, then it is easier for x to be forgetful than
              it is for y.'
        b.   'The busier a person gets, the easier it is for him/her to get forgetful.'

In addition, theoretically there is no reason to say that *xuesheng* 'students' in (65) at most constitutes a N' because adjunction, as Chomsky (1986) argues, is subject to the restriction that phrases can only be adjoined to maximal projections.

7. Concluding remarks

The Chinese comparative correlative, containing an (implicit) adverb of quantification, involves a quantificational tripartite structure. The mapping between its syntactic tree structure and the quantificational tripartite structure is subject to the Revised Extended Mapping Hypothesis. Semantically, the correlative adverb *yue* 'more' functions to regulate a relationship between a pair of degree/quantity variables and a comparison relation. Since the adverb *yue* 'more' implies a comparison, occurrence of the adverb *yue* 'more' induces a pair of degree/ quantity variables compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. The relationship between these two variables is subject to the condition: For every x_1, there must exist an x_2; the degree value of x_2 on the scale denoted by the predicate modified by the adverb *yue* 'more' must be larger than that of x_1 on the same scale, and vice versa. In addition, a relation denoted by the correlative adverb *yue* 'more' must be identified either as the restrictive domain or the nuclear scope of a quantificational tripartite structure; therefore, a 'restrictive-domain-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more') must co-occur with a 'nuclear-scope-expressing' relation denoted by one adverb *yue* 'more' (or more than one adverb *yue* 'more'), and vice versa. The two degree/quantity variables 'directly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more' are further associated with two 'corresponding' variables (syntactically or semantically) predicated by the predicate modified by the adverb *yue* 'more', respectively. These two 'corresponding' variables can be considered the variables that are 'indirectly' compared with each other along the scale denoted by the predicate modified by the adverb *yue* 'more'. The type of predicate modified by the adverb *yue* 'more' provides further information to help identify the nature of the two 'indirect' variables (i.e. individuals, times or worlds).

Typologically, there are two types of comparative correlatives in English: the *as ... more/-er ... (so) ... more/-er* comparative correlative and the *the more/-er ... the more/-er* comparative correlative. The former does not involve overt movement while the latter does. However, Chinese has only one type of comparative correlative, which is similar to the English *as ... more/-er ... (so) ... more/-er* comparative correlative in that neither of them involves overt movement (i.e. PF pied-piping).

References

Beck, S., 1997. On the semantics of comparative conditionals. Linguistics and Philosophy 20 (3), 229–271.

Bohnemeyer, J., Swift, M., 2001. Default aspect: the semantic interaction of aspectual viewpoint and telicity. In: Proceedings of Perspectives on Aspect, Utrecht Institute of Linguistics.

Carlson, G., 1977. Reference to Kinds in English. Doctoral dissertation. University of Massachusetts, Amherst.

Chao, Y.R., 1968. A Grammar of Spoken Chinese. University of California Press, Berkeley.

Chomsky, N., 1986. Barrier. MIT Press, Cambridge.

Chomsky, N., 2001. Derivation by phase. In: Michael, K. (Ed.), Ken Hale: A Life in Language. Cambridge University Press, Cambridge, pp. 1–52.

Culicover, P., Jackendoff, R., 1999. The view from the periphery: the English comparative correlatives. Linguistic Inquiry 30 (4), 543–571.

den Dikken, M., 2005. Comparative correlatives comparatively. Linguistic Inquiry 36 (4), 497–532.

Diesing, M., 1992. Indefinites. MIT Press, Cambridge.

Ding, S.S., Lü, S.X., Li, R., Sun, D.X., Guan, X.C., Fu, J., 1979. Xiandai Hanyu Yufa Jianghua [Lectures on the Syntax of Contemporary Chinese]. Shangwu yinshuguan, Beijing.

Doetjes, S.J., 1997. Quantifiers and Selection: On Distribution of Quantifying Expressions in French, Dutch and English. Doctoral dissertation, Leiden University.

Fillmore, C., 1987. Varieties of conditional sentences. Proceedings of Eastern States Conference on Linguistics (ESCOL) 3, 163–182.

Heim, I., 1982. The Semantics of Definite and Indefinite Noun Phrases. Doctoral dissertation, University of Massachusetts, Amherst.

Heim, I., 1985. Notes on Comparatives and Related Issues. Ms. University of Texas, Austin.

Higginbotham, J., 1985. On semantics. Linguistic Inquiry 16 (4), 547–593.

Hinrichs, E.W., 1985. A Compositional Semantics for Aktionsarten and NP Reference in English. Doctoral dissertation, Ohio State University.

Hsiao, S.Y., Tsao, F.F., 2002. Lun hanyu liang-zhong guanlian jushi de yufa yu yuyi [On the syntax and semantics of two correlative constructions in Mandarin Chinese]. Language and Linguistics 3 (4), 811–838.

Huang, C.T.J., 1988. Wo pao de kuai and Chinese phrase structure. Language 64 (2), 274–311.

Kamp, H., 1981. A theory of truth and semantic representation. In: Groenendijk, J., Janssen, T., Stokhof, M. (Eds.), Formal Methods in the Study of Language: Proceedings of the Third Amsterdam Colloquium: Part I, Mathematical Centre Tracts, Amsterdam, pp. 277–321.

Kennedy, C., McNally, L., 2005. Scale structure and the semantic typology of gradable predicates. Language 81 (2), 345–381.

Kratzer, A., 1986. Conditionals. In: Farley, A.M., Farley, P., McCullough, K.E. (Eds.), Papers from the Parasession on Pragmatics and Grammatical Theory. Chicago Linguistic Society, University of Chicago, pp. 1–15.

Lewis, D., 1975. Adverbs of quantification. In: Keenan, E. (Ed.), Formal Semantics of Natural Language. Cambridge University Press, Cambridge, pp. 3–15.

Li, C.N., Thompson, S.A., 1981. Mandarin Chinese: A Functional Reference Grammar. University of California Press, Berkeley.

Lin, J.W., 2003a. Aspectual selection and negation in Mandarin Chinese. Linguistics 41 (3), 425–459.

Lin, J.W., 2003b. Temporal reference in Mandarin Chinese. Journal of East Asian Linguistics 12 (2), 259–311.

Lin, J.W., 2007. On the semantics of comparative correlatives in Mandarin Chinese. Journal of Semantics 24 (2), 169–213.

Liu, X.N., 1988. Xiandai hanyu ciwei "le" de yufa yiyi. Zhongguo Yuwen 1988 (5), 321–330.

Liu, C.S.L., 2008. The light verb lai in the Chinese comparative correlatives. Languages and Linguistics 9 (1), 69–99.

Lu, J.M., Ma, Z., 1985. Xiandai Hanyu Xuci Sanlun [Essays on Chinese Functional Words], Yuwen chubanshe, Beijing.

McCawley, J.D., 1988. The comparative conditional construction in English, German and Chinese. In: Proceedings of the 14th Annual Meeting of the Berkeley Linguistic Society, Berkeley Linguistic Society, University of California, Berkeley, pp. 176–187.

Partee, H.B., 2004. Noun phrase interpretation and type-shifting principles. In: Partee, B.H. (Ed.), Compositionality in Formal Semantics: Selected Papers by Barbara, H. Partee. Blackwell, Malden, pp. 203–230.

Quirk, R., Greenbaum, S., Leech, G., Svartvik, J., 1985. A Comprehensive Grammar of the English Language. Longman, London.

Thiersch, C., 1982. The harder they come, . . .: a note on the double comparative construction in English. In: Welte, W. (Ed.), Festschrift für Alfred Wollmann. Tübinger Beitrage zur Linguistik 195. Narr, Tübingen, pp. 47–65.

Tsai, W.T.D., 1994. On nominal islands and LF extraction in Chinese. Natural Language and Linguistic Theory 12 (2), 121–175.

Tsai, W.T.D., 2001. On subject specificity and theory of syntax-semantics Interface. Journal of East Asian Linguistics 10 (2), 129–168.

von Fintel, K., 1994. Restrictions on Quantifier Domains. Doctoral dissertation, University of Massachusetts, Amherst.

von Stechow, A., 1984. Comparing semantic theories of comparison. Journal of Semantics 3 (1), 1–77.

Wold, D., 1991. A few properties of the . . . the . . . comparative constructions. In: Second Annual Meeting of the Formal Linguistic Society of Midamerica (FLSM2) at University of Michigan, Ann Arbor, pp. 272–281.

Xing, F.Y., 1985. Yue X yue Y'' ju xing [The yue X yue Y sentence pattern]. Zhongguo Yuwen 1985 (3), 178–185.

Xing, F.Y., 2001. Hanyu Fuju Yanjiu [A Study of Complex Sentences]. Shangwu yinshuguan, Beijing.

Zhang, Y.J., 2002. Fuci yu Xianding Miaozhuang Gongneng [Adverbs and the Function of Attributive Modifiers]. Anhui jiaoyu chubanshe, Hefei.

Zhao, S.K., 1999. Han Ying Duibi Yufa Lunji [Essays on the Contrastive Study of Chinese-English Syntax: A Cognitive-Functional Approach]. Shanghai waiyu jiaoyu chubanshe.

Zwarts, J., 1992. X'-syntax – X'-semantics, Doctoral dissertation, OTS/Leiden University.