

NP+yihou in Mandarin Chinese: Semantics of Temporal Reference

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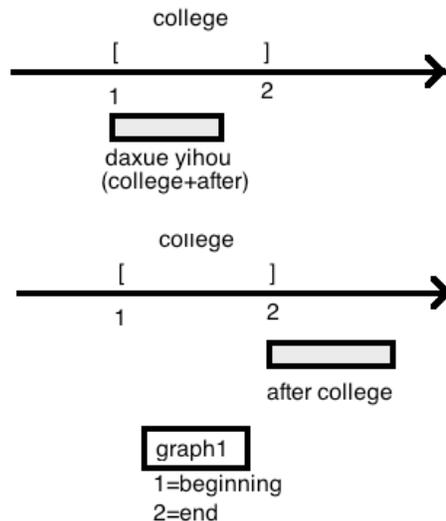
In this article I discuss the temporal reference ambiguity of the word ‘yihou’ (meaning ‘after’) in Mandarin when it interacts with a duration NP (a duration NP is defined as an NP that denotes a duration instead of a point. We will elaborate on the definition later). At a first glance, we obtain a meaning contrast between Chinese and English in the following two sentences:

(1) women shi [daxue yihou] renshi de.

We BE [college after] meet PART
“we met after (the beginning of) college”.

(2) We met [after college].

Here we are concerned with the similar syntactic constructions in both (1) and (2) in the bracketed prepositional phrase (PP), yet their semantic interpretations are non-identical: in the case of Chinese, an [NP+yihou] derives a duration that begins with the beginning point of the NP (here by denoted as type 1 meaning); in contrast, the English [after+NP] denotes a duration that begins with the ending point of the NP, a type 2 meaning (there is also the question of what exactly does a [NP+after] PP pick out semantically, we will extend on that later). This is demonstrated in graph 1.



Graph 1 Type 1 and type 2 meanings

However, when we consider more NPs in Mandarin, this contrast does not always hold:

(3) tamen shi [erzhan yihou] renshi de.

they BE [**WWII after**] meet PART.
"they met after (the end of) WWII".

(4) tamen shi [nianhui yihou] renshi de.
they BE [**an annual meeting after**] meet PART
"They met after (the end of) the annual meeting".

(5) tamen shi [2010 nian yihou] renshi de.
They BE [**2010 (year) after**] meet PART
"They met after (the beginning of) 2010".

Examples (3) and (4) show two cases of [NP+after] that have type 2 meaning, whereas (5) is a similar example to (1) in that it has a type 1 meaning.

Moreover, we see that even in the case of example (1), type 1 meaning can be blocked by appropriate context, deriving a type 2 meaning:

(6) wo mei neng jiang ziji daxue ji [daxue yihou] de shiqing xie xialai.
I not can PART self college and [**college after**] PART things write down.
"I have not been able to write down things about my life during college and after (the end of) college".

In example (6), the contrastive use of [during college] and [after college] blocked the type 1 interpretation of [college+after] (otherwise, a type 1 interpretation would result in these two phrases meaning the same thing).

From the above examples I have showed that:

- a. Different NPs have different interpretations as to the temporal reference of [NP+after], some with type 1 and some with type 2 meaning;
- b. Even the same NP can switch to a different meaning type given the proper context of interpretation;

With these initial characterizations in mind, I explore more data on the distribution of [NP+after]¹. A final note before this section concludes is that we should make a clear distinction between the type of bare NP structure that I'm interested in here and other types of situations where there is no ambiguity (i.e., the temporal reference point of 'yihou' is clearly defined). First we observe the construction in (7):

(7) women shi [jinru daxue yihou] renshi de.
We BE [enter college after] meet PART.
"We met after we entered college".

¹ The meaning of [VP+after] seems to be relatively consistent with type 2 meaning, and it is not the focus of discussion here. I will also show later that the semantic factors play a major role in the interpretation of 'yihou', rather than the syntactic factor.

Here, as the difference in syntactic brackets between (7) and (1) shows, in a sentence like (7), the constituent construction of [NP+yihou] is broken by the verb, and NP becomes part of the VP that is part of the larger PP [PP[VP enter college] after]. Moreover, the semantic value of such a construction picks out a clear point (point of entering college) of temporal reference for ‘yihou’, therefore eliminating the type of possible ambiguity as shown in graph 1. This type of construction is not the concern of this paper. In the same vein, in the following discussion we are only interested in the meaning of the bare NPs that can have a duration property temporally (i.e., it can be conceived as occupying a duration, such as a year in the case of ‘2010’ and or 4 years in the case of ‘college’, rather than an NP that can only be considered as referring to a point in time, such as ‘nine o’clock’, or ‘beginning’, in which case it will always take on a type 2 meaning, ‘after the end of x’).

The second type of situation where the interpretation of ‘yihou’ is clear is in the presence of a context that can clearly disambiguate the reference of [NP+yihou] (and we’re not interested in explaining this type of situation). One such case we already discussed is given above in example sentence (6), where the context blocks the type 1 interpretation of [college+after].

In fact, the very research question of this paper resides in finding the patterns of a preferred interpretation (among type 1 and type 2) of an internally ambiguous [NP+yihou] phrase in the absence of the context. In general, when a linguistic entity (NP+yihou) is ambiguous (has two interpretations: type1 and type2), the context or presupposition can usually help to disambiguate between the two meanings. In the case of Chinese ‘yihou’ vs. English ‘after’, ‘yihou’ has a clear interpretation in the presence of a clear context, whereas in the absence of such context it can take on either type 1 or type 2 meaning. In the English ‘after’, no matter what context is present, or absent, the interpretation is always consistent (type 2). However, as I will show in this paper, in the case of Mandarin, when the context is not present, there is still a pattern that can strongly predict which interpretation will the listener/speaker take.

1. The 2-Type Meaning Distribution of [NP+yihou]: Data and Analysis

Given the initial sparse data above, the natural thing to do next is to give many examples of [NP+after] in Mandarin and observe their pattern distribution. Table 2 gives a number of examples and their corresponding meaning types. For the sake of convenience I will use the English glossary in place of the corresponding Mandarin transliterations.

TABLE 1

Mandarin XP+ ‘yihou’(after)	syntactic category	type 1 meaning	type 2 meaning
QP			
three months + after	QP		Y
five days + after	QP		Y
two years+after	QP		Y

NP			
college+after	NP	Y	
high school+after	NP	Y	
the fourth quarter+after	NP	Y	
puberty+after	NP	Y	
2010+after	NP	Y	
2009+after	NP	Y	
September+after	NP	Y	
1960s+after	NP	Y	
Tang Dynasty+after	NP	Y	
WWII+after	NP		Y
war+after	NP		Y
wedding+after	NP		Y
meeting+after	NP		Y
cultural revolution+after	NP		Y
olympic game+after	NP		Y
dinner+after	NP		Y
blizzard+after	NP		Y
VP			
sleep+after	VP		Y
take a bath+after	VP		Y
eat lunch+after	VP		Y
play basketball+after	VP		Y

From Table 1 we can see that the majority of syntactic categories and a good deal of NPs derive a type 2 meaning when combined with ‘yihou’ (this is of course not an exhaustive list, as it is impossible to have an exhaustive list. However, it seems that we can come up with just as many NPs that take a type 2 interpretation as those NPs that take a type 1 interpretation). The only group of NPs deriving a type 1 meaning is highlighted with bold font. It is obvious from this group that a common property emerges from them: they all represent a stage, or a phase, in a sequence of similar entities that share a common feature.

This feature of the type1 NPs is not hard to appreciate. For instance, college is a phase in the sequence {...kindergarten, elementary school, middle school, high school, college, graduate school, ...}, the year 2010 is a phase in the sequence {...2009,2010,2011,2012...}, and ‘Tang dynasty’ is a phase in the sequence of dynasties in Chinese history: {...Tang Dynasty, Song Dynasty, Ming Dynasty,...}. Here, we attempt to give a semantic definition of the term ‘phase’ in a sequence of phases, here I termed ‘array (which literally means a sequence of elements sorted)’. Apparently, there are many requirements we must put in the definition, such as the durative property of a phase, the temporal order of the phases, the common feature shared by phases, etc. However, one not so obvious but conceivable requirement that a NP must satisfy for it to be a phase is that, the phases must occur consecutively in temporal order, with no time breaks in between (The Consecutive Requirement). This requirement is satisfied in all of

the examples we gave that bear a type 1 meaning; furthermore, one example in type 2 group also lend support to the necessity of this requirement: the ‘WWII’. WWII can be conceived as a member of the sequence ‘WWI, WWII’. However, it does not satisfy the Consecutive Requirement because there are many years in between WWI and WWII that many other things happened. Therefore, WWII cannot be conceived as a phase. So far, it seems that we have no evidence that rules out the Consecutive Requirement.

To sum up, we have attempted a definition for a ‘phase’ in an array of phases:

[Phase in an array]

x is a phase in an array Y if x is a member of the set:

$$\{F \mid x_1, x_2, x_3, \dots, x_n\}$$

where F represents a feature that is present in all members of the set. Instances of F may be year, month, phase of human development, phase of school, etc. In addition, the members of the array set must satisfies these conditions:

- (1) They are ordered in a temporal ascending order;*
- (2) Each element x of the array Y is considered as an interval rather than a point by speakers (i.e., x must occupy a duration);*
- (3) There is no time t in between x_n and x_{n+1} where an element y_m at t is not a member of the array (this condition is hypothetical Consecutive Requirement);*

Given this observation and the definition of phase, I further pursue two research questions in the remaining sections of this paper: First, is the phase effect on type 1 meaning, as observed in Table 1, robust across native speakers of Chinese? If so, can we make the subjects switch their interpretation from type 2 to type 1 given a particular presupposed context where a NP, such as ‘war’, denote a phase in an array of phases? To explore this question, I conducted a semantic experiment to observe the effect of ‘phase’ in a cross-speaker judgment task.

Second, even if we proved that the effect of phase hypothesis is robust, we still have the task of explaining why does the presence of the ‘phase’ strongly predict the type 1 interpretation of the bare [NP+yihou] structure.

2. The Robustness of Phase Effect on Type 1 Meaning

In order to test the phase effect on type 1 meaning, (derived from the initial observation above), I adopt two approaches to empirically verify the validity of this hypothesis. These two approaches address production and perception of meaning, respectively: first, observation of the actual sentences produced by native speakers that contain [NP+yihou] sequences and their meaning type. This is done by carrying out a corpus search. Second, observation of native speakers’ judgment on the meaning type of sentences that contain bare [NP+yihou] sequences without a clear context (such as in example 6) that can

disambiguate between type 1 and type 2 meaning. I will describe the design and results of both of these approaches.

2.1 Corpus Query

For the current task I consulted the following corpora:

1. Chinese Internet Corpus, 280 million words (tokens). This corpus has been compiled by Serge Sharoff from the Internet in February 2005 along with [other Internet corpora](#) (for English, German and Russian).
2. [The Lancaster Corpus of Mandarin Chinese](#), created by Richard Xiao and Tony McEnery
3. Chinese Business Corpus, 30 million words (tokens). This corpus has been compiled by Serge Sharoff from the Internet in 2008 along with [other business corpora](#) (for English and Russian).

The query interface is located online at <http://corpus.leeds.ac.uk/query-zh.html>, which carries out a search over these three corpora. Because the target for this particular research task is not annotated by any known corpus, I had to manually check the meaning type of each instance of the [NP+yihou] sequence. Due to the time limit the current term project, I only searched several representative such sequences of each meaning type, but a more comprehensive query on more instances of NPs will be the task of future study.

First I present the distribution regarding [daxue yihou] (college after) within the 95 examples showed in the corpus query. The preceding column shows the words/phrases that are preceding the [daxue yihou] structure in question (for instance, a ‘shang’ in the ‘preceding’ column indicate the phase [daxue yihou] is preceded immediately by the verb ‘shang’. A (NULL) indicates nothing is preceding the target phrase):

	Preceding	Number of instances	Meaning type	Percentage in 95 tokens
1	shang,jin,du- (V., enter)	78	Type 1	82%
2	duwan(V.,finish)	2	Type 2	2%
3	dao(preposition, to)	1	Type 1 or 2	1%
4	NULL (type 1 meaning)	13	Type 1	14%
5	NULL (type 2 meaning)	1	Type 2	1%

Table 2

This instance is representative of a non-time phase word (such as college, high school, puberty, in contrast to phase words that are explicitly time on the surface, such as 2010, September). As we can see in Table 2, rows 1 and 2 represent cases where there is a clear defining reference point for ‘yihou’: beginning of college in the case of 1, and end of college in the case of 2. These are what I call the presence of a clear context that can help disambiguate between type 1 and type 2 meaning. In 4 and 5, however, there is no structural context that clearly defines a point that is the reference point of ‘yihou’. As we can see from the percentage of 4 and 5, among the sentences where there is no immediate structural context to disambiguate the reference point of ‘yihou’, 13 out of 14 tokens take on a type 1 meaning (according to the discourse context). The discourse context is

different from the structural context in that whereas the structural context (such as row 1 and 2) clearly defines one point as the reference point of ‘yihou’, the discourse context refers to the surrounding sentences (of the sentence that contains ‘yihou’) in discourse to look for a clear interpretation of the reference point of ‘yihou’. Example (6) from the beginning section of this paper offers a good example of discourse context that blocks the type 1 meaning interpretation and it is also observed in the corpus query results (row 5).

Above I discussed the representative case of a non-time phase word. A time phase word, such as 2010, or 1960s, on the other hand, cannot yield effective results in the corpus query method. The reason is that in many cases of “2010 nian yihou” (after 2010) it is not possible to clearly interpret from the sentence whether it refers to after the beginning or end of 2010. This is due to another type of discourse context that is present: In the case of ‘daxue’ (college) from above, because a lot of times the discourse on “after college” will involve talking about taking courses, being a student, etc., therefore, it is rather easy to clearly know that they meant after the beginning of college, not the end, where the speaker is no longer a student. However, this kind of discourse context is clearly not available for a time word like 2010, because as a generic time reference word, the speaker is not bound to talk about a particular topic. For this reason, the corpus query is not sufficient to decide the phase effect on type 1 meaning.

Despite the deficiency of the corpus query, it is worth pointing out that the results of the corpus data did reveal several patterns. First of all, it can be seen without doubt that either in the presence of structural or discourse context, type 1 meaning is used much more frequently in discourse than type 1 meaning when associated with ‘daxue yihou’ (college after). This pattern can be hypothesized to predict why the word ‘college’ is strongly associated with type 1 meaning when *no context is present* (when neither the structural nor the discourse context is present, i.e., [daxue yihou] (college after), which is the primary target of investigation for the current paper). Speakers might have picked up from their speech input and output that when context is clear, type 1 meaning is *most often* associated with this word; therefore they may carry this information to process the word when context is deprived. The distribution of the two types of meaning is clearly shown in the corpus query results above.

Second, one crucial pattern observed across all ‘phase’ words (including time phase words such as 2010, September) is that they often are accompanied by a sequential narrative in its immediate surrounding discourse context. For instance, a corpus query on “2000 nian yihou” (after 2000) yielded 66 results; among the 66 results, 41 entries that contains “2000 nian yihou” also contain a sequential narrative of other time references (such as ‘the 1990s’, ‘the year 1997’, ‘before 2000’, ‘the year 2005’, etc) in the same sentence, the immediate sentence preceding or following the sentence that contains the target phrase “after 2000”. This observation holds across all phase words (including non-time words like ‘college’), and it may shed light on why the ‘phase’ effect is associated with type 1 meaning: in a sequential narrative of an array of time periods (or phases), each ‘phase’ word serves to signify the beginning of a new phase and often describes the change in situation (the narrative may first describe the situation in 1996,1997,..., and then describe a change in situation after the year 2000, which gives a type 1 meaning).

2.2 Experiment Design

Three important questions I bear in mind while designing the experiment questions are:

- (1) Are phase effects consistently and categorically observed as type 1 meaning?
- (2) If a target word is normally interpreted as type ii meaning, can it be interpreted as type i meaning when experimentally manipulated into the context of an array of phases?
- (3) If a target word is novel (i.e., with no pre-existing strong inclination to type i or type ii), can I manipulate it into type i meaning, given the right context?

The experiment is designed to ask the subjects to complete a series of 24 semantic judgment questions. In all sentences a simple sentence format is given in order to eliminate all possible context that may block or induce one reading over the other (these context are discussed in previous sections, and will not be repeated here).

Questions are of the format given in the previous section examples:

(a) *tamen hi _____ yihou renshi de.*
they BE _____ after meet PART
"They met after _____".

(where the blank space is filled in a different word for each question, such as college, 2010, WWII, the seventh war, September, the storm, etc.)

What is the earliest time they could have known each other?

- A. sophomore year in college
- B. one year after graduation from college
- C. two years after graduation from college

Several other considerations while designing questions and options are:

1. The use of distraction sentences "yiqian" (before) in between questions with real targets words;
2. The use of novel arrays. This type of question is designed to test the effect of 'phase' on novel sequences: if subjects are given novel words and are told they form a sequence of things, will they be inclined to interpret 'yihou' as type 1 meaning? Example: phases in a sonata form and symphony, which consists of technical jargons in musical composition and music theory that layperson will not be familiar with.
3. The use of contextually manipulated arrays (example: war: WWII vs. the seventh war in a series of 12 wars). As already discussed, [erzhan(WWII)+yihou] is associated with type 2 meaning. In this example, subjects are given a series of consecutive twelve wars in ancient time and are asked about the meaning of [qizhan (the seventh war)+yihou].

4. Considerations on option ordering. In all of the questions, three options are given and consistently ordered in a temporally ascending sequence. Also, in most cases the first option is of type 1 meaning, second option of type 2 meaning, and third option also of type 2 meaning (a distractor). I will explain my reasons for not randomizing these options for each question. It's true that randomize the chronological orders of the options would make the subjects less aware of what the target is (but only to a limited degree), however, it introduces extra processing load in processing all of those years and months that appear in random orders. Because all the questions concern the earliest time, all three answers for all questions are going to be in the format of "xxxx nian (year) xxxx yue (month) (optionally xxxx ri (date))". For 24 questions, each with three of these dates in random chronological order, it is a lot of processing load just to sort out for each question which of A, B, and C is the earliest date (especially in Chinese, where the sequence will involve a lot of characters, not only numbers). Therefore, after a trial test on myself with randomized options, I decided to not randomize them because it is clear in my experience of taking the test that if the subjects have to process the order of these sequences at the same time they have to process the meaning of the test sentences, this will introduce two drawbacks:

(1). They will need longer time to process the three options and will increase the potential total processing time for the meaning of the test sentence as well. This will reduce the possibility of their answer being a reliable intuitive judgment;

(2). They will be more likely to make errors just on which of the A, B and C are chronological the earliest date, and there is no good way to detect whether they made a mistake in assessing the orders of the three options alone, or they intend to choose that option based on the sentence of the meaning.

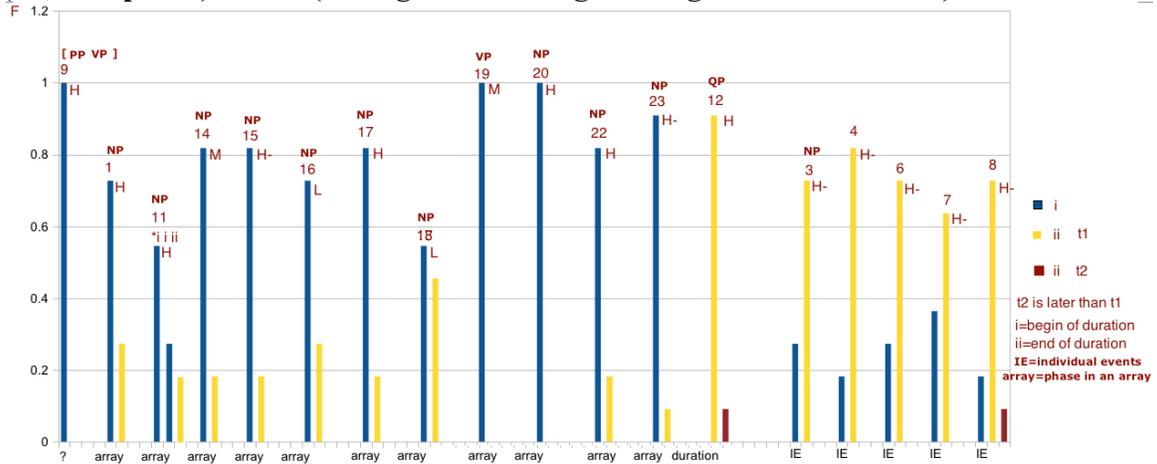
Overall these two drawbacks and the limited advantages of randomizing the options led me to decide not to randomize order of the answers. Instead, I gave them emphasized and explicit instructions before the test, that they should rely on their intuition and judge the answer of each question based on the meaning of each sentence. This is intended to make sure that their answers truthfully reflect their intuitive judgment of the meaning of each sentence (even if they know what target I'm after, which I cannot guarantee they don't even if I randomize the answers, it will not interfere with the results of the experiment).

5. Considerations on the influence of the foreign language. The lack of control for foreign language background is a flaw in the design of the current experiment. It is thus possible that the subjects' judgment may have been influenced by their second language (such as English). I will test the effect of L2 in future studies.

11 subjects across ages (20s-50s) who are native speakers of Mandarin participated in the experiment.

2.3 Results and Discussion

chart 1 histogram of meaning types in phase (array) words and individual events (IE, non-phase) words (coding of word targets are given in the table 2)²



note: 1 the number on top of each token represents the numbering of each target word in test questions
 y=frequency of rating for each type i or ii on the x axis, each three columns form a group, representing the 3 options of any test question
 2projected word frequency scale: H>H->M>L
 3Syntactic categories prediction: NP[array]=i, NP[IE]=ii, VP=ii, QP=ii
 4 all the test questions include 3 answer options: (1)type i; (2)type ii; (3)type ii. (3) is a distraction option and is a time later than (2).
 The only exception to this is number 11 (third group on the test), where I gave options (1)type i; (2)type i;(3)type ii. (2) is a later time than (1), in which case (2) is the distraction. However, the results show that distraction options sometimes are also picked as the answer, in low frequency.

table 3 percentage of the words meaning type

Target word+coding	syntactic category	type I (percentage)	type ii (percentage)	phase in array
I. Target words with no context given in experiment				
PP+VP				
at this company+work+after 9	PP VP	1	0	Y
QP				
two years+after 12	QP	0	1	N
NP-arrays(bare NP)				
array:phase of education adv.				
college+after 1	NP	0.727	0.273	Y
array:phase of human dev.				
puberty+after 15	NP	0.818	0.182	Y
array:year				

² For a larger and clear view of this histogram see <http://goo.gl/POyxp>.

2010+after 11	NP	0.818	0.182	Y
2009+after 17	NP	0.818	0.182	Y
array:month				
September+after 22	NP	0.818	0.182	Y
array:decade				
1960s+after 20	NP	1	0	Y
array:dynasty				
Tang Dynasty+after 23	NP	0.909	0.091	Y
NP-IEs(bare NP)				
Individual event(IE):war				
WWII+after 3	NP	0.273	0.727	N
IE:meeting				
annual meeting+after 4	NP	0.182	0.818	N
IE:revolution				
cultural revolution+after 6	NP	0.273	0.727	N
IE:olympic game				
olympic game+after 7	NP	0.364	0.636	N
IE:blizzard				
blizzard+after 8	NP	0.182	0.818	N
II. Target words with experimentally manipulated contexts				
NP-Experimentally given context as phase in an array(bare NP)				
novel array:musical forms				
3rd movement+after 14	NP	0.818	0.182	Y
development+after 16	NP	0.727	0.273	Y
contextually given array:war				
seventh war+after 18	NP	0.545	0.455	Y
VP(Experimentally given context as phase in array)				
play basketball+after 19	VP	1	0	Y

2.1. General confirmation of phase effect

The results from the experiment are shown in Chart 1 and Table 3 above. The results in general support the effect of phase on type 1 meaning interpretation in the following aspects. First of all, it can be clearly observed across the “array” group (left in figure 1) that type 1 meaning prevails the phase words, whereas across the “IE (individual events)”³ group, type 2 meaning prevails. It is also worth exploring why the interpretation for each group did not turn out to be 100%. I will explore this issue later.

Second, the ‘phase’ effect seems to hold across syntactic category as well. In the bottom of Table 3 we see the VP that has been given a context of a phase is also interpreted

³ The term ‘individual events’ are used to contrast with ‘phase’ words because they do not constitute a phase in an array of events, but an isolated instance of events, thus ‘individual’ events.

strongly as type 1 meaning. As discussed above, [VP+yihou] in a neutral context always unambiguously points to a type 2 meaning. However, in this test question, I gave the subjects a phase where ‘he played basketball from age 14-20’, forming an array of phases in the human development where “he did not play—he played—he did not play” characterizes each of the three phases. However, the meaning type of [VP+yihou] may have to do with the temporal types of verbs in terms of states, activity, achievement, accomplishment (Lewis 1979), and falls out of the scope of this paper.

Third, the results for novel arrays also confirm the phase effect. These include a series of novel technical terms known in music theory as the phases of a classical sonata form, and movements in a symphony. These items are different from the familiar and commonly known phase words: subjects have minimum (or at least much less frequent) exposures to the use of these novel items with ‘yihou’, therefore further validating the strong effect of phase.

Fourth, the results for the *qizhan* ‘seventh war’ also shows that in the appropriate context of a sequence of consecutive wars, the context of phase effect can override the type 2 meaning that is most often associated with *erzhan* ‘WWII’ (notice the morphology for WWII is literally ‘two+war’, identical to the ‘seven+war’ observed in the ‘seventh war’). Specifically looking at the frequency difference, while 27% of the subjects interpreted WWII as type 1 meaning, 55% of the subjects interpreted the ‘seventh war’ in an array context as type 1 meaning. This means that given appropriate context, a 28% of subjects changed their interpretation about the same [NP+yihou] phrase.

How can we explain the frequency difference found in the experiment results? From the above discussion in the corpus query section, I have suggested that it could be that the usage frequency where an [NP+yihou] phrase is most often used in the presence of a clear context (such as the ‘enter+college+after’ context in Table 2) could have an effect on how it is interpreted in the absence of the disambiguating context. Therefore, we would expect that a phase word with a high usage frequency will have a higher chance to be interpreted as type 1 meaning than a phase word with low usage frequency (such as the novel words). In turn, we expect that a word like “seventh war” would have an even lower chance (but greater than 50%) to be interpreted as type 1 meaning even though they are in a context of phase in an array (in the experiment), given that in their usage, they are most often associated with type 2 meaning. Our observation from the experimental data does confirm this quantitative relationship between these items (see graph 1 for a comparison: $F17 > F16 > F8 > F3$, where F17 is the percentage of ‘year’ in type 1 meaning, F16 is the novel array, F8 is the ‘seventh war’ in a sequence of consecutive wars, and F3 is the WWII).

An alternative explanation for the non-categorical results in the experiment is that this is due to experiment design flaws. Most notably, the foreign language effect has not been controlled in this experiment and may lead to the ‘imperfect’ type 1 meaning results associated with ‘phase’. While this is a possibility, it does not negate the validity of phase effect that is clearly observed across the board. Furthermore, foreign language effect will have trouble explaining the results on items like the ‘seventh war’ vs. ‘WWII’, where

we see that the 28% of the same subjects changed their mind when given the context of an array of wars. This suggests that even if a small portion of subjects are affected by their L2 English background and tend to interpret ‘yihou’ with type 2 meaning across the board, they did not do so consistently and the phase effect in Mandarin is still present. Moreover, this also shows that those who do not speak a second language (which constitutes around 70% of the subjects) also do not agree 100% of the time on the meaning type, which is by definition expected (because as discussed above, the ‘NP+yihou’ without context is ambiguous).

3. Phase Effect and the Two-type Meaning Ambiguity

In this section I explore the semantic meaning of [NP+yihou] more carefully and integrate the results from the experiment with the semantic analysis.

3.1 Semantic ambiguity as syntactic ambiguity?

Most discussions in the literature on the temporal aspects of Mandarin are on the fact that Mandarin does not have verb tense (see Lin 2006 for an overview). Regarding duration, Lin (2007) discussed the meaning of Chinese durative phrases in relation to the different types of verbs (accomplishment vs. states). Lin argued that in the interpretation of durative phrases when modifying different types of verbs, both interpretations utilize the same meaning of durative phrases, the only difference being that Process-related duratives (modifying process verbs) are adjoined to VP or AgrOP but Result-related duratives (modifying resultative verb) are adjoined to the most deeply embedded RP. Here I argue that in the case of [NP+yihou], we cannot reduce the ambiguity to syntactic ambiguity. The evidence can be seen throughout the discussion in this paper: the exact same structure can be interpreted differently merely due to the change of discourse context. In addition, the case of [NP+yihou] do not display the interesting array of syntactic phenomena (such as selection on word order) as the duratives do with different types of verbs. Finally, as comparing to other types of semantic ambiguity that can be reduced to syntax (such as the scope ambiguity), the logical form of the two readings of [NP+yihou] merely differ in t_R , the reference time that the ‘yihou’ is associated with. A time point cannot be reduced to syntactic structural difference.

3.2 The semantic value of [NP+yihou]

Let us revisit the discourse contexts that lead to a clear and unambiguous reading of [NP+yihou]:

(8) daxue de shihou wo hen shou, **daxue yihou wo pang le.**
college PART time I very thin college after I fat PART
“During college I was skinny; after college I became fat”. (type 2 context)

(9) daxue yiqian wo hen shou, **daxue yihou wo pang le.**
college before I very thin college after I fat PART
“Before college I was skinny; after I entered college I became fat”. (type 1 context)

From (8) and (9) we can see clearly that the exact same target sentence with [NP+yihou] will have a different meaning type when the discourse context changed. (8) is a context that clearly leads to type 2 reading while (9) represents a clear context for type 1 reading.

However, careful scrutiny reveals that there is an asymmetry between the nature of context between (8) and (9). In the case of (8), the time reference of “during college” blocks the interpretation that “college+after” means after college begins; otherwise they will mean the same thing. However, in (9), there is no such blocking: speaking of the events before college will not block the interpretation that ‘college+after’ can be after the end of college. In fact, we observe this in the English sentence:

(10) Before college, I was thin; after college I became fat. What happened in college?

Sentence (10) shows that a context like (9) will not block a type 2 reading. The difference between (9) and (10) must then reveal the differences between Chinese and English: in (10) we see that the [after college] in English has a default interpretation of type 2; this should, similarly, apply to (9), meaning that the default interpretation for [college+yihou] is type 1. In other words, while a discourse context of sentences like (8) blocks one interpretation over the other, (9) is a perfectly neutral context to observe the default meaning of [college+yihou], and here in Mandarin we obtain a type 1 meaning. If (9) is always interpreted as type 1, then we should not expect a bare [NP+yihou] without a discourse context (such as the first example (1) in the beginning of this paper) to be interpreted as type 2 (counter the experiment results). This can be confirmed with further experiments, where both (9) and (1) should be tested for consistency.

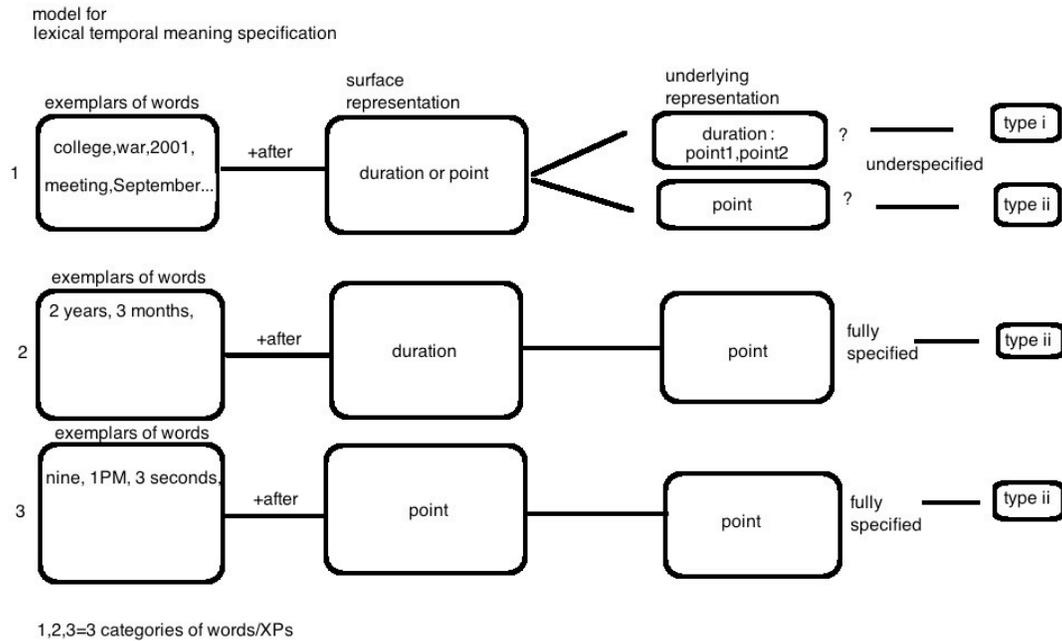
As I have made clear during the analysis above, in order for [NP+yihou] to have a unambiguous interpretation, the reference point of ‘yihou’ must pick out one point in time instead of a duration. Graph 2 shows a summary of the different types of NPs in terms of the semantic value they point to. It is clear that a QP (which is a subtype of NP) differs from regular NP with a temporal property in that [QP+yihou] picks out one point exactly, instead of duration:

(11) $[2 \text{ nian 'year' +yihou}] = \text{a point in time, } t_2, \text{ which when comparing to the reference time of 'yihou' } t_R, \text{ must satisfies the condition that } t_2 - t_R = 2 \text{ years.}$

The representation for a regular NP with a temporal property (such as college, high school, Tang Dynasty, 2011, etc) is much less clear. In fact we’re not sure whether the Graph 2 has the correct representation: if it is the case represented in Graph2, then there is a three-way contrast: (1) ‘college’ to be seen as a point in time (type 2 meaning); (2) ‘college’ to be seen as the beginning point of a duration (type 1 meaning); (3) ‘college’ to be seen as the end point of a duration (type 2 meaning).

An alternative scheme for a regular NP+yihou would be a two way contrast: (2) and (3). In this scheme, a phase word like ‘college’ will be always interpreted as a duration, which picks out two points in time, and cause the ambiguity. There is no evidence to

assess which of these two schemes would correctly represent the mental process of semantic processing.



Graph 2 Types of [NP+yihou] meanings

On the other hand, if we observe a non-phase NP like ‘meeting’, ‘cultural revolution’, because it is rarely (if not never) interpreted as type 1 meaning, it is therefore natural to assume that it is most often not interpreted as a duration. Therefore, the surface point scheme will work well for the non-phase NPs.

Having established a rich description of the phase effect on type 1 meaning, the question remains is that why is ‘phase’ to be linked to the type 1 meaning. Throughout the discussion I have hypothesized several clues as to why this is the case (notably the sequential narrative in the corpus query results). Here I offer one clue to the answer of this question. I consider the difference in meaning between these two sentences:

(12) women shi daxue yihou renshi de.
 We BE college after meet PART
 “We met after (the beginning of) college”.

(13) women shi daxue de shihou renshi de.
 We BE college PART time meet PART
 “We met during college (literally at the time we were in college)”.

Temporally, both of these meanings pick out the same time interval: the time from the beginning of college to the end of college. However, what (12) emphasizes that (13) does not is the significance of the dividing point of the beginning of this duration: the significance of the reference point does not exist in (13). In the case of (12), however, the significance of the reference point for 'after' can signify a change beyond this point: the reason that one chose to say (12) instead of (13), semantically and pragmatically, may be that they are emphasizing that the situation after this reference point is different from before this point.

In contrast, in the case of non-phase NPs, such as 'meeting +after', the alternative that is present in (12) and (13) does not exist. Because meeting is an individual event in time instead of a sequence of named phases, there is no name to refer to the time period after the meeting is finished. The only way to refer to the time period after the meeting is 'huiyi yihou' (meeting+after), but cannot be *'____ de shi hou' (at the time of ____).

This contrast leads to the point that in the presence of an alternative expression for type 1 meaning, the 'yihou' expression must be chosen over the 'de shihou (the time when...)' for a semantic or pragmatic reason, which is an extra emphasis on the temporal reference point. However the key question is that how is the emphasis on this point related to the phase NPs. My hypothesis is that, phase NPs may have different representations than IE (individual event) NPs regarding their internal semantic representation of time:

Hypothesis: A Phase NP has a more precise representation of time than an IE (individual event) NP.

In an array of phases, each phase NP represents a relatively well-defined duration. This duration is also usually part of the common ground among the native speakers of the language. For instance, native speakers of Mandarin, no matter where they are from, usually have a good agreement on how long is college, how long is high school, how long is the Tang Dynasty, how long is the puberty, etc. Therefore, a reference of point in time can be more precisely located with a phase NP. Also, time NPs such as 2011, 2012, or September, October also provide an absolute coordinate for referencing points in time. In a way, Phase NPs represents a relatively absolute time frame that is homogenous. In contrast, an individual event has no pre-defined, widely agreed duration: a blizzard or a meeting can last any amount of time. More importantly, they do not provide a homogenous time frame for one to locate a temporal reference; instead, the significance of the individual event resides in the event itself, only within the duration that the event is happening. In other words, if the event did not take place then the reference to this period of time will no longer valid. In contrast, the existence and reference to a time point in the phase NPs will not be eliminated regardless of what happened (no matter what happened or did not happen in 2011 or during college, the reference to this time frame will always exist). Therefore we may conclude that a phase NP bears a more generic time reference that is available as part of the common ground for all speakers of a particular language.

Connecting with my previous point about the reason for choosing [daxue yihou] over [daxue de shihou], I propose that in order to emphasize the point reference in the former expression while picking out a duration, one must be able to reference the time point more precisely. In other words, comparing the situation after a phase begins to the situation before the phase begins (i.e., in the previous phase) is more meaningful because the time reference here is more generic and homogenous. In contrast, comparing the situation after an individual event begins to the situation before it begins is less meaningful because the individual event presents a “disturbance”, if you will, to the otherwise homogeneous continuum of time (i.e., due to the significance of the individual event itself in the time continuum, the situation after it begins may be not as comparable on a common ground to the situation before it begins).

Reference

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