GliFlix: Using Movie Subtitles for Language Learning

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ABSTRACT
We introduce *GliFlix*, a new user interface aiming to enhance foreign language literacy as the users watch foreign-dubbed films. To reduce cognitive load and thus enhance learning, *GliFlix* presents "augmented subtitles," selectively highlighting foreign words spoken in the films together with the users' primary-language subtitles. To demonstrate the usefulness of *GliFlix*'s augmented subtitles, we conducted a preliminary within-subjects study with 10 users, which showed that augmented subtitles potentially are preferred to the conventional one-language subtitle and may result in higher rates of foreign vocabulary acquisition.

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General terms: Design, Human Factors, Languages

Keywords: Video Player, Movie, Learning, Language

INTRODUCTION
Over the past decade, the need to know foreign languages has gained in importance. Indeed, learning a foreign language ranks high on the priority lists of a number of people, with as many as 39 percent of people regretting not speaking additional languages and often wishing they could speak more languages [2]. Yet, most learning is still restricted to devoted, goal-directed learners either through formal schooling or specialized multimedia aids. Casual learners, on the contrary, generally have lower levels of commitment and resources devoted to learning, and hence have limited means to acquire foreign languages. As intuition suggests, a top reason cited for difficulties of learning a foreign language is the "lack of time" [2].

To enable casual learners of foreign languages to overcome such obstacle to expanding their repertoire of foreign vocabulary in the comfort and entertainment of watching their choices of foreign-dubbed movies, this demo introduces *GliFlix*, a web-based tool that employs computational linguistics to automatically pair and highlight selected foreign and native-language words, using interactions designed to be intuitive to casual learners. Below, we describe the rationale and the prototype of *Gliflix*, present the results of our preliminary study, and discuss future work.

Figure 1: A screenshot of the *GliFlix* video player.
Demo: http://graphics.stanford.edu/~sakunkoo/gliflix

RELATED WORK
Previous research has suggested that, for language learning to be effective, learners need to have frequent exposure to that language [5], ideally through a multi-sensory experience [4]. Accordingly, it has been shown that foreign language films are quite effective to vocabulary acquisition. Yet, scholars also note that the effectiveness of foreign language films is significantly lower for acquisition of languages quite different from one's native language, perhaps because of the limited capability of the casual learners to discern and match specific vocabulary while watching movies [4]. A natural question thus follows, "How can we augment language learning through subtitled foreign-dubbed films?"

This question motivates the present work, which proposes that a combination of a selectively highlighted foreign subtitle and a conventional subtitle in one's native language may better encourage vocabulary acquisition, with minimal distraction from the films.

We predict that augmented subtitles (C & D in Figure 2) will be preferred to and lead to higher rates of vocabulary acquisition than the conventional one-language display, which does not show any foreign vocabulary, and the parallel subtitle, which shows the whole foreign subtitle (A & B in Figure 2). The rationale is that augmented subtitles should provide more frequent exposure and a multi-sensory

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experience (auditory and visual) to foreign vocabulary. Also, the automated, interactive pairings are expected to help reduce cognitive load on the viewers to discern and match specific vocabulary in two languages while comprehending the storyline.

SYSTEM DESCRIPTION

GliFlix is a web-based video player that supports the display of augmented subtitles as well as other interactive language learning features. *GliFlix* takes as input a video file in mp4 and flv formats, and two subtitle files (English and foreign) in the srt format. In this study, we use HandBrake [3] and SubRip [7] to prepare the video files from DVDs. *Gliflix* employed computational linguistics to tokenize the subtitle files at the word level. Next, the meanings of foreign words are retrieved from several dictionaries [6] and Google Translate [8]. The English meanings of foreign words are further expanded to their synonyms using WordNet and are finally matched to the English subtitle.

In terms of user control, users can filter the matched pairs of foreign- and English-language subtitled words by vocabulary difficulty (based on word frequency data provided by Wiktionary) and the number of highlighted words allowed per screen. *GliFlix* also keeps the history of augmented word pairs that have been displayed and offers a multiple-choice quiz for review. The history also serves as a navigator for jumping back to the scene where the foreign word was enunciated. Finally, the users can hear the pronunciation by clicking a highlighted foreign word in the history panel or the subtitle itself.

PRELIMINARY USER STUDY

We designed our pilot study to determine whether augmented subtitles can potentially offer a vocabulary acquisition benefit and user satisfaction over conventional and parallel subtitles (A & B in Figure 2). Two types of subtitle augmentation—in-sentence highlight and out-of-sentence highlight (C & D in Figure 2)—were examined. Hence, the four types of subtitles we tested were *Control (conventional), Parallel, In-Sentence Highlight, and Out-of-Sentence Highlight*. We hypothesized that (1) Either In- or Out-of-Sentence Highlighted Subtitle will be preferred to control and parallel subtitles, and that (2) Either In- or Out-of-Sentence Highlighted Subtitle will result in higher rates of vocabulary acquisition than control.

Ten participants were recruited on-campus. All were American between the ages of 19-24. The participants first freely tried the four interfaces in counterbalanced presentation, in their chosen foreign language, either French or Spanish. They were then asked to rank their preference of the four alternatives and provide reasons. Subjects then viewed 2-minute comparable film segments in the control and the augmented interfaces, and then completed a 20-word multiple-choice vocabulary quiz following each type of interface. To control for prior knowledge, the users were requested to mark the words that they already knew prior to the study, and such words were excluded from their scores.

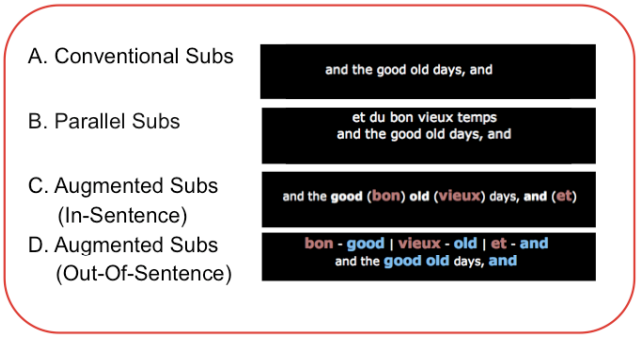

Figure 2: Four subtitle interfaces

FINDINGS AND FUTURE WORK

The preliminary results confirmed our hypotheses regarding user preference and vocabulary acquisition. *Gliflix*'s augmented subtitles seem to offer a balance between educational value and (minimal) distraction from the films. Nine out of ten participants ranked as their most preferred option at least one type of *Gliflix*'s augmented subtitles. Five participants preferred In-Sentence and four preferred Out-of-Sentence designs. The only subject who preferred the parallel subtitle described herself as an advanced learner of her chosen language (Spanish). Furthermore, eight out of ten participants learned significantly more vocabulary from augmented subtitles than from control in which the users tended to learn little new vocabulary beyond guessing. Through informal feedbacks, several features were added to the system, including adjustments on the number of highlighted words per screen and the types of words as well as the online vocabulary quiz.

Overall, the quantitative and qualitative results are highly encouraging. To follow up from this demo, we plan to conduct a more rigorous study on vocabulary acquisition and a second study on the effects of word selection such as the optimal number, repetitiveness, and location of highlighted words (e.g. boundary versus inner words in a sentence) for language learning, as well as introduce ephemeral highlighting to the augmented subtitle.

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