

# The Time-referential Characteristics of Sports Action Verbs

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**Abstract.** The action-oriented texts from the sports textbooks were chosen for this paper's research object. Following the word segmentation process, we first measured the frequency of verbs. Second, we selected the frequently used sports action verbs based on their syntactic distribution properties and the functional terms studied by predecessors. Finally, we investigated the temporal sequence features and boundary components of sports action verbs using the boundary theory.

**Keywords:** Time Sequence, Sports Action Verbs, Time Reference.

## 1 Preface

This paper analyzed the time sequences of sports action verbs from the perspective of cognitive linguistics based on the boundary theory, hoping to provide new ideas for sports action recognition. In recent years, with the breakthrough of the neural network theory and the rapid development of artificial intelligence, especially the human motion recognition in computer vision, which was used in a variety of scenarios, such as intelligent home, sports action teaching, human-computer interaction, rehabilitation, intelligent monitoring, live entertainment, and other fields. Most of the research in the above fields used video data as a corpus source and described human action sequence through the human action recognition model, which can solve the problem of the time sequence of human motion to a great extent, but there are also many problems, for example, the boundary of sequential action is not always clear, how to define the beginning or ending boundary of an action. There are some differences in the duration of sports verbs. Some actions are accompanied by the beginning and end of another action, that is, they have the same duration; some actions' duration is long and some actions' duration is short; some actions end with the beginning of another, which shows that the duration of different verbs is different, the spatial boundary characteristics are also different.

As for the research on the time sequence of sports action language, there are few kinds of research on the time sequence of a certain type of corpus. Most of them are based on observing some corpus commonly used in daily life or introspection corpus. For example, Sun Ch. F.[1], Rui Guo[2, 3], et al. In this paper, we selected action-related texts

from six physical education textbooks, and then counted the frequency of verbs after word segmentation by using PKUSEG word classifier[4] to choose the high-frequency sports action verbs and investigate the time sequence of verbs in sports action texts according to their syntactic distribution characteristics and the boundary theory. Human action recognition is defined as the input of a video sequence of human action into a computer, which can recognize different actions through recognition algorithms. There are individual movements and group movements, this paper is mainly about the individual movements in sports commonly used. For example, dancing movements, Yoga movements, body movements, training movements, and so on. In this paper, we selected sports action verbs from six sports textbooks as the source of the corpus, and then examined their time reference.

## 2 Related Works

Lu[5] mentioned that the theory of Boundary was first put forward by Langacker, and *Bounded and Unbounded* was first published by Shen[6] in China, it is pointed out that things have the opposite of Bounded and Unbounded in space, and actions have the opposite of Bounded and Unbounded in time sequences. A bounded action has an opposite starting point and an endpoint on the timeline, while an unbounded action has no starting point and an endpoint or only a starting point and no endpoint, that is, from the perspectives of homogeneity, heterogeneity, scalability and repeatability, the event is a bounded action with an intrinsic endpoint, which can be used with “不”(bu4, negative words: not), not follow “着”(zhe, auxiliary) or “在”(zai4, at), and activity is an unbounded action without an intrinsic endpoint, which can be used with “着”(zhe, auxiliary) and “不”(bu4, not). The mapping of bounded and unbounded opposites to verbs is the opposite of continuous and non-continuous verbs. It can be seen that previous scholars hold that “不”(bu4, negative words: not), “着”(zhe, auxiliary) and time-quantifier phrases restrict the verbs on Bounded and Unbounded in different degrees.

Reichenbach[7] used S (time of speech), E (time of event), R (reference time of reference) to indicate the time reference of English. Comrie[8] defined the time system as the relative position of the speaking time or the reference time on the time axis; Comrie[8] further divided linguistic time reference into absolute time reference and relative time reference. Absolute time reference distinguished past present and future. Relative time reference distinguished event time by reference to a time in context. Smith[9] divided the time system of language into speech time, reference time and situation time. Deng Sh. X. [10] first borrowed Vendel's[11] classification of verbs according to three parameters, namely bounded (Telic) or unbounded (atelic), instantaneous or durative, dynamic or stative. He discussed the four different ways of Chinese expression in the context of activity, completion, achievement and status first, when classifying the situations described by the verbs, and then determined the time characteristics of Chinese predicate. Dai[12] investigated the boundary features and time reference features of verbs and proposed that time is a way of observing the time sequences of events. Temporal meaning refers to the specific time of "Past, present, future", which contains indicative or index expressivity. Shi Y. Zh. [13]described the semantic features of

“了”(le, auxiliary), “着”(zhe, auxiliary) and “过”(guo4, auxiliary) and its selectivity to verbs with different semantic features in the internal process of a complete action from the beginning to the end. Guo [2] pointed out that the most important feature of declarative composition is its temporality. The temporality of verbs can be regarded as a complete system consisting of internal temporality and external temporality. The internal temporality refers to the internal process of the declarative component, including the three elements of the beginning, the end and the continuation. The external temporality refers to the relationship between the state represented by the declarative element and the external time process. Guo[3] further proposed that the temporal reference of the predicate component in Chinese can be divided into internal reference and external reference. Internal reference refers to the temporal relationship between multiple actions in a sentence, while external reference refers to the relationship between the situation represented by the sentence and the external world. Li[14] believes that modern Chinese is divided into “has been” and “will be” rather than the past, the present and the future. Sun [15] constructed a three-part aspect system based on the four-level Chinese aspect system established by Chen[16], which includes verb lexical aspect, predicate aspect and grammatical aspect, Sun also believes that there is no grammatical means to mark absolute tense in modern Chinese, and that the system of tense in modern Chinese mainly depends on relative tense, which can be expressed by lexical elements or by grammatical elements. This paper also holds that the time reference in Chinese is mainly a relative time reference, which explains the time reference in Chinese by the event time and the reference time.

According to the boundary theory that the predicate has the time sequences. Shi[13] proposed that “了”(le, auxiliary), “着”(zhe, auxiliary) and “过”(guo4, auxiliary) does not indicate the time and location of the action directly, but it is closely related to the time characteristic. Wang[17] summed up the forms of the six aspects in the Chinese, these include the progressive aspect, the perfect aspect, the near past aspect, the beginning aspect, the continuing aspect and the short aspect. Gao[18] summed up six aspects of the Chinese, including progressive aspect “着”(zhe, auxiliary), perfect aspect “了”(le, auxiliary), “过”(guo4, auxiliary) and “好”(hao3, done); Xing[19] divided verbs into ending verbs and non-ending verbs according to whether they can follow “着”(zhe, auxiliary) and “了”(le, auxiliary). Chen[16] believes that the various grammatical meanings represented by “了”(le, auxiliary), “着”(zhe, auxiliary), “过”(guo4, auxiliary) and “来”(lai2, auxiliary) are the representation of the internal time structure of events; According to Sun[1, 15], the boundary point is the core grammatical concept of the Chinese verb system, which can help us to construct the time sequences of Chinese predicates. Chinese verbs can be divided into internal and external temporality. Chinese verbs can also be considered from both internal and external boundaries. The following Table 1 summarizes some scholars' research on time reference system.

**Table 1.** Research on time reference system of some scholars

Scholars	Time reference system
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Reichenbach[7] (1947)	S(time of speech)	E(time of event)	R(time of refer- ence)
Comier (1985)	Absolute time reference (using speaking time as reference to distinguish the past, present and fu- ture)	Relative time reference (using a certain time in the context as refer- ence to distinguish the time of an event)	
Smith[9] (1997)	S(time of speech)	R(time of reference)	Time of state
Guo[2] (1997)	Internal temporality (the	Extrinsic temporality	
Guo[3] (2005)	Internal time reference	External time reference	

Most predecessors discussed the time-aspect system of Chinese by the semantic function of “了”(le, auxiliary), “着”(zhe, auxiliary), and “过”(guo, auxiliary) based on the introspection method, however, few studies have been carried out on the basis of a certain type of corpus. This paper aims to make use of the functional features of some words summarized by predecessors based on the syntactic distribution, analyzing an event as a decomposable structure, the internal structure of an event consists of at least a starting point, an ending point, and a continuous process between two timepoints. Firstly, this paper classified the common verbs in sports action text based on the syntactic distribution characteristics. Then, the paper investigated the temporal features of the action verbs and analyzed whether the action verbs have the difference between internal and external temporality and the difference between process and non-process. The research shows that there are differences between sports action and action in timeline. The internal starting point, ending point, and continuation of postural verbs are time-bound settings. Therefore, it is necessary to distinguish between “Bounded” and “Unbounded” verbs on the timeline.

### 3 The Selection and Characteristics of The Corpus

#### 3.1 The Selection of Sports Action Corpus

The sports training materials in the field of sports are selected from six books[20–24], which introduced the methods of physical function training in detail to guide teachers and students in teaching and learning. The series includes “*Manual training for young people*”, “*Manual stretching training for young people*”, “*Body Movement Function Training*”, and “*Yoga Basic Introduction*”. It is mainly aimed at junior high school students and primary school students, which mainly introduced the teaching key points, actions essentials, teaching difficulties, correction methods, training methods, the notice, and so on. we selected the text under the “Action Essentials” in this book. “*Yoga Basic Introduction*” this book mainly includes five chapters of content, we selected the yoga basic posture and other actions.

### 3.2 The Scale and Characteristics of Sports Action Corpus

The following Table 2 shows the size of the original corpus. There are many meta-languages in the original corpus, such as Main, head, muscle , and their attributes in Figure 1, which result in the program counting the number of sentences separated by periods and the number of paragraphs separated by line breaks being less accurate. Therefore, we cleaned up the corpus, choosing the text related to sports activity, and made a half-angle conversion of the special punctuation in the text. The following Table 3 shows the scale of the corpus before and after cleaning.

**Table 2.** Size of the raw corpus

Corpus source	Number of characters	Number of words	Number of paragraphs
Manual of Physical Training for Teen-agers: Stretching Exercises	11072	218	469
Manual of Physical Training for Children: Stretching Exercises	10042	199	414
Manual of Physical Training for Youth: Freehand Training	25466	648	946
Physical Motor Function Training	66661	1849	2359
Manual of Physical Training for Children: Stretching Exercises	19589	584	959
Yoga Basics	53444	1571	1347
Sum	186274	5069	6494

c018  
 head:站姿  
 muscle:拉伸前侧腿的臀大肌站和腘绳肌，以及后侧姿腿的髋关节屈肌  
 main:  
 -身体直立, 双脚间距与肩同宽, 腹部收紧, 抬头挺胸, 目视前方。  
 -右膝抬至胸前, 双手抱膝向上提拉, 右脚脚尖勾起; 左脚全脚掌撑地, 收紧支撑腿一侧的臀大肌; 保持背部挺直, 拉伸动作, 持续1到2秒。右脚向前落地。  
 -换至对侧, 循环进行, 直至完成规定次数。

c020  
 head:斜抱腿(摇篮抱腿)  
 muscle:拉伸前腿髋关节外站侧肌群和后腿髋关节屈肌  
 main:  
 -身体直立, 双脚间距与肩同宽, 腹部收紧, 抬头挺胸, 目视前方。  
 -右膝尽量抬至胸前, 右手扶右膝, 左手扶脚踝呈“摇篮”状, 缓慢用力向上提拉; 同时左脚全脚掌撑地, 收紧支撑腿一侧的臀大肌; 保持背部挺直, 拉伸动作持续1~2秒。右脚向前落地。  
 -换至对侧, 循环进行, 直至完成规定次数。

**Fig. 1.** Examples of raw corpus texts

**Table 3.** Statistics of sports action corpus before and after cleaning

Sports action corpus	Before cleaning	After cleaning
Number of characters	186274	107427
Number of sentences	5069	3444
Number of paragraphs	6494	2194

By observing the sports action corpus, we found that the features of this kind of text are short and simple sentences, a high frequency of verbs in short sentences, and at least one verb in each short sentence. Actions are also related in the timeline, which are complex before and after the emergence of actions.

### 3.3 The Selection of sports verbs

After the data cleaning, we obtained a corpus of sports action text with a scale of 107427 words. Then, we used PKUSEG, which is a Chinese word segmentation tool developed by Peking University[4], to set up a user-defined dictionary for word segmentation. We obtained 1177 verbs and counted their frequency finally. According to Pareto's Rule<sup>1</sup>, we excluded 80% of the low-frequency verbs, that is, we only took the first 20% of these verbs and got 235 high-frequency verbs. The highest frequency of the verb is “保持”(bao3chi2, keep), a total of 1039 times. This ensures the universality of sports

<sup>1</sup> Pareto's Rule: Originally discovered by Italian economist Pareto in 1897, it holds that 80% of the social wealth is concentrated in the hands of 20% of the people, while 80% of the people own only 20% of the social wealth. Later, Joseph Juran summarized it as Pareto's Rule.

action verbs, that is, sports action verbs commonly used in daily life. The following Table 4 shows some sports verbs and their frequencies.

**Table 4.** Some sports action verbs and their frequencies

动词( <i>dong4ci2,verb</i> )	频次( <i>pin2ci4,frequency</i> )
保持( <i>bao3chi2, keep</i> )	1039
呈( <i>cheng2, present</i> )	683
伸直( <i>shen1zhi2, straighten</i> )	615
上( <i>shang4, get on</i> )	515
支撑( <i>zhi1cheng1, support</i> )	333
挺直( <i>ting3zhi2, straight and upright</i> )	324
收紧( <i>shou1jin3, frap</i> )	306

## 4 The Temporal Referential Features of Verbs

### 4.1 The Classification of Sports Action Verbs

In order to study the temporality of sports action verbs, it is necessary to know which kind of sports action verbs are most closely related to temporality. There have been some related research on sports action verbs classification, and some verb-head corpus can provide reference for us, such as Xing[25-26]. Dai[12] divided verbs into gesture verbs and action verbs. Gesture verbs are usually static, and can express dynamic with the help of dynamic words such as “下来”(*xia4lai2, Down*), “起来”(*qi3lai, up*). Action verbs are divided into instantaneous verbs and sustained verbs, instantaneous verbs occupy only one instant point, being with “着”(*zhe, auxiliary*) means action repeated, sustained verbs + “着”(*zhe, auxiliary*) without repeated meaning. Shen[6] summed up four types of action: continuative action, activity, event, and timing action according to the relation between verb and object. Guo[2] believes that the process structure of verbs consists of three elements: the beginning, the end, and the continuation of the internal process of the action or state represented by the verb. Guo[3] further divided the verb process structure into the static verb and dynamic verb. He holds that some predicates express foreground information, some predicates express background information, some predicates with external time reference express foreground information, and predicates with internal time references express background information. The internal time reference takes the following events as the reference time and the external time reference takes a time location in the external world as the reference time. Yang[27] analyzed the cognitive principles of verbs in different spatial positions and classified these verbs based on Guo's[3] research, distinguishing the static spatial verbs and the dynamic spatial verbs. The verbs involved in the static expression of spatial position have the characteristics of attachment, such as [+being], [+state], for example,

the verbs of “有(you3, have)”, “在(zai4, at)”, “是(shi4, be)”, which express the objective existence, and the dynamic verbs can participate in the expression of the position of dynamic space, should have the characteristic of [+displacement]. Lu[5] questioned the idea that action is bounded, and things governed by action must also be bounded.

This paper divided the action verbs of sports into the continuous verb and the instantaneous verb (The action is completed at the beginning, also called the point verb Li[28]). The continuous verbs were divided into two categories: those with a starting point and those without an ending point, and those with a starting point and those with an ending point. In this paper, This paper classified 235 verbs according to their syntactic distribution, that is, whether they can follow “了”(le, auxiliary), “着”(zhe, auxiliary), “过”(guo4, auxiliary), and quantifiers. The following figure 2 shows verbs' collocation frequency in the corpus. We found that there are some verbs that can be collocated with “了”(le, auxiliary), “着”(zhe, auxiliary), and “过”(guo4, auxiliary), but it doesn't account for much in the real corpus of sports action, this may be due to the fact that most sports textbooks are geared towards teachers and students, and teachers are influenced by the pragmatic principle of the economy when they teach action points.

We classified the subjects in order to study the temporal structure of predicates, and we hold that most of the verbs in sports action texts are action verbs or postural verbs, and their boundedness or unboundedness is not determined by the action verbs alone but can be determined by referring to the time of events. We distinguished static verb and dynamic verb according to whether adding “了”(le, auxiliary) based on Guo's[3] observation of the real corpus of sports action text. The dynamic verbs are divided into action verbs and change verbs, the verbs in examples (1)-(3) below, such as “完成”(wan2cheng2, Finish) and “做”(zuo4, do), can be classified as static verbs because they have an internal process that unfolds over time, so they have an inherent temporality. Observing the verb with “着”(zhe, auxiliary) in the sports action text expressed the continuous meaning. According to Guo's[2] research, we think that the verbs that can be with “着”(zhe, auxiliary) have internal processes and internal temporality or durations, for example, “贴”(tie, Paste), “指”(zhi3, point), “注视”(zhu4shi4, Gaze), “看”(kan4, look), “站”(zhan4, stand up), “握”(wo4, hold). Because there are few cases of verbs being with “了”(le, auxiliary) in sports action text, it can not be classified into static verb and dynamic verb according to whether being with “了”(le, auxiliary) which can indicate the end of action. Because the verb + “着”(zhe, auxiliary) denoted the continuation of an action or a state, it is infinite, these verbs are classified as static verbs[2]. The verb + “Quantifier” in the sports action text, such as “呼吸”(hu1xi1, breath), “持续”(chi2xu4, continue), “练习”(lian4xi2, practice), “弯曲”(wan1qu1, bend) and so on, it is found that these verbs can be realized as concrete events in the external world, and they are all bounded, so they are all process verbs. Sun[15] proposed that active verbs are not easy to determine in terms of boundedness unboundedness. The boundedness or unboundedness of a VP formed by action verbs is not determined by the action verb alone, but by the noun argument or other adjunct with which it is associated.



#### 4.2 Observing Time Referential Features From The Syntactic Structure of Verb + “了”(le, auxiliary)

we classified the verbs as static verbs according to the function of “了”(le, auxiliary), and investigated the internal time limit of the verbs. “完成”(wan2cheng2, Finish) and “做”(zuo4, do) both indicate the end of the action, which belong to the continuous verbs with an ending point.

(1) 当最后一次摇摆完后，随着惯性坐于地上，两手抱膝休息片刻，就完成了 1 个完整的回合。重复 3~6 个回合。(Dang zui hou yi ci yao bai wan hou, sui zhe guan xing zuo yu di shang, liang shou bao xi xiu xi pian ke, jiu wan cheng le yi ge wan zheng de hui he. chong fu 3~6 ge hui he. [After the last swing, sit on the ground with inertia and rest your hands on your knees for a moment to complete a full round. Repeat 3-6 rounds].)

(2) 抬起头，用鼻孔慢慢呼出空气，这就完成了 1 个回合。坚持做 30 个回合。(Tai qi tou, yong bi kong man man hu chu kong qi, zhe jiu wan cheng le 1 ge hui he . jian chi zuo 30 ge hui he . [Raise your head and breathe out slowly through your nostrils. This completes 1 round. Do 30 rounds].)

(3) 如果你做了上述一系列动作后感觉有点疲劳，可用躺尸式来彻底放松。(Ru guo ni zuo le shang shu yi xi lie dong zuo hou gan jue you dian pi lao, ke yong tang shi shi lai che di fang song [If you feel a little tired after doing the above, you can use the pose to relax completely].)

The verb “完成”(wan2cheng2, Finish) in example (1) to example (3) appears after “坐于地上”(zuo4 yu2 di4 shang4, to sit on the ground) and “双手抱膝”(shaung1shou3 bao4xi1, to put one's hands on one's knees), which shows that “了”(le, auxiliary) after the verb “做”(zuo4, do) is a marker of past tense. In example (1), the two actions “坐”(zuo4, sit) and “抱膝”(bao4xi, hug knee) appearance before the verb “完成”(wan2cheng2, Finish). If the predicate event “抱膝”(bao4xi, hug knee) is taken as the reference time, the “坐”(zuo4, sitting) action takes place before the “抱膝”(bao4xi, hug knee) and lasts until the time of “完成”(wan2cheng2, Finish); the “抱膝”(bao4xi, hug knee) action lasts until the time of “完成”(wan2cheng2, finish) from the moment it occurs. “坐”(zuo4, Sit) and “抱膝”(bao4xi, hug knee), the first two verbs have a beginning point, endpoint and durations. In example (2), the verbs “抬起头”(tai2 qi3 tou2, head up) and “呼出气”(hu1 chu1 qi4, Breath out) appear before the verb “完成”(wan2cheng2, finish), if “抬起头”(tai2 qi3 tou2, Head up) is taken as the event time reference point, and “呼出气”(hu1 chu1 qi4, breath out) appear after “抬起头”(tai2 qi3 tou2, head up), the beginning point of “呼出气”(hu1 chu1 qi4, breath out) is the endpoint of “抬起头”(tai2 qi3 tou2, head up), and “抬起头”(tai2 qi3 tou2, head up) is an instantaneous action.

#### 4.3 Observing Time Referential Features From The Syntactic Structure of Verb + “着”(zhe, auxiliary)

Sustained and non-sustained verbs are defined according to whether the verb can take the tense-aspect auxiliary word “着”(zhe, auxiliary). The verbs “贴”(tie1, Paste),

“指”(zhi3, point), “看”(kan4, look), and “站”(zhan4, stand up) belong to the continuous verbs with a starting point, that is, the pre-boundary verbs. we found that the actions’ duration is not consistent, and the action reference point has an effect on the time sequences of verbs. The time sequence of the verbs in example (4) is, “呼气”(hu1qi4, instantaneous verb: breath out) -> “扶”(fu2, holding) -> “迈”(mai4, stepping) -> “着地”(zhao2di4, landing) -> “脚贴地面”(jiao3 tie1 di4mian4, feet on the ground) -> “左腿下蹲”(zuo3tui3xia4dun1, left leg squat). The action of “脚贴地面”(jiao3 tie1 di4mian4, feet on the ground) has been achieved when the feet hit the ground, but the time of this action is still continuing is not over, so we think that don’t have end time point. “呼气”(hu1qi4, instantaneous verb: breath out) action occurs immediately after the end, but repeats every period of actions; The action of “迈”(mai4, stepping) begins after “扶”(fu2, holding) and ends at “脚贴地面”(jiao3 tie1 di4mian4, feet on the ground).

(4) 呼气, 双手在左脚两侧扶地面, 右脚向后迈一大步, 使膝盖着地, 脚背贴着地面, 左腿蹲下去。(Hu qi, shuang shou zai zuo jiao liang ce fu di mian, you jiao xiang hou mai yi da bu, shi xi gai zhao di, jiao bei tie zhe di mian, zuo tui dun xia qu. Exhale, put your hands on the ground on both sides of your left foot, take a big step back with your right foot so that your knees are on the ground, the instep is on the ground, and your left leg is crouched down.)

#### 4.4 Observing Time Referential Features From The Syntactic Structure of “Verb + Quantitative Phrase”

We observed that the verbs are continuous verbs with a starting point and no ending point in example (5-7). The verbs “呼吸”(hu1xi1, breathe), “持续”(chi2xu4, Continue), “做”(zuo4, do) are all pre-boundary verbs. The time sequences of the verbs are found to be “呼气”(hu1qi4, breathe out) -> “移动”(yi2dong4, move) -> “脸贴腿”(lian3 tie1 tui3, To press the face against the leg) -> “肘弯曲”(zhou3 wan1 qu1, Elbow bend) -> “呼吸”(hu1xi1, breathe). The specific internal time reference points of the verbs are “呼气”(hu1qi4, breathe out) and “移动”(yi2dong4, move), which belong to the instantaneous verbs. The beginning point is the same as the endpoint, and there is no time reference point in the internal process, the action “肘弯曲”(zhou3 wan1 qu1, Elbow bend) begins after the action “移动”(yi2dong4, move) and has no ending time point; the action “肘弯曲”(zhou3 wan1 qu1, Elbow bend) begins after the action “脸贴腿”(lian3 tie1 tui3, To press the face against the leg) and has no ending time point, so the duration of the action “脸贴腿”(lian3 tie1 tui3, To press the face against the leg) is longer than the duration of the action “肘弯曲”(zhou3 wan1 qu1, Elbow bend). “呼吸”(hu1xi1, breathe) has a starting time point and an ending time point, which is starting at the beginning of the action and ending at the end of the action.

(5) 呼气, 头随着脖颈移动而往下移动, 直到脸部贴于双腿, 两手肘稍弯曲, 深呼吸。保持此姿势, 呼吸 3~6 次。(Hu qi, tou sui zhe bo geng yi dong er wang xia yi dong, zhi dao lian bu tie yu shuang tui, liang shou zhou shao wan qu, shen hu xi. bao chi ci zi shi, hu xi 3~6 ci. [Exhale, moving your head down with your neck

*until your face is pressed against your legs, elbows slightly bent, and take a deep breath. Hold this position and breathe 3-6 times].* )

(6)身体直立，双脚间距与肩同宽；左膝抬至胸前，双手抱膝向上提拉，左脚脚尖勾起；右脚 脚后跟踮起；收紧支撑腿的臀大肌，保持背部挺直，拉伸动作持续 1 到 2 秒。(Shen ti zhi li, shuang jiao jian ju yu jian tong kuan; zuo xi tai zhi xiong qian, shuang shou bao xi xiang shang ti la, zuo jiao jiao jian gou qi; you jiao jiao hou gen dian qi; shou jin zhi cheng tui de tun da ji, bao chi bei bu ting zhi, la shen dong zuo chi xu 1 dao 2 miao [Stand upright with your feet shoulder-width apart; lift your left knee to your chest and lift with your hands around your knees, lifting the tip of your left foot; stand on Tiptoe with your right heel; tighten your gluteus maximus muscles, which support your legs, and keep your back straight, the stretch lasts 1 to 2 seconds].)

(7)深呼吸，保持手指位置不变，向外侧转动肘关节，将肩膀打开到最大程度，然后将双臂由 体侧放下。如此重复 2、3、4 步，由前向后做 10 次，然后由后向前再做 10 次，之后回 复初始坐姿。(Shen hu qi , bao chi shou zhi wei zhi bu bian , xiang wai ce zhuan dong zhou guan jie, jiang jian bang da kai dao zui da cheng du, ran hou jiang shuang bi you ti ce fang xia. ru ci chong fu 2、3、4 bu, you qian xiang hou zuo 10 ci , ran hou you hou xiang qian zai zuo 10 ci, zhi hou hui fu chu shi zuo zi [Exhale deeply, keeping your fingers in place, turn your elbows outwards, open your shoulders to the maximum, and lower your arms from your side. repeat 2,3,4 steps, 10 times from front to back, then 10 times from back to front, then return to the original sitting position.] )

According to the above research, we classified the verbs according to their syntactic distribution, for example, we categorized the verbs in example (1-3) as static verbs, such as “完成”(wan2cheng2, Finish) and “做”(zuo4, do); The verbs “贴”(tie1, Paste), “指”(zhi3, point), “看”(kan4, look), “站”(zhan4, stand up) belong to continuous verbs with starting time point, that is, the pre-boundary verbs; The verbs in example (5-7) are continuous verbs with a starting point and no ending point. Furthermore, we observed the boundary and the intrinsic time-reference characteristics of actions. For example, we found that the temporality of the sports action verb “肘弯曲”(zhou3 wan1 qu1, Elbow bend) belongs to the pre-boundary verb, which has a starting time point without the end of time point, etc. It is further verified that the majority of action verbs or postural verbs in sports action texts are bounded or unbounded, which are not determined by the action verbs alone, but the idea that the verb is bounded/unbounded can be determined by reference to the time of the event.

## 5 Conclusion

This essay examined the sports action verbs in the sports action text, which were selected from the action-related content in the sports textbook. We chose the most popular sports action verbs. Then, using the functional qualities of various words already studied by forerunners, we looked into the boundary features and internal time reference components of sports action verbs. Additionally, we examined the time sequences of

sports acts, categorize the verbs in sports action texts according to whether or not they contain process, and test for internal and external temporal differences in real sports action texts.

In this paper, there are still many deficiencies: the analysis of finite verbs in this paper was simplified, and the emphasis was placed on the syntactic distribution of the verbs in the text. While the methods used in this paper are workable, the subject matter is relatively constrained. In the following stage, we intend to examine more verbs before abstracting the fundamental principle to make it more organized.

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