

Zero Anaphora and Topic Chain: A Cross-Linguistic Study

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Abstract

A cognitive-functional framework is explored to account for the occurrence and distribution of zero anaphora and topic chain in discourse. Although traditionally regarded as a unique discourse device for topic-oriented languages, zero anaphora and topic chain seem to manifest cognitive constraints underlying discourse processing and may be governed by universal principles to a certain degree. Based on the cognitive-functional framework, the present study proposes a TOPIC-CHAIN PRINCIPLE, arguing that topic chain encodes a referent that is cognitively most accessible at the moment of discourse production, as enhanced by maximum discourse coherence of topic continuity and thematic coherence. The study demonstrates, using text data from the two historically unrelated, morpho-syntactically different languages, Chinese and English, that cognitive accessibility and thematic coherence indeed warrant the use of topic chain in discourse. The structural differences found in the use of zero anaphora between syntactically different languages as discussed in previous studies may be more of clause-level than discourse-level phenomena.

Keyword: zero anaphora, topic chain, cognitive activities, discourse function, discourse coherence

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1. Introduction

The present study investigates the occurrence and distribution of zero anaphora, especially the use of TOPIC CHAIN in discourse, which consists of a sequence of clauses about a topic that is overtly mentioned in the first clause and then left unspecified by zero anaphora in the rest of the clause sequence. It is generally considered, with regard to zero anaphora, that there are typologically two types of languages of the world, pro-drop languages such as Chinese and non-pro-drop languages such as English (Bresnan 1982, Huang 1984). While the former makes a principal use of zero anaphora in discourse where the referent of the elliptical argument can be identified and recovered from discourse context (c.f., Chen 1986, 1995, Huang, J. 1984, Huang, Y. 1995, Li & Thompson 1979, Luk 1977, *inter alia*), the latter uses zero anaphora in syntactically constrained circumstances (Chomsky 1982, Hale 1992, Payne 1993, Austin and Bresnan 1996, *inter alia*). Since topic chain utilizes a sequence of zero anaphora that refers back to a topical entity at a given juncture of discourse, it seems to be a unique phenomenon in pro-drop languages or “topic-oriented” languages (Li 2005).

While acknowledging that language-specific differences do exist in the use of zero anaphora between the two types of languages, the present study argues that topic chain is a manifestation of cognitive activities of attention and focus underlying discourse processing, which are of universal characteristics, and hence the use of topic chain may be governed by general cognitive principles that direct reference tracking in discourse in both pro-drop and non-pro-drop languages. This paper aims to uncover such principles by examining patterns of topic chain distribution in both Chinese and English, two morpho-syntactically different and historically unrelated languages.

2. A Cognitive-Functional Framework

The present study argues that the most important factors determining the mechanism of reference tracking, which includes the use of topic chain, are memory constraints and discourse functions. From a cognitive perspective, the use of discourse anaphora is constrained by cognitive activities, especially the storage, capacity and processing of working memory, as abundant literature has demonstrated (Ariel 1994, Chafe 1996, Cornish 1999, Givón 1983, 2001, Gundel 1996, Tomlin 1987, Tomlin & Pu 1991, *inter alia*).

To demonstrate how working memory serves as the cognitive basis underlying reference tracking, let's briefly look at a concentric working memory model proposed by Oberauer (2002: 412) that describes its structure and processes.

The model consists of three functionally distinctive regions: an activated part of long-term memory, a capacity limited region of direct access, and a focus of attention, as presented in Figure 1. The dots and lines in the model represent a network of long-term memory representations, some of which (black dots) are activated. A subset of these items is held in the region of direct access (larger irregularly framed area in the middle), within which one item is selected for processing by the focus of attention (small circle in the center). Activated items outside the region of direct access form the activated part of long-term memory. The three regions, as Oberauer points out, are not necessarily separate structures but functionally different states of representations in working memory. The activated part of long-term memory retains memory elements that are not needed for ongoing processes, the region of direct access forms a selection set of memory elements that must be held available for an ongoing processing task, and the one memory item/chunk selected within the selection set for processing at any moment enters the focus of attention. Memory elements in the activated part of long-term memory (or outer region of working memory) are held available in the background over brief periods and can be retrieved indirectly via association links to bring the representations into the region of direct access.

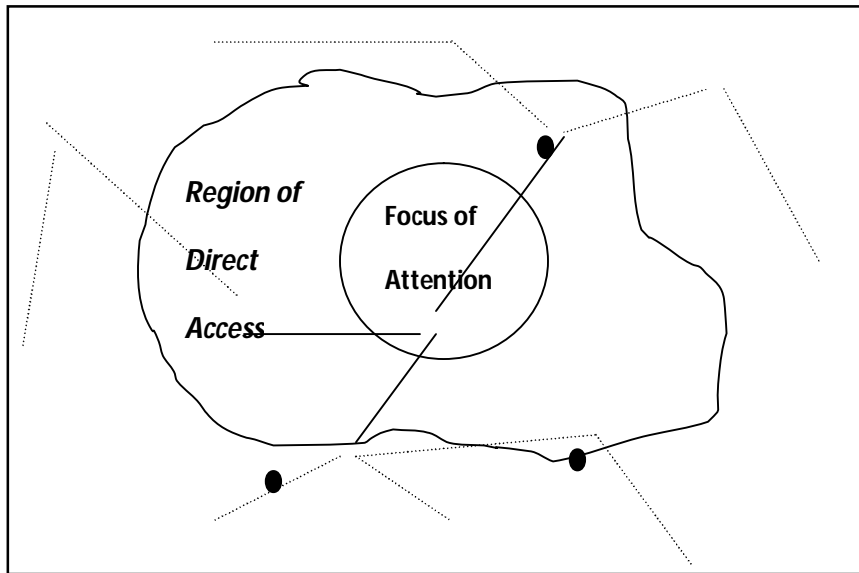


Figure 1: Oberauer's (2002) Working Memory Model

Numerous experiments (Caravan 1998, McElree & Doshier 1989, Oberauer 2001, 2003, 2006, Oberauer, Demmirich, Mayr & Kliegl 2001) have provided evidence for different functional states of working memory contents, where subjects performed various memory tasks such as recognition, arithmetic, and memory updating. The results show that items from an active set (a sequence of digits, words, or geometrical figures) are accessed faster than those from a passive set, reflecting the processing latency for the items in the region of direct access versus those in activated part of long-term memory. In addition, when an item that has just been processed is selected again for the next processing step, the access is faster than when a new item must be drawn from the active set, showing the special status for the item in the focus of attention.

Oberauer's model helps characterize the accessibility of entities in reference tracking in terms of their respective memory locations or regions: an entity that resides in the focus of attention is most accessible because it is selected for the next cognitive task, and an entity that is in the region of direct access is more accessible than one in the activated part of long-term memory because the former is being held available for the ongoing operation while the latter is in the background unrelated to the ongoing task. Thus, it makes great processing sense that an entity currently in the focus of attention would be referred to by a most attenuated form, because it is in the 'spotlight' and immediately accessible in our mental representation of discourse; a referent that is currently active in memory would be referred to by a more attenuated form because it is more accessible; a referent that is currently inactive tends to be coded by a less attenuated form because it is presently in the 'shadow' and less accessible.

What increases or decreases activation levels of a referent in our mental representation, however, depends largely on the discourse, pragmatic and semantic properties of the referent. For example, in a span of discourse where information flows smoothly, cognitive resources may be devoted mostly to activations of referents, whereas in discourse where information flow is disrupted limited cognitive resources would have to be shared between bridging the information gap and activating referents. Hence discourse coherence would promote activation processes while thematic discontinuity would decrease activation levels of referents. From a functional perspective, discourse anaphora is mainly a hearer-oriented process, where the speaker must constantly make assessment about the hearer's cognitive status on a particular referent and choose an appropriate anaphoric form base on that assessment. Every anaphor constitutes a specific tacit instruction to operate on the mental discourse representation that the hearer is constructing in collaboration with the speaker. In other words, a specific anaphoric form (other than a first mention in discourse) not only signals to the hearer where to find its referent in memory but also informs her/him how it is related linearly and hierarchically to the same referent in prior discourse. Since anaphor recovery seems in general to be a regular, routine, and automatic process on the part of the hearer in discourse comprehension, s/he must be sensitive to or constantly seeking, albeit mostly subconsciously, the signals and cues provided by the speaker on discourse structure, upon which anaphora is interpreted and understood.

Hence we propose the following general TOPIC-CHAIN PRINCIPLE in discourse processing:

Topic chain encodes a referent that is cognitively most accessible at the moment of discourse production, and the referent is kept activated and stays in focus as enhanced by maximum discourse coherence. Specifically, it is used to code a topical referent that persists over a span of maximally coherent discourse. The topic chain is terminated if the maximum discourse continuity is disrupted.

In spoken and written discourse, maximum discourse continuity must be warranted by both topic continuity and thematic coherence. It only exists within a discourse unit, where no discontinuity of any kind occurs and where focus of attention on a local, topical referent is maintained throughout the unit.

3. Topic Chain and Maximum Discourse Coherence

It is clear from the above discussion that the use of anaphors is constrained by cognitive accessibility of their referents under concern, while discourse coherence contributes to the degree of cognitive accessibility. This section further explores the crucial relationship between discourse coherence and topic chain on the one hand, and examines how maximum discourse coherence is achieved and how it warrants the occurrence of topic chain in both Chinese and English discourse on the other.

The present study considers maximum discourse coherence as a parameter of two-fold: TOPICAL CONTINUITY (c.f., Givón 1983) and THEMATIC COHERENCE. The former specifies topical persistence of a referent across a span of discourse, and the latter describes thematic continuity of the discourse unit in which the referent occurs. In discourse processing, a referent that is the local topic of a discourse unit would tend to be kept activated and gain focal attention much more than a non-topical referent, and the referent would remain in focus if nothing in the unit disrupts its topicality, i.e., the thematic coherence of the unit is high. While a topical referent is defined as the topic or center of a discourse unit, i.e., what the discourse unit is about, maximum thematic coherence of the unit is generally achieved and maintained by focusing narrowly on a certain state of events involving the topical referent, mostly notably when (1) the referent is being characterized or depicted, (2) (current) foreground actions or events involving the referent is being tightly sequenced, and (3) important past experience or events of the referent is being compressed.

Consequently, a topical referent that persists in a maximally coherent discourse unit would warrant its coding in a topic chain, where the first mention is established with an overt anaphor (either a full NP or a lexical pronoun) and the rest unrealized with zero anaphors. On the other hand, if the local topic changes and/or thematic continuity is broken, the focus of attention would divert and maximum discourse coherence is disrupted. At such a discourse juncture, a zero anaphor would not be sufficient to bridge the gap, albeit a minor one, and an overt anaphor must be used.

Whereas TOPIC CHAIN is a prevalent device in Chinese discourse for coding a topical referent in a maximum thematic unit, it is often found in English discourse as well that serves the same function. The remainder of this section illustrates how maximum discourse coherence determines to a large extent the occurrence and distribution of topic chain in both Chinese and English discourse. All examples are taken from contemporary written narratives of the two languages.

To avoid the problem of circularity, the identification of theoretical concepts vital in this study such as thematic units that are maximally coherent and minor thematic continuities that disrupt maximum coherence were independent of the anaphor use in the sample Chinese and English narrative texts. In other words, a thematic unit that is deemed maximally coherent not because it consists of a series of zero anaphora but because it maintains thematic and topical continuity; a minor thematic gap is considered one only if there exists, for example, a thematic shift regardless of which anaphoric form occurs in the excerpt after the identified gap.

3.1. Characterizing a Topical Referent

Topic continuity of a referent can be established and maintained through its detailed characterization. Such a referent is usually placed in clause-initial position as subject because topicality correlates strongly with grammatical subject (Du Bois 1985, Givón 2006). Once introduced or reinstated in discourse, the referent would be focused on and coded by zero anaphora until a minor discontinuity occurs, viz., topic continuity is realized by a series of elliptical subjects after its first, overt mention.

In Chinese, a topic-oriented language, topic continuity is ultimately responsible for the occurrence of topic chain; a topical referent is almost invariably coded by zero subject after its first mention in a span of discourse, although zero objects occur occasionally. In a quantitative study, Pu (1997) shows that zero subject in Chinese is a grammaticalized phenomenon, where zero subject accounts for 94% of all zero anaphora in her text analysis. Similarly, Li (2005: 112) demonstrates that the topic in a topic chain is primarily realized by zero subject, which accounts for 93% of all zero anaphora in her text data.

In English discourse, the effect of topicality is not obliterated by the language being subject-oriented: A topical referent is most frequently realized as subject and coded by zero anaphora like its Chinese counterpart. After all, languages in general are found to have developed from the pragmatic coding of topic to the grammatical coding of subject (Comrie 1988, Givón 1979, Shibatani 1991), and the very fact that discourse entities as topic are most frequently coded as subject by less explicit coding forms (c.f., Du Bois 1985, Givón 2012, *inter alia*) may have reinforced the grammaticalization of zero subject (as opposed to zero object) over time.

The following examples of Chinese³ and English illustrate how zero anaphora is used to maintain topic continuity and thus to achieve maximum thematic coherence in a micro-unit by a writer's characterization of the referent.

1. (a) Duan Quchen wei-ren zhen-pai, (b) Ødui gongzuo yaoqiu yange. (c) (name) as-person honorablein work demand strict dai-renfangmian you hen suihe,(d)Øtong shenmeren dou neng shuo-treat people aspect also very amiablewith anyoneall can talk-shang hua, (e) Øconglaibu baijiazi. a talk never put-on-air
- (a) *Duan Quchen was a good leader, (b) Østrict when work was concerned. (c) Øbut congenial when dealing with people, (d)Øcould strike up a conversation with anyone, (e) Ønever appeared arrogant or remote.*

³Each Chinese example is shown in *pinyin* first, followed by a word-for-word gloss in English, and then the English translation in *Italics*.

2. (a) **He** kept no hours, (b) \emptyset came and (c) \emptyset went (d) as he pleased, (e) \emptyset didn't believe in knocking on doors (f) when meetings were in progress, (g) \emptyset liked to use our phones and (h) \emptyset drink our coffee.

Passages (1-2) are typical examples of topic chain, which consists of two or more clauses. In (1) the topic is introduced by a proper name (full NP) *Duan Quchenas* subject of the first clause, and then coded repeatedly in sentence-initial position by zero anaphora from (b) to (f). In English, too, the topic is introduced by a lexical pronoun *he* and then left unspecified till the end of the passage except in (d) where an overt subject is syntactically required in the subordinate clause.

3.2. Chaining Foreground, Sequential Actions/Events

Topic continuity is also attained in a discourse unit where a chain of actions or events experienced by a topical referent is close-knit and indispensable to the advance of the storyline. Such a chain of actions or events is usually foregrounded⁴ and tightly sequenced in a succession of clauses, the order of which commonly mirrors the order of the developing action or event process. The action or event sequence is thematically highly coherent since it typically occurs continuously within the same time frame and in the same location. As a result, the topical referent is most likely to be encoded by zero anaphora after its first mention in the sequence. Consider the following:

3. (a) ta meiyou zai shuo dierju hua, (b) \emptyset xunsudi ba.men guanshang , (c) \emptyset
 She didn't again say second word quickly door close
 lakai ziji xiao chuang.de bulian , (d) \emptyset daidaidi zuoxia.
 open self small bed's curtain numbly sit-down
 (a) *She didn't say another word, (b) but closed door quickly, (3) drew apart the curtain of (her) small bed and (d) sat down numbly.*
4. (a) Ferdie looked back at the girls again, then (b) \emptyset stood up and (c) \emptyset strolled to the door, (d) \emptyset pulled aside the curtain and (e) \emptyset stood talking with the barker outside.

⁴Foreground information (in English) is typically expressed by main clauses with non-stative verbs, as opposed to subordination with nonfinite verbs that usually code background information (Hopper 1979, Givón 1993, Tomlin 1985).

The two passages describe such close-knit action sequences, again in a topic chain. If the coding of the topical referent in both passages were overt after the first mention, the overt referring expression would not only have been unnecessary and cumbersome but also disruptive and unnatural to the information flow. Uninterrupted action sequence such as the ones in (3-4) usually describes foreground events that carry on the main storyline, as indicated by main clauses chained together with non-stative, past tense verbs (Hopper 1979, Givón 1993, Tomlin 1985) in the English example.

3.3. Condensing Important Past Events or Experience

Another way to achieve topic continuity is to recount succinctly major past experience or events of a topical referent. These events, usually occurring over a period of time in different locale, are foreground information important to the development of the story. They are commonly coded compactly in a chain of clauses as if they had occurred sequentially in a short time frame, although they may or may not mirror the natural order of events. In such a maximally coherent span of discourse, topic chain is again a prevalent device coding the topical reference of a discourse unit. For example,

5. (a) ta zai xiao kezhai xule yixiao, (b) Ø diertian alege tongxiang qu dashijie
 he at small inn stay one-nightsecond day drag villager to big-world
 kaikai yan, (c) Ø gei tade wuliren maile banda meinu pai xiangzao, (d) Ø
 zaiopen eye for his wifebuy half-dozen beauty brand fragrant-
 soopathahajinqian lele yizhen, (e) Ø yejiu daizhe yizhong 'zongsuan dao
 distortion-mirror front laugh a-whilethen with a-kind 'been there
 guole' de anwei qiachuan huichengle.
 after-all' comfort board-ship return
- (a) *He stayed in a small inn overnight, (b) visited the Grand World the next day with a fellow villager, (c) had a good laugh in front of the distorting mirrors, (d) bought half a dozen Beautiful-Girl toilet soap for his wife, (e) and then boarded a ship to return home with a satisfying feeling of 'been-there-done-that.'*
6. (a) He plotted strategy, (b) Ø cross-examined witnesses, (c) Ø argued with Jared Kurtin, (d) Ø appealed to the jurors, (e) Ø did a dozen tasks as he pounded the asphalt in the dark.

Both passages describe sequences of events experienced or participated by the topical referent, extending and developing the main storyline. These highly coherent sequences warrant the use of topic chain, which in turn, keeps the reader's attention focused on the topic, while other non-topical referents are usually nominalized, i.e., *tongxiang* ('a fellow villager') and *tade wuliren* ('his wife') in (5), and *witnesses, Jared and the jurors* in (6).

4. Minor Thematic Discontinuity: Termination of Topic Chain

This section examines the other part of the TOPIC CHAIN PRINCIPLE, i.e., minor thematic discontinuity, which breaks maximum thematic coherence and terminates the use of a topic chain. The present study identifies four types of minor thematic discontinuity that breaks maximum discourse coherence and terminates the use of topic chain.

4.1. Interruption in Close-Knit Action/Event Sequence

The first type of minor discontinuity is realized in discourse by breaks in close-knit action or event sequences, e.g., a time or location change in the action or event sequence, at which point the topic chain that codes the topical referent would end, and a lexical pronoun or full NP would occur. For example,

7. (a) Zou Xinping tiaoxia mache, (b) Ø xiang tuolaji zouqu. (c) ta jinru
 (name) jump-off horse-carriagetoward tractor goshe enter
 jiashishi (d) Øbatuolaji kaidao lu bian , (e) Ø miele huo, (f) Ø que
 meiyoubctractor drive.to road sidekill enginebut not
 liji xialai
 immediately get.off
 (a) *Zou Xinping jumped off the horse carriage and (b) walked to the tractor. (c) She entered the cab, (d) drove the tractor to the roadside, (e) killed the engine, (f) but didn't climb down right away.*
8. (a) When she finally got up and (b) Ø turned off the lights and (c) Ø open the door into the hall, (d) she found herself dreading to go up the stairs. (e) She almost ran up them in her haste, (f) Ø hurried along the passage and (g) Ø opened the door of her room. (h) Once inside she at once felt her tears calmed her down and (i) Ø appeased.

Passage (7) seems to describe an continued action sequence, where the topical referent *Zou Xinping* 'gets off the horse carriage', 'walks to the tractor', 'enters the cab', etc. However, the sequence occurs in two places, i.e., outside the tractor (a-b), and inside it (c-f). The location change between (b) and (c) represents a minor discontinuity in the flow of information, which is also signaled by a period at the end of clause (b) in the passage. The minor discontinuity triggers the use of a lexical pronoun in (c) for *Zou Xinping*, even though *she* is the only referent in the passage. Similarly, Passage (8) describes continued action sequence within a short period of time, which consists of three maximally continuous segments, the first depicting moments before *she* goes up the stairs (a-d), the second *her* running up the stairs to her room (e-g), and the third inside her room (h-i). Within each of these maximally coherent sequence, a 'topic chain' is used to encode the topical referent *she*, as each of the minor discontinuity occurs, however, the topic chain is terminated and a lexical pronoun is used to code the topical referent. Much like in Chinese discourse, the interruption of a close-knit action or event sequence in English is usually accompanied by a stop/period in writing.

4.2. Thematic Shift

The second type of minor discontinuity is represented by thematic shifts in the flow of information in a span of discourse, where there are often transitions in narration from a topical referent's physical activities to her/his state of mind, from a portrait of the referent's appearance to his/her physical activity or inner thoughts, from background to foreground information, or vice versa. Such a thematic shift would disrupt maximal thematic coherence in the information flow of discourse and terminate a topic chain. For example,

- 9 (a) Zen Huixin dingzhe chuanxintougu de hanfeng, (b) Ø yongjindi tuizhe xiao
 (name) bravebone.chilly of cold.wind all.strength push small
 che (c) Ø waiwaixiexiedi zou zai qiqubupingde tulushang, (d) ta gaibudao leng...
 cart wobbly walkin ruggeddirt.road on she not.feel cold
 (a) *Zeng Huixin braved the cold wind, (b) pushed the cart with all (her) strength, (c) staggering along the rugged dirt road. (d) She didn't feel cold . . .*
10. (a) He squatted over the corpse and (b) Ø reached gently to the blackened
 bruise at the left temple. (c) Definite depression, maybe all that had done the
 trick, one blow. (d) He stood up and (e) Ø looked around.

In (9) clauses (a-c) describe an event involving a single referent, *Zeng Huixin*, which is coded by a topic chain. Though still about the same referent, clause (d) shifts from what *Zeng* did to what she felt while pushing the cart in the rugged dirt road; this minor thematic gap triggers the use of a lexical pronoun in (d). Before the thematic shift, a topic chain is employed to code the referent, but at the juncture of the shift a lexical pronoun is used instead. Passage (10), too, describes an action sequence of 'squatted ... , reached ... , stood up ... , and looked around', but the flow of the sequence is interrupted midway between clauses (b) and (c) by the referent's deduction of what happened to the victim as *he* 'reached gently to the blackened bruise at the left temple'. When the action sequence resumes at (c), a lexical pronoun is used to bridge the minor thematic gap.

4.3. Emphatic Effect

The third type of minor thematic discontinuity is one created by writers/speakers to achieve certain emphatic effect. This often happens in a span of discourse where the flow of information is highly coherent, but repeated lexical pronouns are found used to code the topical referent although a topic chain would have been the usual device. Such marked uses of lexical pronoun is to fulfill the speaker/writer's intent to emphasize certain attributes or qualities of the referent; zero anaphora, empty in form, would not serve such a purpose well. For example,

11. (a) yinwei ta shi jizhe, (b) yinwei tashenshendi tongqing naxie shoule because she isjournalist because she deeplyphathize those sufferyuanqude ren, (c) yinwei ta tongheng shenhuo zhong de yiqie chouer.

Injustice peoplebecause she hate lifeinof allugliness

- (a) *Because she was a journalist; (b) because she sympathized deeply with those who were done injustice; (c) because she was indignant over all ugliness in life.*

12. "(a) Yes, because he jumped, (b) because he gave his money to some unknown heir, (c) because he made no effort to shield his fortune from estate taxes, (d) because he'd been crazy as hell for some time."

In (11) the topical referent is coded by a chain of lexical pronouns in the passage to emphasize the reasons why *she* has been so involved in a case described in the preceding discourse.

The repeated use of overt anaphora in cases such as (11) above is a special device to break, on purpose, the maximum thematic continuity of the unit for emphatic effect. This overuse of resource would make the reader linger over the 'anomaly' of the reference, thus fulfilling the writer's goal. Such overt and repeated references in a short span of discourse to the same discourse participant are often found in parallel structures, construed to highlight the aspect of the referent that the writer intends to emphasize, as shown by the three *because*-clauses in (11).

Much like (11), the English passages (12) consists of four parallel subordinate clauses that make emphatic why the speaker considers the referent (*he*) to be crazy, although all *because*-clauses could have been conjoined with one *because* and an elliptical subject in the second and consecutive clauses. The repeated, overt subject in these separate parallel structures instead of conjoined clauses with zero subjects breaks maximum thematic continuity of the passage intentionally and successfully, drawing the listener/reader's attention to the emphasized elements in discourse.

4.4. Weakened Topicality

Although human referents are mostly the center of narratives and figure prominently as topics of discourse, important nonhuman entities, almost always an object, may occasionally be topicalized to mark its significance in advancing the storyline. As the topicalized entity is placed in clause-initial position, the human topic of the micro-unit, though still the clause-subject, would have to be 'demoted' to non-initial position. This change of focus, albeit temporarily, weakens the topical status of the human referent and creates minor referential discontinuity, where a zero anaphor would not be adequate to code the human referent that is being bumped out of focus. For example,

13. (a) zuijin yiduan shijian tayizhi zaixie yige gushi, (b) **zhe gushi**, tagousile
 recent period timehe keep writeastory this story he think.of
 hengjiu (c) Ø_j Ø_izaojiu xiang xie , (d) Ø_j Ø_ikeshi yizhi meiyou
 very.long long.ago want write but all.along have.no
 shijian xie.
 time write

- (a) *He had been writing a story recently.* (b) **This story** *he had been conceiving for some time,* (c) *wanted to write (it) a long ago* (d) *but had no time to write (it).*

In (13) *zhe gushi* ('this story'), the object of clause (a) is an important entity of this discourse unit, and to promote its importance, it is topicalized and preposed to clause-initial position in (b) so that it can be focused on. At the moment of topic shift (from *he* to *this story*), the focus of attention is diverted and an lexical pronoun is used to code the same topical referent in (b), while the new focus (*this story*) is topicalized, and then coded repeatedly by zero object in topic position, signaling to the reader that it remains in focus and is worthy of her/his attention. Of particular interest here is the fact that the majority of zero object in Chinese discourse codes topicalized objects such as the ones in (13) above. In other words, object entities are not likely coded by zero anaphora unless they are considered important enough to be topicalized and focused on.

Moreover, once the nonhuman entity is topicalized and put in focus, the human referent that is the topic of the discourse unit reenters focal attention and reclaims its topicality. After all, the value and importance of nonhuman entities are made relevant in discourse only in reference to the humans who own them, use them, and manipulate them (Fox & Thompson 1990, Pu 2007). As shown in (13c-d), when both human and nonhuman referents are in focus of attention at the juncture of discourse, both would be coded by zero anaphora in a double topic chain, with zero object and zero subject occurring in the same clause for the remainder of the discourse unit.

In English a zero object is syntactically not permitted, and therefore cases like (13) are theoretically not possible. Nonetheless, when an argument other than the subject of a clause is the focus of attention, it is typically placed in a so-called 'focus' structure and may well be coded by a topicalized zero object in a nonfinite clause once its focus status is established. For example,

14. (a) This was [**the kind of secret message**]_i, **her friends**_j left for each other at school, (b) $\emptyset_i \emptyset_j$ hidden in the bicycle shed, (c) $\emptyset_i \emptyset_j$ slipped into a blazer pocket.
15. (a) There were [four lesser partners]_i in his_j firm, (b) **four**_i Josh_j had handpicked and (c) $\emptyset_i \emptyset_j$ hired and (d) $\emptyset_i \emptyset_j$ mentored and (e) $\emptyset_i \emptyset_j$ listened to on some matters of management.

In (14) the NP *the kind of secret message* is the object of the verb *left* in (a). It is preposed before the subject, *her friends*, placed in the focus position of the main clause, and made the focus of discourse at the moment. The focus is topicalized and persists in the remainder of the passage, and a zero anaphor is employed to code the topicalized object referent in the subsequent clauses (b-c). Likewise in (15), *four lesser partners* in (a) is repeated as *four* in an appositive structure(b) and topicalized in clause-initial position, which is then coded by three consecutive zero objects in (c-e), all parallel appositive clauses. In both examples, the topical referent of the micro-unit, *her friends*, and *Josh* respectively, is temporarily bumped out of focus and coded by an overt anaphor (either a lexical pronoun or a full NP) as the object referent is being made the new focus, but each is coded by zero subject in the rest of the discourse unit as it reclaims attention after the focus shift. The zero anaphors in (14-15), coding the subject and object in the same clause, are used much the same way as the double topic chain found in Chinese passages such as (13) above.

Though zero anaphora is quite prevalent in Chinese discourse, zero subject seems to be a grammaticalized phenomenon while zero object is very rare (about 5% of all zero anaphora, see Pu 1997, Li 2005, *inter alia*), which is similar to the asymmetry of zero subject and object in English.

5. Conclusion

The present study challenges the traditional view that TOPICCHAIN, to which zero anaphora is essential, is a device unique to topic-oriented languages such as Chinese. It argues that the phenomenon is more language-general because what topic chain manifests fundamentally are cognitive constraints underlying reference tracking and speaker-hearer (or writer-reader) interaction in discourse processing.

The present study proposes a TOPIC-CHAIN PRINCIPLE, stating that what determines the use of topic chain is the sustained attentional effort on a referent that is maintained in a discourse unit of maximum thematic coherence. Maximum thematic coherence is a discourse condition of universal characteristic for the use of topic chain, i.e., as long as a discourse unit is maximally coherent thematically, its topical referent would be coded by a topic chain in a language.

Once that maximum coherence is disrupted, zero anaphor is no longer preferred but an overt coding form would be used to bridge the gap in mind and mark the thematic discontinuity in text.

The present study has demonstrated, with written text samples from both Chinese and English, that TOPIC CHAIN PRINCIPLE is generally observed by speakers/writers in their process of tracking references and building discourse coherence. Although the present study holds that the topic chain principle has universal characteristics, the use of topic chain in discourse genres other than narratives as well as more, diverse languages constitutes an empirical hypothesis subject to further research and refinement.

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