

SEMANTIC ANALYSIS AND CONTEXTUAL HARMONY OF DURATIONS¹

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ABSTRACT

Temporal relations, such duration, aspect, frequency, time point and sequence as expressions, describe the relationships between temporal elements and events in complex knowledge networks. Logical compatibility between temporal elements and different types of events has a strong influence on the semantic interpretation and grammaticality of sentences. It is one of the most complicated, frequently used, but least understood concepts in linguistics. In this paper, we focus on durations, and show that syntactic structures (construction patterns) make fine-grained distinctions between durations. We also explain their common functionalities and differences based on semantic harmony. In addition, we show that the usage of durations is affected primarily by their constructional meanings and the types of collocated events; and constructional meaning of durations is main factor which affect the usage of durations. Furthermore, we demonstrate that the morpho-syntactic structure of durations also reduces the flexibility of their usage. We list four types of morpho-syntactic structures of duration expressions, and discuss the constraints on their usage. Based on our observations, we conclude that the properness of a sentence depends on an ordering of the lexical words such that the semantics, syntax, and morphology of the sentence are in harmony.

SUBJECT KEYWORDS

Semantic harmony

Constructional meaning

Durations

Temporal relation

1. INTRODUCTION

Zhu (朱 1985) observed that: “Language includes both form and meaning. The ultimate goal of syntactic research is to clarify the correlation between meaning and grammatical forms.” More recently, Lu (陸 2009) proposed the concept of semantic harmony/prosody to clarify the interactions between the syntactic structure and the semantic relations of language. Based on the theory of semantic harmony, Lu believes that construction senses (Goldberg 1995) limit the usage of grammatical phrases. For example, *xu1xin1 dian3 er0* 虛心點兒 *Be a little modest!* is acceptable, but **jiao1lao4 dian3 er0* 驕傲點兒 **Be a little proud!* is not. This is because the “Be a little ...” construction requires a self-effacing term.

The constructional meaning of a sentence is the meaning produced by its semantic structure (Goldberg 1995). Clearly, the semantic roles of arguments are determined by syntactic patterns, i.e. constructions, especially in weakly marked languages. That is, construction patterns contribute the sense of arguments by specifying semantic roles; and in this paper, we show that they also contribute the sense of adjuncts. For example, why are *san1nian2 du2wan2 da4xue2* 三年讀完大學 *to graduate from the university within three years* and *yi1xia4z0 jiu4 shui4zhao2 le0* 一下子就睡著了 *to fall asleep suddenly* proper phrases, while **san1nian2 du2 da4xue2* 三年讀大學 *three years to study university* and **hao3yi1hui3er0 jiu4 shui4zhao2 le0* 好一會兒就睡著了 *to fall asleep in a while* are improper phrases?² Later in the paper, we show that improper sentences violate the contextual semantic harmony due to the incompatible construction meaning of durations and event types. Construction patterns also influence changes in the lexical sense. Take the Verb-phrase (VP) *hen3 tai2* 很台 *very Taiwanese* as an example. From the structure of “very ...,” we know that “very” is always followed by a state verb that denotes the characteristic property of its subject. Thus, the noun *tai2* 台 *Taiwan* can be naturally understood as the adjective “*Taiwanese*” in this context. That is, we derive sense from the construction in accordance with the semantic harmony.

The concept of temporal relations is one of the most complicated, frequently used, but least understood topics in linguistics. It describes the relationship between temporal elements and events in complex knowledge networks. Temporal relations include expressions of duration, aspect, frequency, time point and sequence. For example, *mei3tian1* 每天 *everyday* denotes the temporal relation of frequency, and *xing1qi2yi1* 星期一 *Monday* denotes the temporal relation of a time point. In the past, temporal

words were often analyzed from the perspective of syntactic behavior; for example, they were classified as nouns or adverbs, or distinguished by the tense or aspect (陸 & 馬 1985). Li et al. (2005) made clear-cut definitions for different types of temporal adverbs and studied the logical compatibility between types of events and aspects. In this paper, we focus on the construction meaning of duration expressions (referred to hereafter as “durations”) and their contextual semantic harmony. In general, a duration word/expression is neutral when used to denote a temporal relation, as its core meaning expresses a certain length of time. For example, *san1fen1zhong1* 三分鐘 *three minutes* is a typical duration expression. In *san1fen1zhong1 chi1guang1* 三分鐘吃光 *eaten in three minutes*, the term “three minutes” functions as a pre-verbal adverbial and denotes the temporal relation of a duration for event completion. On the other hand, in *deng3 san1fen1zhong1* 等三分鐘 *wait for three minutes*, the term *san1fen1zhong1* 三分鐘 *three minutes* is a post-verbal nominal and denotes the temporal relation of a duration for event continuation. In other cases, such as *san1fen1zhong1 bian4tian1* 三分鐘變天 *the weather changed in three minutes*, the term *san1fen1zhong1* 三分鐘 *three minutes* is a pre-verbal adverbial, but its sense emphasizes that the state/situation changes in a short time. There are similarities and differences between different types of durations. Our objective is to explain those functionalities and idiosyncrasies based on the theory of semantic harmony. Huang et al. (2000) suggested that event types and semantic attributes influence the syntactic grammar and semantic interpretation of sentences. In the following sections, we show that their theory is also applicable to the usage of durations.

A temporal word can have multiple senses that are not always easy to distinguish. For example, the *Modern Chinese Dictionary* (1996) lists four meanings for *yi1 tian1* 一天:

- (1) a. *yi1 zhou4 ye4* 一晝夜 24 hours
 b. *yi1ge0 bai2tian1* 一個白天 daytime
 c. *fan4zhi3 guo4qu4 mou3 yi1 tian1* 泛指過去某一天 one day in the past
 d. *yi1tian1dao4wan3* 一天到晚 from day to night

Definitions a., b. and d. refer to non-specific durations or periods of time, but c. expresses a time point, which refers to a particular point on the time axis. The sense of a duration or a time point is resolved by the context. When it describes a period of time without referring to a specific time point,

it is a duration; otherwise, it is a time point (李 1998). In this paper, when we refer to a duration expression, we mean that its core sense implies the duration and use that sense in its context.

The remainder of the paper is organized as follows. In the next section, we review related works. In Section 3, we discuss the construction patterns and semantic interpretation of durations. In Section 4, we consider the co-occurrence restrictions and semantic harmony of durations. In section 5, we differentiate syntactic behaviors of four different types of morpho-syntactic structures of durations. Then, in Section 6, we summarize our conclusions.

2. LITERATURE REVIEW

Initially, construction grammar was taken to be a self-evident fact. In the last three decades, however, the early notion of construction grammar has been challenged, as an increasing number of researchers have shifted their focus to lexical semantics. Despite this change of emphasis, to be acceptable, sentences must be syntactically valid and be in semantic harmony, as shown by the following example:

(2) Host + attribute + value
 a. *Zhang1-San1* 張三(*Chang-San*) *shen1gao1* 身高(*height*) *yi1qi1wu3 gong1fen1*
 175公分(*175 centimeter*)

b. **Zhang1-San1* 張三(*Chang-San*) *sheng1ri4* 生日(*birthday*) *zuo2tian1* 昨天
 (*yesterday*)

(3) Host + time-value + attribute
Zhang1-San1 張三(*Chang-San*) *zuo2tian1* 昨天(*yesterday*) *sheng1ri4* 生日
 (*birthday*)

Sentences (2) a. and (3) are called host-attribute-value constructions (劉 2008). They are composed of three consecutive nouns without verbs, but they are perfect Chinese sentences. According to the theory of semantic harmony, the host+attribute+value structure is semantically complete. In contrast, sentence (2) b. is not an acceptable sentence syntactically. The word ordering in (3) is better because a time point expression usually precedes the main predicate, and *sheng1ri4* 生日 *birthday* acts as the main predicate although it is a noun. The above example shows that the properness of a sentence is an ordering of lexical words such that the syntax and semantics are in harmony.

Unlike most lexical semanticists, Pinker (1989) considered that there are “syntactically relevant aspects of verb meaning,” which Goldberg (1995) subsequently described as “constructional meanings.” According to Goldberg, “a construction is posited in the grammar if and only if something about its form, meaning, or use is not strictly predictable from other aspects of the grammar, including previously established constructions.” She did not deny the interaction between verbs and constructions, but she treated constructions as the same basic data type as morphemes, such as a CAUSE-RECEIVE construction or a CAUSE-MOTION construction. Croft (1991) suggested that “individual lexical items appear to denote only causally linked events.” For example, he argued that sailing and the implication of motion can only be conflated if the activity of sailing causes the motion. Thus, the following sentence is unacceptable.

(4) * The boat burned into the cave.

In our research, we found that constructional meaning also exists in duration-event structures. Moreover, we believe that the constructional meaning is derived from the fact that **unmarked/underspecified semantic relations are resolved and/or specified by the construction patterns**.

Contextual harmony is achieved due to the logical and grammatical collocations of lexicon, morphology, syntax, semantics and pragmatics of sentences. The concept has been widely applied in lexicology or discourse structure research. For example, Sinclair (1991) posited that the combination, “*set in*” has a negative prosody, so *rot* is a prime example of something that is going to set in. Lexicographers realized the importance of semantic harmony with the development of computer technology and the increasing use of computers, because corpora often provide large amounts of data to support semantic harmony. The concept has also been used to analyze discourse structures. A discourse is not simply a concatenation of utterances. It is organized into a hierarchy based on the relations between the discourse segments and their topicality. It has been found that semantic harmony correlates with the structure of a discourse. (Sinclair 1991) Similarly, on the syntax level, we believe that semantic harmony provides a new perspective that integrates the lexicon, morphology, syntax, semantics and pragmatics of sentences.

There have been few papers dealing with constructional meaning and semantic harmony of temporal phrases, and almost all of them put attention

on the viewpoint of aspect or tense (Schelkens 2000, Verdoolaege 2001). For instance, Pastor (2003) took *today*, *yesterday* and *tomorrow* as examples, showing that when time spans are involved in events, what kind of boundaries for our understanding are reasonable, i.e. for meeting the semantic harmony properly. Basically, these papers are all analyses of points in time, but do not focus on “duration”. In this paper, we will explain how different the fine-grained semantic distinctions are for the concept of duration, and how they have caused misunderstanding in language processing, such as translation and question-answering system etc.

3. CONSTRUCTION PATTERNS AND SEMANTIC INTERPRETATION OF DURATIONS

As mentioned earlier, the core sense of a duration word/expression is that it denotes a certain period of time, such as *san1fen1zhong1* 三分鐘 *three minutes*, *yi1hui3er0* 一會兒 *a while*, *san1nian2* 三年 *three years*, and *chang2nian2* 長年 *yearlong*. It does not specify a particular point on the time line. Hence, we do not classify words like *zao3shang4* 早上 *morning* and *xing1qi2ri4* 星期日 *Sunday* as durations, because their core sense denotes a particular time point, although they denote the sense of a period of time at a certain time point.

3.1 Senses of Durations in Different Construction Patterns

In principle, generic durations may be combined with prepositions and/or postpositions such that their sense and grammatical function are unambiguous, as shown by the following examples:

(5) *zai4 er4shi2fen1zhong1 hou4 jiang1 huo3shi4 kong4zhi4* 在廿分鐘後將火勢控制
After twenty minutes, the fire was controlled.

(6) *zai4 liang3nian2 nei4 nian4wan2 da4xue2* 在兩年內唸完大學
To graduate from the University within two years.

These two examples can be easily understood. However, the semantic interpretation of a generic duration can be ambiguous; it may be interpreted as different fine-grained temporal relations that have co-occurrence constraints with different type of events. The following examples show three duration relations of the same duration word due to different syntactic structures (construction patterns).

(7) *ba1fen1zhong1 de2 shi2liu4 fen1* 八分鐘得十六分 *to score sixteen points within eight minutes*

(8) *yang2guang1 ba1fen1zhong1 di3da2 di4qiu2* 陽光八分鐘抵達地球 *after eight minutes the sunlight reaches the Earth*

(9) *biao3yan3 ba1fen1zhong1* 表演八分鐘 *perform for eight minutes*

Each of the above examples expresses a slightly different sense of duration.³ The first sense is **duration for event completion**, as shown in figure A, which emphasizes that the event was completed within the time period; and the second is the **duration before a state/situation change**, as shown in figure B. If the duration expression appears after the verb, as in (9), it denotes the sense of **duration for event continuation**, as shown in figure C. In contrast to the sense of the first type, the third event type is unbounded, i.e., events without a definite end point (Thompson 2006, Huang et al. 2000).

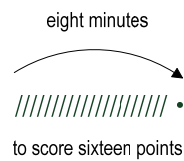


Figure A

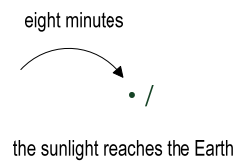


Figure B

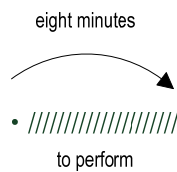


Figure C

Typical durations share the same sense interpretations and can be substituted in the same context, as shown by the following examples:

(10) *lao3ban4tian1 pao4 yi1hu2cha2* 老半天泡一壺茶 *take a long time to make a pot of tea*

(11) *hao3yi1hui3er0 shui4zhao2 le0* 好一會兒睡著了 *take quite a while to fall asleep*

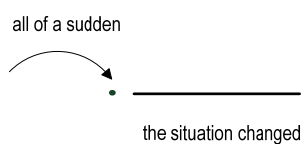
(12) *shui4 yi1xia4z0* 睡一下子 *sleep for a short while*

The duration expression *lao3ban4tian1* 老半天 *a long time* in (10) refers to the time taken to complete the event, i.e. *to make a pot of tea*. In contrast, the expression *hao3yi1hui3er0* 好一會兒 *quite a while* in (11) denotes a long period before the event *sleep* starts. Therefore, preverbal durations can have ambiguous sense interpretations.

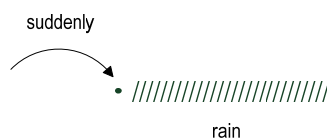
3.2 Preverbal Durations

It is not possible to distinguish between the two meanings of preverbal duration based on their syntactic position. One denotes a change of state after a certain length of time (duration); the other denotes that the event was completed within a certain period (duration). However both can be interpreted as the **duration for change of state**. The **duration for event completion** can be interpreted as the duration from the state at the start of the event changing to the state of event completion and the **duration before a state/situation changes** obviously denotes the duration from the pre-event state to the event-state. They share the same construction pattern DURATION-EVENT, although they are differentiated by the type of collocation event, as shown by the following examples:

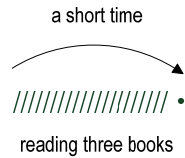
(13) a. *yi1xia4 feng1yun2bian4se4* 一下風雲變色 *all of a sudden the situation changed*



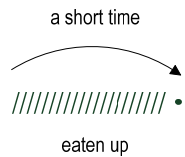
b. *yi1xia4 jiu4 xia4yu3 le0* 一下就下雨了 *rain suddenly*



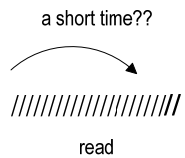
c. *yi1xia4 du2 le0 san1ben3shu1* 一下讀了三本書 *reading three books within a short time*



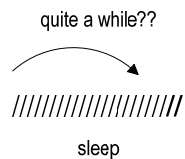
d. *yi1xia4 quan2 chi1guang1* 一下全吃光 *eaten up in a short time*



e. **yi1xia4 du2shu1* 一下讀書 *a short time read*



f. **hao3yi1hui3er0 shui4jue4* 好一會兒睡覺 *quite a while sleep*



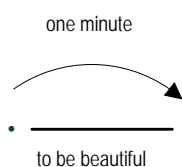
The type of **duration before a state/situation changes** collocates with events with starting point (Huang et al. 2000). Examples (13) a. and b. express a short period before the state/situation changes, i.e., after a short time, the subject achieves the state of the event. In addition, the type of co-occurrence event can be 1) a state, such as *feng1yun2bian4se4* 風雲變色 *the situation changed*; or 2) an activity, such as *xia4yu3* 下雨 *rain*. On the

other hand, (13) c. and d. focus on events completed within a period of time, i.e., a short duration. In this case, the events should be bounded events, so the endpoints of the events are required; thus, the perfective aspect particle ‘le0 了’ often appears concurrently, as in (13) c. Unbounded events will result in improper constructions, such as (13) e. and f.

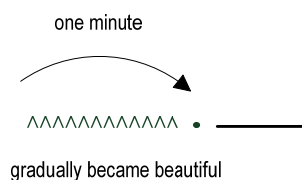
3.3 Post-Verbal Duration for Event Continuation

Post-verbal durations all denote the sense of **duration for event continuation** without ambiguity. The following phrase (14) is a typical example:

- (14) *bian4mei3 yi1fen1zhong1* 變美一分鐘 *become beautiful for one minute.*

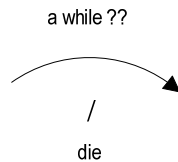


- (15) *yi1fen1zhong1 bian4mei3* 一分鐘變美 *Take one minute to become beautiful.*⁴

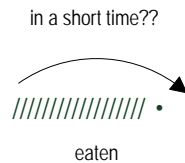


The difference between (14) and (15) is obvious. In (14), the post-verbal duration emphasizes the continuation of the state of being beautiful; however, in (15), it emphasizes a certain length of time before the change of state occurs. We find that the sense and grammatical functions of a generic duration are influenced by syntactic positions as well as different types of events. A post-verbal duration denotes a continuing event; therefore, it cannot co-occur with any bounded or punctual event, such as those in (16) a. and b.

(16) a. *si3 yi1xia4 死一下 *die a while*



b. *quan2 chi1guang1 yi1xia4 全吃光一下 *eaten in a short time*



4. SEMANTIC HARMONY AND CO-OCCURRENCE RESTRICTIONS

Lewandowska-Tomaszczyk (1996) posited that there exists a certain aura of meaning connected with lexical items and the syntactic contexts in which they occur, and it spreads over the senses of potential neighbors by creating specific semantic expectations. She quoted Louw (1993), who observed that “in many cases, semantic prosodies hunt in packs.” Next, we consider duration expressions in terms of the theory of semantic harmony to determine which event-duration collocations are not logically compatible. As mentioned in Section 3, preverbal and post-verbal durations collocate with different types of events. To check the semantic harmony of the collocation events, the types of events need to be finer than Vendler’s (1957) activity, state, achievement, and accomplishment categories.

4.1 Event Types and Event-Duration Collocations

Huang et al. (2000) proposed the MARVS (Module-Attribute Representation of Verbal Semantic) representation to refine the event structure analysis. MARVS defined event type by the composition of the following five atomic event modules:

(17) • **Boundary** (complete) : It is an event module that can be identified by means of a temporal point (usually denoting a starting point or an end

point) and it might also denote a complete event while the event must be regarded as a whole, i.e. the starting point and the end point of the event is conflated, e.g., *chu1fa1* 出發 *take off*.

/ **Punctuality:** It is an event module that represents a single occurrence of an activity that cannot be measured based on duration, e.g., *quan4* 勸 *persuade*.

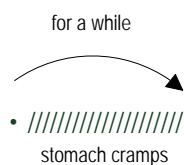
////// **Process (activity):** It is an event module that represents an activity that has a time span, i.e., that can be measured in terms of temporal duration, e.g., *san4bu4* 散步 *stroll*.

— **State:** It is a homogeneous state module in which the concept of temporal duration is irrelevant; i.e., it is neither punctual nor does it have a time span, e.g., *qing2* 晴 *sunny*.

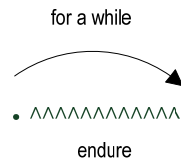
^^^^ **Stage:** It is an event module consisting of iterative sub-events, e.g., *bian4mei3* 變美 *became beautiful*.

According to Huang et al., if events involve durations, the event types must be limited to state, process or stage; punctual or bounded events are excluded because they should be completed in an instant. The authors also used the time element as a criterion to identify an event type. In this paper, we consider more complex linguistic phenomena than Huang et al. (2000). Specifically, we distinguish three fine-grained types of duration and find that preverbal durations may co-occur with punctual or bounded events, e.g. (23), (26), (27). As for post-verbal durations, we find that the post-verbal durations only express an event's continuation, no matter how long the event lasts as exemplified in (18), (19), (20). We verified, as Huang et al. (2000) noted, that punctual and bounded events are not allowed in this kind of construction, as shown by the example (21):

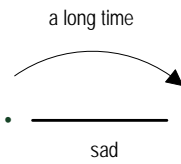
(18) *wei4 chou1chu4 le0 yi1hui3er0* 胃抽搐了一會兒 *Stomach cramps for a while*



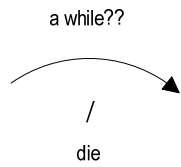
(19) *ren3nai4 pian4ke4* 忍耐片刻 *endure for a while*



(20) *ai1chou2 xu3jiu3* 哀愁許久 *sad for a long time*

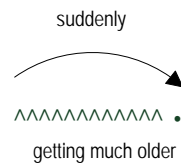


(21) **si3 yi1xia4* 死一下 **die a while*

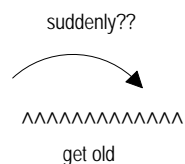


Regarding preverbal durations, there are two ambiguous senses. One denotes duration for event completion and only collocates with **bounded types of events**. Hence, the perfective aspect particle ‘*le* 了’ often appears concurrently with this type of duration as shown by the following examples:

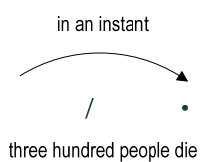
(22) *yi1xia4 shuai1lao3 le0 xu3duo1* 一下衰老了許多 *getting much older suddenly*



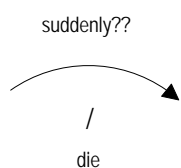
vs. **yi1xia4 shuai1lao3* 一下衰老 *suddenly get old*



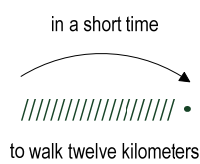
(23) *yi1xia4 si3qu4 san1bai3 duo1 ren2* 一下死去三百多人 *three hundred people died in an instant*



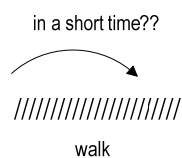
vs. **yi1xia4 si3* 一下死 *suddenly die*



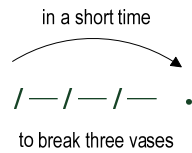
(24) *yi1xia4 zou3 shi2 er4 gong1li3* 一下走十二公里 *to walk twelve kilometers in a short time*



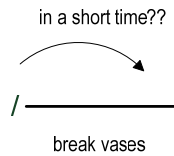
vs. **yi1xia4 zou3* 一下走 *to walk in a short time*



(25) *yi1xia4 shuai1po4 san1ge0 hua1ping2* 一下摔破三個花瓶 *to break three vases in a short time*

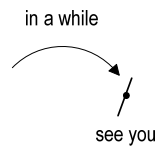


vs. **yi1xia4 shuai1 hua1ping2* 一下摔花瓶 *to break vase in a short time*

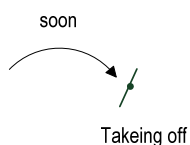


The other type of preverbal duration denotes the duration of state/situation change. It does not describe the duration of an actual event; instead, it describes the length of time before an event starts (or starts to change), so it is usually short. Thus, the five event modules in MARVS representation may collocate with preverbal durations, including punctual and complete types, if the collocation events have **starting points**, but no endpoints. Note that if a collocation event is bounded (i.e. it has endpoints), the duration should be interpreted as a duration for event completion, as shown by the following examples:

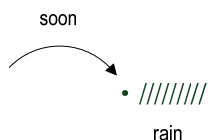
(26) *yi1hui3er0 jian4* 一會兒見 *See you in a while.*



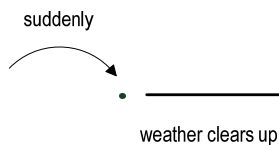
(27) *yi1xia4 jiu4 chu1fa1* 一下就出發 *Taking off soon.*



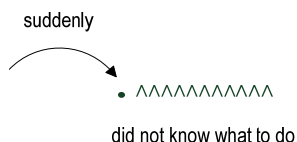
(28) *yi1xia4z0 xia4yu3 le0* 一下子下雨了 *It will rain soon.*



(29) *yi1xia4 jiu4 fang4qing2 le0* 一下就放晴了 *Suddenly, weather clears up.*



(30) *yi1xia4 bu4zhi1suo3cuo4* 一下不知所措 *Suddenly, did not know what to do.*



In summary, the post-verbal duration phrases co-occur with event types of state, process and stage with starting points but neither punctual nor completed events. The preverbal durations of event completion collocate with event types of state, process and stage with endpoints but neither punctual nor completed events. The preverbal durations of state change collocate with event types with starting points (including punctual and complete event type with starting point) and denote the duration time for completion of state change.

The above observation is also applicable to other framework of

situation types. Xiao (2004) had classified situation types into five categories: \pm Dynamic (to distinguish situation between process [/, //, or ^^] and state [—]); \pm Durative (to distinguish situation between lasts for a certain period of time [↖] and doesn't last in time. [•]); \pm telic (to distinguish situation between has a final spatial endpoint [/, //, •, or —•] and hasn't a final spatial endpoint [/, //, ^^, —, •, •, •, or •]); \pm result (to distinguish situation between indicates the success of a final spatial endpoint [/, //, •, or —•] and doesn't indicate the success of a final spatial endpoint. [/, //, ^^, —, •, •, •, or •]); and \pm bounded (to distinguish situation between has a final temporal endpoint [/, //, •, or —•] and hasn't a final temporal endpoint. [/, //, ^^, —, •, •, •, or •]).

According to Xiao's classification system, we conclude that the duration expressions mentioned above collocate with different situation types respectively:

- A. The preverbal durations which denote "state/situation change" collocate with \pm durative, —telic, —result, and —bounded situation types with starting point as their core sense.
- B. The preverbal durations which denote "event completion" collocate with +durative, +telic, +result, and +bounded situation types as their core sense.
- C. The post-verbal durations collocate with +durative, —telic, —result, and —bounded situation types as their core sense.

4.2 Short/Long Durations

Durations are further classified into short durations, like *san1miao3zhong1* 三秒鐘 *three seconds*, and long durations like *san1nian2* 三年 *three years*. Normally, long durations do not play the role of duration of change of situation/state because the resulting semantics would not be logical, as in (31) b. In contrast, *san1nian2 hou4* 三年後 *after three years* in (31) c. is a time point, not a duration.

- (31) a. *yi1hui3er0 jian4* 一會兒見 *See you in a while.*
- b. **san1nian2 jian4* 三年見 **See you in three years.*
- c. *san1nian2 hou4 jian4* 三年後見 *See you after three years.*

It should be possible to distinguish between a long duration and a short duration intuitively; however, the length of time is a relative concept, as shown in (32) and (33):

(32) *wo3 san1nian2 jiu4 bi4ye4* 我三年就畢業 *I will graduate in three years.*

(33) *ta1 san1fen1zhong1 cai2 da2wan2* 他三分鐘才答完 *It took him three minutes to answer the questions.*

In Mandarin, *jiu4* 就 indicates that an event happens faster or earlier than expected; Thus, no matter what duration expressions collocate with it, they all denote a short period of time (i.e., shorter than expected). In contrast, *cai2* 才 indicates that an event takes longer or happens later than expected; Hence, no matter what duration expressions collocate with it, they all denote a long duration (i.e., longer than expected).

4.3 Absolute Long/Short Duration Expressions

In addition to generic durations, some Mandarin expressions only denote a short duration, e.g., *yi1xia4z0* 一下子 *a short while* and *zha2yen3jian1* 眨眼間 *in the twinkling of an eye*; and some only denote a long duration, e.g., *hao3yi1hui3er0* 好一會兒 *a good while* and *lao3ban4tian1* 老半天 *for a long time*. The following sentences are incorrect:

(34) * *wo3 lao3ban4tian1 jiu4 bi4ye4* 我老半天就畢業 **It will take me a long time to graduate.*

(35) * *ta1 yi1xia4 cai2 da2wan2* 他一下才答完 **It took him a short time to answer the questions.*

We call them absolute long/short duration expressions because they refer to fixed long/short concepts. Obviously, they impose additional constraints on their collocation events. In contrast, generic duration expressions, such as *san1nian2* 三年 *three years*, *san1fen1zhong1* 三分鐘 *three minutes*, have no problem to occur in the duration situations like (34), (35).

5. MORPHO-SYNTACTIC HARMONY AND STRUCTURE-SENSITIVE DURATIONS

Other than the semantic constraints imposed on collocation events, some morpho-syntactic structures of time words/expressions also limit their functionality. For example, a few short duration expressions like *yi1zhuan3yan3* 一轉眼 *in a wink* and *bu4yi1hui3er0* 不一會兒 *in a moment*, never occur as post-verbal durations, such as (36); while long duration expressions like *jing1nian2lei3yue4* 經年累月 *for months and years* and *yi1nian2dao4tou2* 一年到頭 *throughout the year* are never used to denote situation changes, such as (37).

(36) * *ta1 pao3 le0 yi1zhuan3yan3* 他跑了一轉眼 *he runs in a wink.*

(37) * *yi1nian2dao4tou2 feng1yun2bian4se4* 一年到頭風雲變色 *the situation changed throughout the year.*

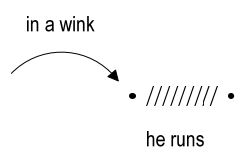
We believe there are two reasons for the differences: sense differences and their morpho-syntactic structures. Based on our observations, we find that duration words have at least four kinds of morpho-syntactic structure, which we discuss in the following subsections.

5.1 ‘*yi1* —’ + Verb = Verb+ ‘(*zhi1*) *jian1* (之)間’

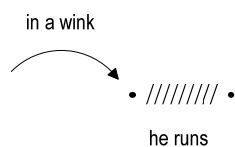
In Mandarin, “*yi1...jiu4* 一...就” is a construction of the sense of “as soon as”. For example, in *yi1 kul jiu4 chuan3* 一哭就喘 *as soon as one cries, panting follows*, *yi1 kul* 一哭 means “as soon as one cries,” and its syntactic feature is an adverb that modifies the event “pant”. Naturally, many duration words are formed by “*yi1* —” and they can all be regarded as adverbs that denote short duration. A complete type of verb such as *yi1zhuan3yan3* 一轉眼 *in a wink*, *yi1zhuan3nian4* 一轉念 *in a momentary thought*, *yi1tan2zhi3* 一彈指 *as fast as snapping one’s fingers*, *yi1zha2yan3* 一眨眼 *in the twinkling of an eye* and *yi1zhuan3shun4* 一轉瞬 *in a flash*. Example is as (38) a. In addition, these types of duration expressions all have synonyms of the form “Verb+(*zhi1*) *jian1* (之)間” because the word “(*zhi1*) *jian1* (之)間 *between*” denotes the duration time for completion of the verb. Thus, (38) b. shows the same meaning as (38) a. Moreover, they cannot play post-verbal duration as exemplified by (38) c. In contrast, (38) d. is perfectly all right. Both senses of *yi1zhuan3yan3* 一轉眼 and *yi1fen1zhong1* 一分鐘 express the sense of short duration, but have different syntactic behaviors.

Therefore morphological structure of a constituent does affect the grammaticality of a sentence.

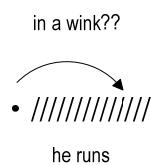
(38) a. *yi1zhuan3yan3 ta1 jiu4 pao3 le0* 一轉眼他就跑了 *In a wink, he runs.*



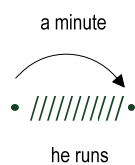
b. *zhuan3yan3zhi1jian1 ta1 jiu4 pao3 le0* 轉眼之間他就跑了 *In the blink of an eye, he runs.*



c. **ta1 pao3 le0 yi1zhuan3yan3* 他跑了一轉眼 *he runs in a wink.*



d. *ta1 pao3 le0 yi1fen1zhong1* 他跑了一分鐘 *he runs a minute.*

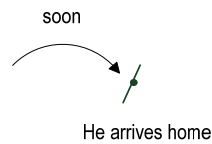


5.2 Negation + Duration Word

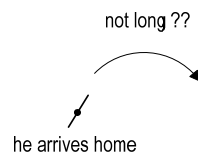
The second kind of short duration expressions are formed by a negation followed by a duration, they can be further divided into two structures. The first is an adverbial with VP-like structure, such as *bu4yi1hui3er0* 不一會兒 *not long*, *bu4duo1hui3er0* 不多會兒 *not long*, and *bu4xuan2zhong3* 不旋踵 *not long*. They only function as a preverbal duration similar to the kind

of durations mentioned in section 5.1. An example of this is (39) a. Although (39) b. seems a proper phrase, it is not a sound sentence. The proper sentence is given in (39) c., which *bu4yi1hui3er0* 不一會兒 modifies the post-event not pre-event, i.e. it still denotes the duration before state/situation changes.

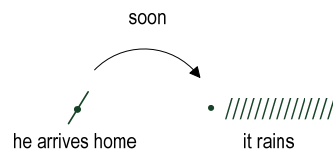
(39) a. *bu4yi1hui3er0 ta1 di3da2 jia1xiang1* 不一會兒他抵達家鄉 *Soon, he arrives home.*



b. * *ta1 di3da2 jia1xiang1 bu4yi1hui3er0* 他抵達家鄉不一會兒 *he arrives home not long.*

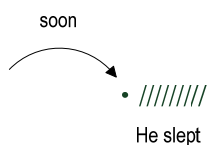


c. *ta1 di3da2 jia1xiang1 bu4yi1hui3er0 jiu4 xia4yu3 le0* 他抵達家鄉不一會兒就下雨了 *Soon after he arrives home, it rains.*

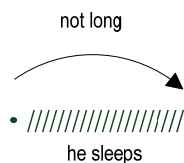


The second structure is formed by the combination of the negation word *mei2* 沒 or *bu4 dao4* 不到 and a time span noun, such as *mei2duo1jiu3* 沒多久 *not too long*, *mei2 liang3tian1* 沒兩天 *only a day or two*, and *bu4 dao4 yitian1* 不到一天 *no more than a day* etc. This duration expression denotes a short duration that is not as long as the negated interval. They are not only preverbal durations but also post-verbal durations as exemplified in (40).

(40) a. *mei2duo1jiu3 ta1 shui4 le0* 沒多久他睡了 *Soon, he slept.*



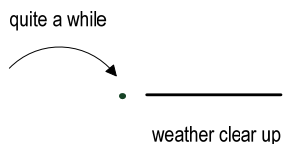
b. *ta1 shui4 mei2duo1jiu3* 他睡沒多久 *He did not sleep long.*



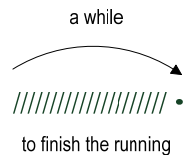
5.3 Degree Adverb + Duration

Some long durations are combinations of a degree adverb and a duration word, such as *hao3yi1hui3er0* 好一會兒 *quite a while*, *lao3ban4tian1* 老半天 *a long time*, *chang2nian2* 長年 *year-long*, and *duo1shi2* 多時 *for a good while*. Since only adverbs denoting a high degree can occur, the newly coined duration expressions are combined with long durations only. They can function as preverbal or post-verbal durations, the event types they collocate with determine their senses as we discussed in section 3. For example, the duration in (41) a. denotes the long duration before a change of state occurs; the duration in (41) b. denotes the long duration for event completion; and the duration in (41) c. denotes the long duration for state continuation.

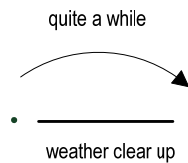
(41) a. *hao3yi1hui3er0 tian1qing2 le0* 好一會兒天晴了 *After quite a while, the weather clears up.*



b. hao3yi1hui3er0 pao3wan2 quan2cheng2 好一會兒跑完全程 *It took a while to finish the running.*



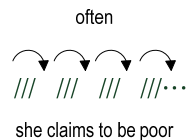
c. tian1qing2 le0 hao3yi1hui3er0 天晴了好一會兒 *The weather has cleared up for quite a while.*



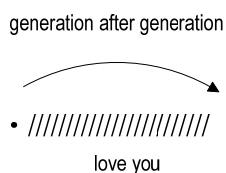
5.4 Durations of Reduplicated Structures

Reduplicating duration structures is a way to create very long durations. Two techniques can be used for this task. The first simply reduplicates the words of durations, such as *ri4ri4ye4ye4* 日日夜夜 *day and night*, *san1nian2wu3zai3* 三年五載 *some years*, *chao1chao1mu4mu4* 朝朝暮暮 *day and night*, *sheng1sheng1shi4shi4* 生生世世 *generation after generation*. The second uses phrase patterns, such as ...*dao4* 到..., ...(*yi3*) *lai2* (以)來, *jing1(ji1)* 經(積)...*lei3* 累..., and ...*fu4* *yi1* 復一... to produce them. Examples are *yi1tian1dao4wan3* 一天到晚 *from morning till night*, *yi1nian2dao4tou2* 一年到頭 *whole year*, *jing1nian2lei3yue4* 經年累月 *months and years*, and *nian2fu4yi1nian2* 年復一年 *year after year*. Most of these durations only take preverbal positions, such as (42) a., but some poetic sentence like (42) b. is also acceptable.

(42) a. ta1 yi1tian1dao4wan3 ku1qiong2 她一天到晚哭窮 *She claims to be poor all day long.*

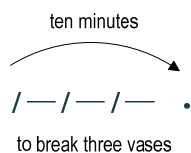


b. *ai4 ni3 sheng1sheng1shi4shi4* 愛你生生世世 *love you for generation after generation.*

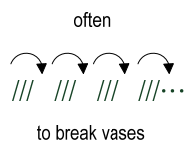


According to our analysis in section 3.2, the duration phrases which appear after an event can only denote event continuation, so (42) b. is certainly in line with this rule. But we also find when these long duration expressions are used as adverbs, i.e., appear before events, they neither denote duration before a state/situation change, nor denote duration for event completion. In fact, some long durations of reduplicated structure denote habitual events, but not long duration of event. The sentences (43) a. and b. show the contrast.

(43) a. *shi2fen1zhong1 shuai1po4 san1ge0 hua1ping2* 十分鐘摔破三個花瓶 *to break three vases in ten minutes*



b. *yitiantidao4wan3 shuai1po4 hua1ping2* 一天到晚摔破花瓶 *to break vases all day long.*



In (43) a. “ten minutes” denotes the actual duration for event completion. In contrast, in (43) b. “all day long” is only used to describe the event occurred often, but not actually happened continuously.

6. SUMMARY AND FUTURE WORK

In this paper, we show that syntactic structures (construction patterns) make fine-grained distinctions for durations. They are a) preverbal durations for event completion, b) preverbal durations for state/situation changes, and c) post-verbal durations for event continuation. There are functional similarities and differences between different duration expressions. We explain the reasons for their common functionalities and differences. In addition, we show how MARVS types of collocated events and the constructional meaning of durations actually dominate the syntactic grammar and semantic interpretation of sentences. That is, they are the main features that control the usage of durations. We also demonstrate how the morpho-syntactic structure of durations reduces the flexibility of their usage. Based on our observations, we differentiate four types of morpho-syntactic structures for duration expressions and explain the constraints of their usage. We have shown that the acceptability of a sentence is attributable to an ordering of lexical words such that the semantics, syntax, and morphology of the sentence are in harmony.

Our contribution in this work is twofold: 1) we provide a way of interpreting the fine-grained semantic and syntactic properties of durations; and 2) under the proposed approach, show that dealing with an unlimited number of new duration expressions is computationally feasible.

Although temporal relations include duration, aspect, frequency, time point and sequence expressions, in this paper, we only consider duration expressions. In our future work, we will try to clarify the other temporal relations and study their syntactic and semantic interactions.

NOTES

1. This research was supported in part by the National Science Council of Taiwan under Grants NSC 98-2631-H-001-013 and NSC96-2221-E-001-023-MY3.
2. Throughout this paper, most of these linguistic data can be observed by querying Academia Sinica Balanced Corpus of Modern Chinese (SINICA CORPUS): <http://www.sinica.edu.tw/SinicaCorpus/> (Accessed on 1/4/2011)
3. In the following figures, ‘•’ denotes a boundary; ‘/////’ denotes a process; and ‘——’ denotes a homogeneous state. The detail descriptions of the pictorial notations are shown in the section 4.
4. Where ‘^^^^^^’ denotes a stage (see section 4.1 for detail).

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時段詞的語義分析及語境和諧律

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題要

時間關係包括時貌、時點、時段、頻率及序列等等，它們在複雜的知識網絡中，被用來表達事件和時間成分之間的關係。時間成分與事件類型的合理搭配對語義的理解以及語法的正確性影響很大，這個既複雜又經常出現的語言學課題，尚未有從語義切入的完備分析。在本文中，我們針對時間關係中的時段成分分析其用法，區別出時段詞的細緻語義，說明它們因結構語義而產生的不同用法。我們還指出時段詞所搭配的事件類型和語義內涵是影響它們用法的主要因素。並發現時段的成分結構也影響了它的用法，我們共列出四種時段成分所衍生的組成形式，並討論其語義及用法限制。最終我們歸納認為句子的完備性須符合語義、語法和詞構的語境和諧律。

關鍵詞：

語境和諧律
時段

結構語義
時間關係