行政院國家科學委員會補助專題研究計畫成果報告

敘事談話的結構：國語言談的認知、語言及語用層面

計畫類別：XX 個別型計畫　　□ 整合型計畫
計畫編號：NSC　94－2411－H－029－010
執行期間：94 年 8 月 1 日至 96 年 7 月 31 日

計畫主持人：楊麗瓊
計畫參與人員：王瑋璇、蔡佳蓉

成果報告類型(依經費核定清單規定繳交)：XX 精簡報告
本成果報告包括以下應繳交之附件：
□赴國外出差或研習心得報告一份
□赴大陸地區出差或研習心得報告一份
□出席國際學術會議心得報告及發表之論文各一份
□國際合作研究計畫國外研究報告書一份

處理方式：得立即公開查詢
□涉及專利或其他智慧財產權，□一年 XX 二年後可公開查詢

執行單位：東海大學外國語文學系

中　華　民　國　96　年　10　月　15　日

敘事結構：從認知、語言及語用的觀點來探索語言中的停頓現象

一、 計畫中文摘要

本計劃的主旨即為從認知、語言及語用的觀點來探索敘事談話中所產生的各種語言停頓現象。研究計劃的資料將取材於自然談話中的敘事部分。自然談話是人類語言交流的最主要方式。在自然談話中談話者必需依視談話環境及聽者的反應需求調適本身的談話主題、句法型式及遣詞用字，不斷的與聽者的認知情況及交流意圖密切配合。自然談話中的敘事部分具有特殊的意義及重要性，因為它的組織結構直接反應出敘述者回憶細節的過程，更有助於了解敘述者如何啟動記憶，如何將腦中所存形象轉化為語言方式，以及在此過程中所產生的種種困難等整個過程。本計劃即以此為主題，以自然談話為材料，以語言中的停頓現象為主軸來探討認知結構與語言的關係，由于認知，心理，及互動的複雜關係，計劃嘗試提出一個能夠解釋相關變數影響的模式，同時亦提供一個語言理論對中文的適用可能性的測試，以增進各界對人類語言及思維的基本了解。

二、 計畫英文摘要

Language and speech researchers have traditionally been interested in how disfluencies and pauses serve as markers of discourse organization, and to what degree they are reliable indicators of phrase boundaries. With recent increased scientific attention focusing greater interest on the underlying mental and psychological foundations for human behavior, linguists and cognitive psychologists have devoted increased research efforts to study language phenomena as a mirror of internal cognitive processes. The Structure of Narrative Discourse project takes a multi-dimensional approach to the investigation of disfluencies and pausing phenomena in narrative speech, emphasizing both the cognitive, psychological, and pragmatic foundations of these phenomena, and their structural linguistic discourse and syntactical influences. The goal of the project is to investigate and analyze the structure of narratives embedded in Mandarin discourse to achieve a deeper understanding of how consciousness, pragmatic intentions, and interactive constraints

shape narrative structure in Mandarin, focusing on how disfluencies and pausing phenomena contribute to coherence and narrative flow in discourse in spontaneous natural conversation. We hope that this project will make a significant advance for a deeper understanding of the role of consciousness and human intentions in spoken language.

三、 關鍵詞

關鍵詞: 言談、認知、 國語、 語頓
Key words: narrative, cognitive, emotion, information flow, pauses, hesitation

四、 計畫執行成果

1. Motivation

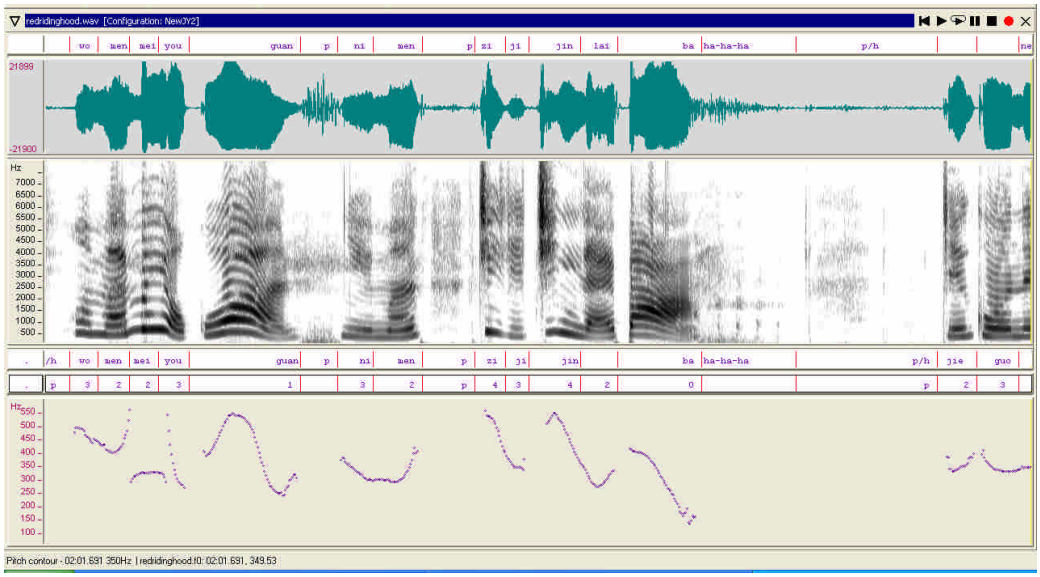
Duration elements-how we use pauses, and how we vary speech rate-are crucial in both the structural and the cognitive organization of discourse. Pauses function to give us time to overcome cognitive difficulties or work-through necessary cognitive processing as topics and focal points change rapidly in conversation. They are often used to gain time for topic planning and in recalling events back into active memory. Pauses also function to provide time to as we hesitate and make calculations or decisions in conditions of uncertainty.

In addition, pauses help to segment the speech stream into idea units (Chafe, 1995), because of the greater cognitive effort needed to bring up succeeding idea units, and act to mark phrase boundaries because of this.

2. Data, methodology & approach

Our data collected for this project consist of a variety of different speech types, including spontaneous conversations recorded in a quiet room, read children's stories, and children's spontaneous stories. The data were segmented to the syllable level and durational features (including syllable, word, phrase durations) and some distance measures were extracted automatically.

Figure 1: Sample speech data and segmentation scheme



For phrase boundary marking, we followed our previous annotation method and used a 2-level categorization scheme differentiating major and minor phrases (coarse labeling at this stage), and this results in 3 types of labels to account for these boundary pauses as well as internal non-boundary pauses. Major phrases correspond roughly to sentences, while minor phrases are clauses and phrases like PP, NP, VP, and fragments. The main criterion we use is whether the phrase is part of a larger idea unit or not.

For this report, we used only a partial subset of the total data collection, including 2 subsections of the spontaneous conversation and 3 read children's stories.

3. Results: Distribution and frequency of Pauses

Our results show that pauses correlate fairly well with phrase boundaries and that this result is consistent across all corpora. We can see that in this table.

Table 1: Distribution of Pauses by Type

File	Ph	Pause	BP	NBP	BP/Ph	BP/P	TP/TT
MD1	666	686	428	258	64.3%	62%	28.4%
MD2	695	547	384	163	55.3%	70%	14.2%
MD3	162	216	159	54	98.1%	75%	35.3%

How well pauses serve as boundary markers, however, depends upon a number of factors such as speaker, gender, and speech style (degree of spontaneity). For example, the results show that there is a big difference between spontaneous speech and read speech: For the read Children's story data, almost every phrase was marked by a pause, 98.1%. This corresponds to the more structured nature of the narration, with complete ideas presented in phrases and sentences. There are also many internal pauses used for emphasis, rhythmic effects, and to introduce new characters or settings.

By contrast, MD1 and MD2 are more spontaneous conversations, involving two speakers. The style in each talk is informal, with considerable freedom for interaction and topic development. Thus, the topics are less structured (than the story data), and rely more on interactive cues and interruptions (for clarification) rather than on phrasal marking by pauses.

4. Duration of pauses and boundary status – major, minor and non-boundary pauses

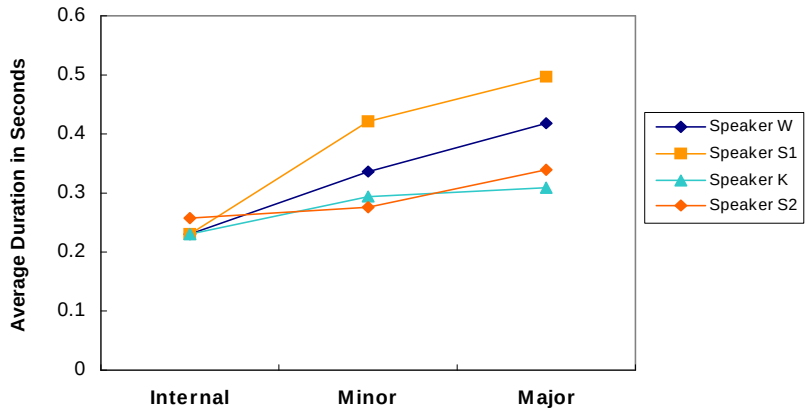
Our data show that the duration of the pause is also well correlated with specific boundary status in that the longest pauses occur on major phrase boundaries, while shorter pauses accompany minor phrase boundaries, and non-boundary pauses have the shortest durations on average.

Table 2: Average Pause Durations by Type

TYPE	NUMBER	AVERAGE DUR
Major Boundary	665	.493324 sec
Minor Boundary	265	.334432 sec
Non-boundary	393	.248334 sec

When we break out these results by speaker, we can clearly see that all of the speakers followed this pattern consistently on average.

Figure 2: Average Pause Duration by Boundary Status and Speaker

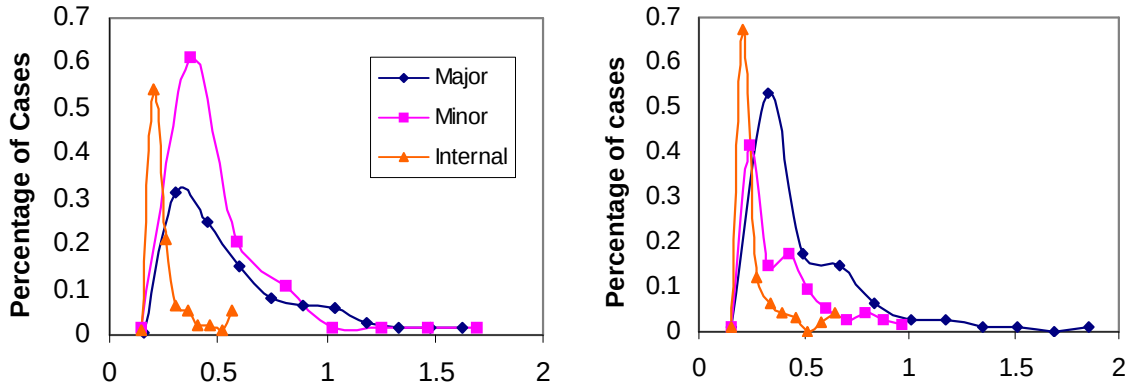


To see whether these consistent patterns can characterize pause status, we look at the distribution of pause duration for major and minor phrases and for internal pauses separately.

The histogram for MD1 in Figure 3 shows that the longer the pause is, the greater the chance that it is a boundary pause. The overlap in duration can be seen as well, and this implies that if the pause has a reasonable duration, it is harder (more ambiguous and other cues) to tell whether it is a boundary pause or a non-boundary pause. For MD2, there is much greater overlap among the 3 curves, making it more difficult to distinguish boundary status on the basis of pause duration alone. The well-separated distribution curves for boundary and non-boundary pauses in MD3 show that read speech is much more regular: it is much easier to tell whether a pause is a boundary pause or an internal pause.

The histograms show that the ability to predict boundary status from duration alone *varies*, suggesting that *speaking style* can affect the structure of pause duration in conversations.

Figures 3-4: Distribution of pause duration - histograms of MD1, speaker S (left) and speaker W (right)



Figures 5-6: Distribution of pause duration - histograms of MD2, speaker S (left) and speaker K (right)

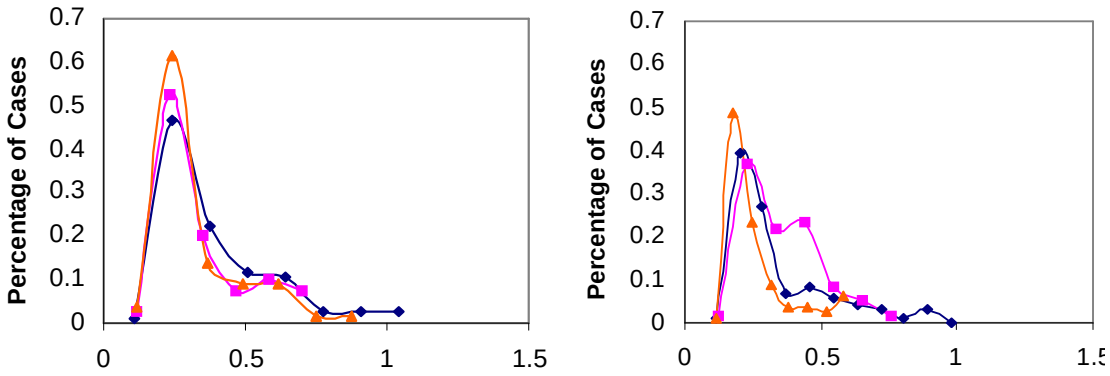
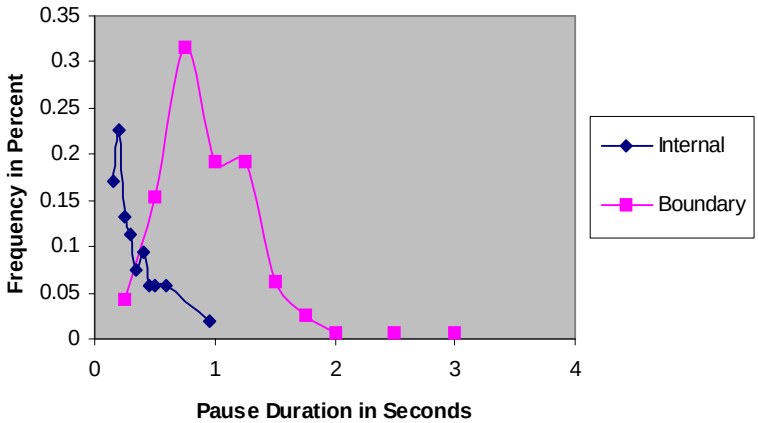


Figure 7: Distribution of pause duration - histogram of MD3, speaker H



5. Read speech vs. Spontaneous speech

Read speech differs greatly from spontaneous speech, with almost all phrases, 98.1%, marked by a pause, corresponding to the more structured nature of the narration. There are also internal pauses used for emphasis, rhythmic effects, and new scenes.

6. Final Lengthening

Final lengthening is evident in the rise in syllable duration close to the end, particularly when the distance to phrase end is less than 4 or 5 syllables, and there is a *progressive* lengthening, with the final syllable before the boundary, at distance 0, having the longest duration.

This result is consistent across all speakers and provides convincing evidence for final lengthening in spontaneous discourse. It further shows that this effect is not confined *solely* to the final syllable but is *spread over several preceding syllables*.

Figure 8: Syllable counts by distance to pause or phrase end: MD1

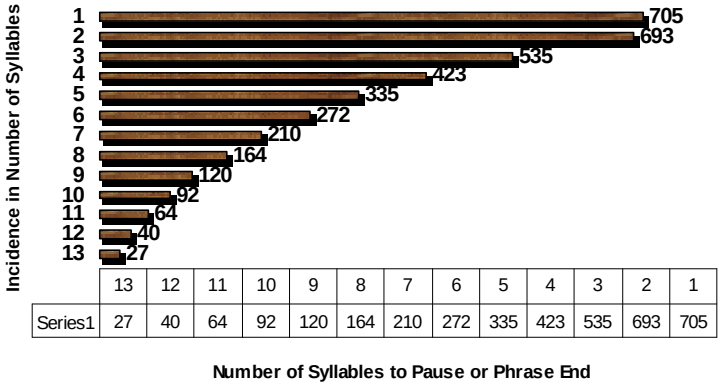


Figure 9: Syllable counts by distance to pause or phrase end: MD2

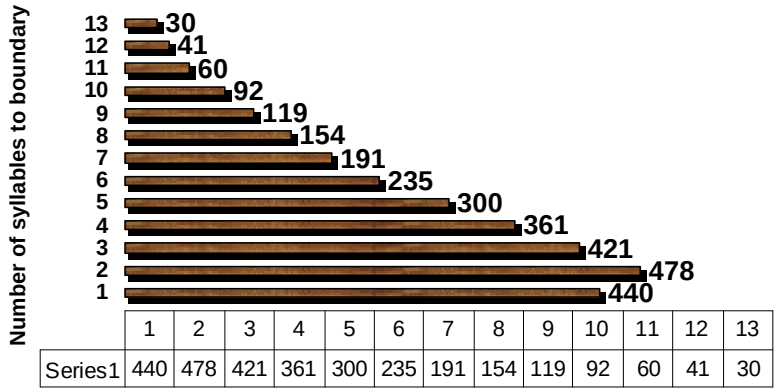
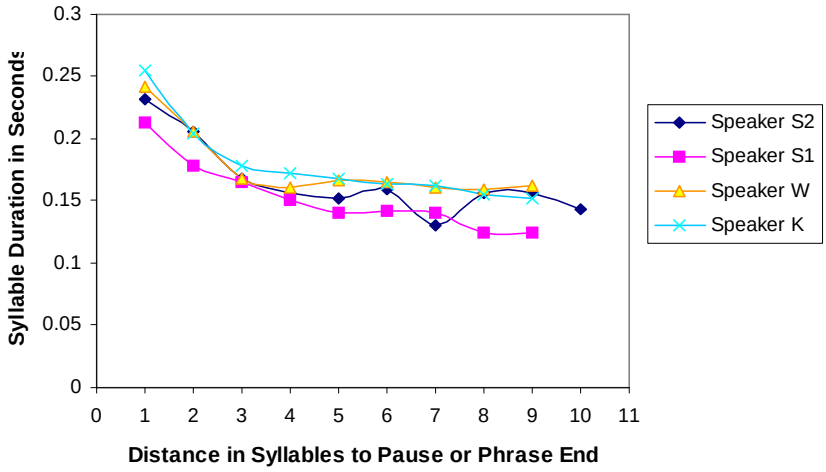


Figure 10: Average syllable duration by speaker as a function of distance to phrase end



7. Why do pauses occur in speech?

We found that in our data pauses often function as indicators of phrasal organization, as interactive signals for turn-taking and suggested topic direction, and are also used as expressive elements in discourse, especially for emphasis or dramatic effect and for building up tension and climax.

In addition, cognitive constraints and interactive negotiations also play a key role in discourse organization. In conversation, on-line topic redirection and memory search frequently require time to coordinate, and pauses are often used to hesitate in these situations of uncertainty or doubt.

8. Conclusion

Our results show that in our Chinese conversation and narrative data pauses correlated well for phrase and boundary marking, however the strength of boundary-marking through duration varies across corpora. We have also found that pause duration correlates with specific boundary status and syllable duration *inversely* correlates with distance to phrase end. The universality of durational features suggests that they are fundamental components of narrative discourse organization and are crucial to language understanding.

五、 計畫進度規劃及成果自評

由於錄音及轉寫語音資料十分費時，而本計畫期間僅有兩位兼任大學生助理協助收集語言資料，並其中一位僅能工作兩個月，因此在分析時僅能專注於部分標記較為完整的語音語料進行分析。計畫成果也已於本年度第十屆國際語用學會議(The 10th International Pragmatics Conference) 及第十六屆國際語音科學會議(The 16th International Congress of Phonetic Sciences) 發表。計畫期間雖遭遇到一些器材及錄音場地的問題，但大體上仍然配合原訂計畫進度。

六、 參考文獻

Campbell, W.N., "Synthesizing spontaneous speech," in *Computing Prosody*, Y. Sagisaka, W.N. Campbell, and H. Norio, eds. Springer-Verlag, 165-186, 1996.

Chafe, W., "Some reasons for hesitating", in D. Tannen and M. Saville-Troike, ed., Perspectives on Silence, Norwood, N.J.: Ablex, 77-89, 1985.

Kompe, R., Prosody in Speech Understanding Systems, Lecture Notes in Artificial Intelligence, Springer. 1997.

Oliveira, M. Jr., Prosodic features in spontaneous narratives. Ph.D. dissertation, Simon Fraser University, 2000.

Shriberg, E., Stolcke, A., Hakkani_Tur, D., and Tur, G., "Prosody-based automatic segmentation of speech into sentences and topics," Speech Communication, 32(1-2), 127-154, 2000.

van Santen, J.P.H. "Contextual effects on vowel duration," Speech Communication, 11:513-546, 1992.

Wightman, C.W., Shattuck-Hufnagel, S., Ostendorf, M., and Price, P.J., "Segmental durations in the vicinity of prosodic phrase boundaries". JASA91: 1707-1717, 1992.

Yang, L.-C., "Contextual effects on syllable duration," in Advances in Speech Synthesis, Proceedings of the 3rd ESCA Workshop on Speech Synthesis, ed. By Nick Campbell, 1998.

Yang, L.-C., Duration and Pauses as Phrasal and Boundary-marking indicators in Speech. Proceedings of the 15th International Congress of Phonetic Sciences.Barcelona, Spain, 2003.

Yang, L.-C., Duration, pauses, and the temporal structure of Mandarin conversational speech. Proceedings of the 16th International Congress of Phonetic Sciences. Saarbruecken, Germany. 2007.