SEMANTICS OF WH-QUESTIONS WITH THE VERBAL *HOW* IN MANDARIN

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This paper studies wh-questions with the verbal "*zenme*"("how*"*) in Mandarin, e.g. "*Yuehan zenme-le Mali?*", a literal English translation of which is "*John how-ed Mary?*" First I give a semantic analysis of the denotation of such questions, arguing that the verbal "how" quantifies over properties of events. Second I give a compositional semantics of such wh-questions, based upon works by Berman (1994) and Lahiri (2002). Third, I discuss the meanings of the use of this "how" as zero-place, one-place, and two-place verbs, and argue that "how" is uniformly used as a two-place/transitive verb, and this explains some properties of such "how" questions.

1. Introduction

In addition to the usual distinction between argument and adjunct wh-questions, there is a special type of wh-questions in Mandarin with the verbal use of "how" as the head of a VP. Little attention has been paid to this type of questions. I will explore their special properties in this paper.

The wh-word *zenme* in Mandarin Chinese can be used in a manner wh-question, as shown in (1):

>   1. Yuehan zenme da-de   Taijiquan?
>   John   how   hit-DE[1]   Taichi
>   How did John practice Taichi?

The same word *zenme* can also be used as the head verb of a VP, as shown in (2)-(5). It can be used as a zero-place verb as in (2), an intransitive verb as in (3), or a transitive verb as in (4). But it cannot be used as a ditransitive verb, as in (5).

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[1] DE is part of the cleft construction *shi…de*, which can be used to indicate past tense.

2. Zenme-le?
   How-ASP[2]
   What happened?

3. Yuehan zenme-le?
   John   how-ASP
   What happened to John?

4. Yuehan zenme-le Mali?
   John   how-ASP Mary
   What did John do to Mary?

5. *Yuehan zenme-le Mali yi-ben-shu
   John   how-ASP Mary one-CL[3]-book
   John what Mary a book?

The meaning of such questions is roughly the same as the corresponding *what* questions in other languages, which also exist in Mandarin, as shown in (6):

6. Yuehan dui Mali zuo-le   shenme?
   John   to Mary what-ASP   what
   What did John do to Mary?

There are subtle differences between these two types of questions in Mandarin, but in this paper I will concentrate on the semantics of the verbal *how* questions.

2.   Denotation of the verbal *how* questions

In terms of the Hamblin-style denotation of questions, the verbal *how* questions are the same as the usual argument wh-questions, like *what* and *who,* in that they denote a set of propositions as possible answers to the question. The issue here is the semantic representation. It is obvious that wh-pronouns like *what/who* range over individuals of type e. What does this verbal *how* denote? Since they are used as various verbs, there isn't a common type. The answer will be clear if we adopt the neo-Davidsonian event semantics (Parsons 1990), in which a verb denotes a type/property of events, e.g.:

7. a. John hit Mary.

   b. $\exists e$ [hitting(e) $\wedge$ Agent(e, John) $\wedge$ Patient(e, Mary)]

Thus the verbal *how* in Mandarin ranges over types/properties of events, and the semantic representation of the denotation of such questions, e.g. as in (4), should be:

8. {p| $\exists P \in D_{<s,t>}$. [p=^$\exists$e. [P(e) $\wedge$ Agent(e, John) $\wedge$ Patient (e, Mary)]]}

3. Compositional semantics

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[2] ASP: aspect marker. "–le" is the perfective aspect marker.
[3] CL: classifier. "ben" is the classifier for books and similar objects.

My next goal is to give a compositional semantics of such questions. If we look at the representation in (8), there are two tasks to perform: (1) there should be a way of deriving the event semantics compositionally; (2) there should be a way of deriving the question denotation. In order to do the first, I'll use Kratzer's (1996) event identification rule, as shown in (9):

9. Event Identification (Kratzer 1996: 122)

f	g	$\rightarrow$	h
$\langle e, \langle s, t \rangle \rangle$	$\langle s, t \rangle$		$\langle e, \langle s, t \rangle \rangle$
			$\lambda x_e \ \lambda e_s[f(x)(e) \ \& \ g(e)]$

As for the compositional semantics of questions, there have been a few proposals, e.g. Berman (1994), Reinhart (1998), Lahiri (2002), and Shimoyama (2006). Berman (1994) gives the following rule for the Q morpheme (see also Baker 1970):

10. $[\![Q\varphi]\!]^{M,g} = \{p: \exists (x_1 \ldots x_n)[p = [\![Q\varphi]\!]^{M,g'}]\}$, where $g' \approx_\varphi g$.

Reinhart (1998) introduces choice functions to abstract the domain restriction without moving a wh-phrase, and points out that choice functions do not work for higher-order entities, such as properties. Lahiri (2002) gives the following rule for the non-wh-in-situ type complementizer:

11. $\lambda p \lambda q [q = p]$

Shimoyama (2006) uses Rooth's (1985, 1996) pointwise functional application rule to derive the Hamblin set, with the semantic contribution of the Q marker being trivial.

Since Chinese is a wh-in-situ language, there are two possible ways of deriving a Hamblin set. If we assume LF movement, then Lahiri's rule (11) can be used directly in conjunction with Kratzers' rule (9). But current research in Chinese linguistics agrees that wh-arguments do not move, and wh-adjuncts undergo LF movement. Then what about the verbal "how"?

First, one of the ways of showing that wh-arguments do not move at LF is that they can escape syntactic islands, while wh-adjuncts cannot. For example:

12a. Yuehan xihuan shei xie   de   shu?   b.*Yuehan xihuan ni zenme xie de shu
    John   like   who wrote DE book   John   likes you how wrote DE book
    [who$_i$ [John likes the book who$_i$ wrote]]   *[how$_i$[John likes the book that you wrote how$_i$]]

In (12a), the direct question reading is available, while in (12b) it shows that the direct question reading is not available. If we assume that wh-adjuncts have to move at LF, (12b) is ruled out by any mechanism that accounts for islands. What about the verbal *how*

69

questions? They are good direct questions in these island constructions. For example:

 13. Yuehan xihuan Mali zenme-le   de   ren?
     John   like   Mary how-ASP DE4 person.
     [how$_i$ [John likes the person that Mary how$_i$-ed]]

Therefore it suggests that the verbal *how* in Mandarin patterns with wh-arguments. The following examples with the exhaustivity marker "dou" also show the same effect.

14 a. Yuehan dou xihuan shei?   b. Yuehan dou zenme-le Mali?
      John   all like   who   John   all   how-ASP Mari.
      Who all does John like?   What all did John do to Mary?

   c. ?? Yuehan dou zenme da-de Taijiquan?
         John   all how   hit-DE Taichi
         Intended reading: What are all the ways that John practiced Taichi?

The exhaustivity marker "all" is not compatible with a manner question, as shown in (14c). But this exhaustivity marker is perfectly good with the argument question in (14a) and the verbal *how* question in (14b). This also suggests that the verbal *how* question patterns with the wh-argument question. If wh-arguments do not move at LF, it is a plausible assumption that the verbal *how* does not move either. Therefore the verbal *how* should be bound by the Q morpheme. Thus the LF representation of a verbal "how" question should be:

 15. [Q […how…]]

Note that this "how" cannot be interpreted via a choice function, and we can only use the rule given by Berman (1994) if we want to specify the semantic contribution of the Q morpheme, unlike in Shimoyama's approach. Rule (10), however, does not abstract the domain restriction of the variables. Therefore I propose that the verbal "how" carries its own domain restriction e.g. x^D and the Q morpheme abstracts this domain restriction and returns a question denotation at the same time, as shown in (16).
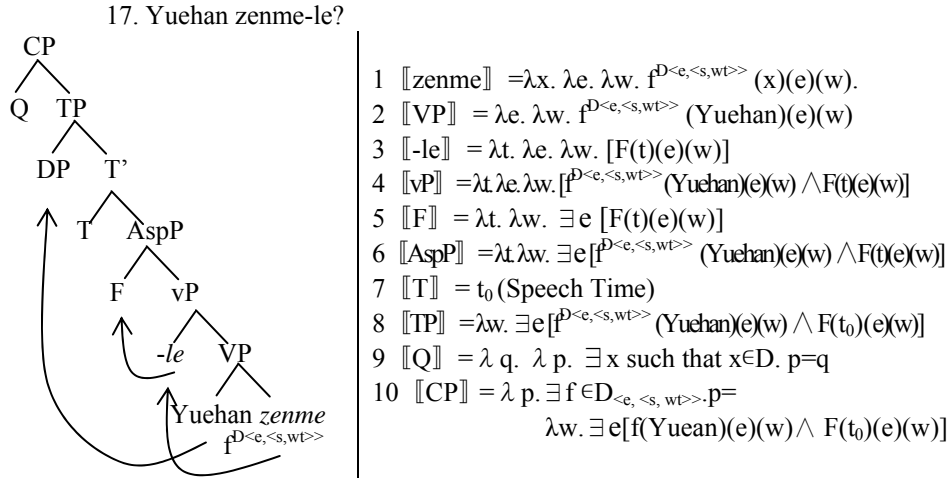
 16.   ⟦Q⟧ $= \lambda$ q. λ p. $\exists$x∈D. p=q, where q contains a restricted variable x^D

For example, if "how" is a transitive verb, it would denote f $^{D<e, \ <s, \ wt>>}$, and such a question would have the LF " [Q […f $^{D<e, \ <s, \ wt>>}$ …]] ". By applying rule (16), we get the correct interpretation λ p. $\exists$ f ∈D$_{<e, \ <s, \ wt>>}$. p=[…]. See (17) on the next page for a sample derivation.

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[4] DE is a structural morpheme in relative clause constructions in Mandarin Chinese.

4. *Zenme*("how") as a transitive verb

As shown in (2)-(5), the verbal "how" can be used as various verbs except as a ditransitive. If we assume that "zenme"(how) is uniformly used as a transitive verb, then all the facts are explained. First, in cases like (2), the meaning of such a question is not "what happened?", but rather "what happened to a contextually salient individual?". For example, if the question is asked about the addressee, then the question is understood as "what happened to you?". Since Chinese is a free pro-drop language, this is not surprising at all. Second, in cases like (3), the subject DP is actually the patient of the verb. Then it originates in the object position and moves to the subject position. As for the ditransitive, its ungrammaticality is straightforward since the verbal "how" can be used only as a transitive verb. I give a sample derivation in (17) for (3). If the subject is dropped, as in the case of (2), the LF structure would be similar, with the DP replaced by a pro, thus deriving the correct interpretation.

17. Yuehan zenme-le?

1. $[\![zenme]\!] = \lambda x.\ \lambda e.\ \lambda w.\ f^{D<e,<s,wt>>} (x)(e)(w).$
2. $[\![VP]\!] = \lambda e.\ \lambda w.\ f^{D<e,<s,wt>>} (Yuehan)(e)(w)$
3. $[\![-le]\!] = \lambda t.\ \lambda e.\ \lambda w.\ [F(t)(e)(w)]$
4. $[\![vP]\!] = \lambda t.\ \lambda e.\ \lambda w.\ [f^{D<e,<s,wt>>}(Yuehan)(e)(w) \wedge F(t)(e)(w)]$
5. $[\![F]\!] = \lambda t.\ \lambda w.\ \exists e\ [F(t)(e)(w)]$
6. $[\![AspP]\!] = \lambda t.\lambda w.\ \exists e\ [f^{D<e,<s,wt>>} (Yuehan)(e)(w) \wedge F(t)(e)(w)]$
7. $[\![T]\!] = t_0\ (Speech\ Time)$
8. $[\![TP]\!] = \lambda w.\ \exists e\ [f^{D<e,<s,wt>>} (Yuehan)(e)(w) \wedge F(t_0)(e)(w)]$
9. $[\![Q]\!] = \lambda q.\ \lambda p.\ \exists x\ such\ that\ x \in D.\ p=q$
10. $[\![CP]\!] = \lambda p.\ \exists f \in D_{<e,\ <s,\ wt>>}.p=$
$\lambda w.\ \exists e[f(Yuean)(e)(w) \wedge F(t_0)(e)(w)]$

The semantics of the aspect marker –*le* is taken from Lin (2004). The verbal complex in the small v moves to Asp at LF to check the aspectual feature F, which, in the case of the perfective aspect –*le,* means that the event time precedes t, which in turn is t_0 here.

5. Conclusion

A few issues remain to be addressed. The first one is the uncancellable Malefactivity

Presupposition, i.e. the patient of the event should be affected in a negative way. If the event is generally regarded as a benefactive one, e.g. *kissing*, the answer is then either humorous, or interpreted as malefactive, e.g. if the patient of the *kissing* event did not like to be kissed. In some cases, *zenme* does not even have to be a transitive verb, as long as the malefactivity presupposition is satisfied. For example, (18) can be a good answer to (3), where John is not the patient of the event.

> 18. Yuehan shuai-le   yi-jiao.
>   John   fall-ASP one-MEASURE
>   John stumbled.

What is the trigger of this presupposition, and how can we account for answers like (18)? I will explore ways of incorporating the presupposition as part of the semantics of *zenme* and also argue that answers like (18) do not contradict my proposal, since a typical answer to (3) should still be one in which John is the patient of some event, while answers like (18) are actually not direct answers.

Acknowledgements

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