

Improving listening skills in language learning with spaced repetition technique

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Abstract. Listening comprehension is one of the hardest skills for many people to develop in language learning. Developing listening skills is a long, slow and painful process for them. Nevertheless, we can significantly increase it with spaced repetition technique. This article is about using the spacing effect for improving listening skills. The user extracts fragments from some video and repeats them later with increasing intervals. We created the application that automates and simplifies this process.

Keywords: Listening comprehension · Language learning · Spaced repetition

1 Introduction

Thousands of people around the world are studying foreign languages. They spend many years to become fluent speakers. Listening comprehension is an ordeal for many of them even though they have access to thousands of high-quality videos on the Internet. We should develop a special learning technique because it is insufficient to watch those videos passively. People forgot words and their sounding too fast.

2 Spaced repetition

The spacing effect was reported by a German psychologist Hermann Ebbinghaus in 1885 [3]. He observed that we tend to remember things more effectively if we spread reviews out over time, instead of studying multiple times in one session. Since the 1930s there have been many proposals for utilizing the spacing effect to improve learning, in what has come to be called spaced repetition. According to Ebbinghaus, we gradually forgot things if we do not repeat them (see Fig. 1). We should recall information if we want to maintain it in our memory.

We break information down into pieces (e.g., statements or video fragments). Each piece has the last repetition day and the next repetition day. We should increase the interval before these days. It is ineffective to do it manually. There are a lot of programs that can assist us. Anki [4] is one of the most popular. It is a free, cross-platform and general-purpose application.

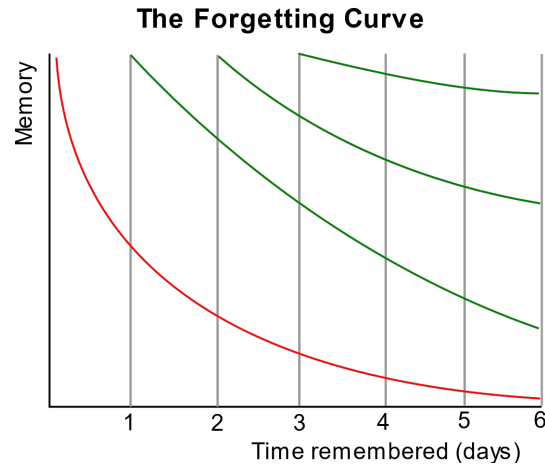


Fig. 1. The Ebbinghaus forgetting curve

3 Spacing effect in language learning

Many learners use spaced repetition for remembering new words. It is easy and natural to create a flashcard with a foreign word on the front side and the translation on the back, and then just review it with increasing intervals. Pimsleur language learning system is also based on spaced repetition. It has been gaining popularity since 1967 when it was developed.

It seems appropriate to use the similar technique for listening comprehension. We can replace flashcards with video fragments. The user can extract these fragments from the video and review them later at increasing intervals. Spaced repetition can help retaining obtained listening skills and imprint the speech deeper in users mind.

4 Automation of video fragments extraction

It is quite hard to extract video fragments without a special program, and it is even more difficult to organize the spaced repetitions of these fragments. We were unable to find any program that does and tried to write an Anki extension that would save video fragments as flashcards, but it was proved inefficient. Thus, it was necessary to create an application from scratch. The special interface was created that allows the user to stop the video and extract a fragment alongside with the subtitles (see Fig. 2). The application tries to guess the start time and the end time of the fragment. This prediction is based on subtitles accuracy and work well in the most cases. The user can adjust the bounds of the fragment if subtitles timing is not good enough for him. The application has the convenient interface for it (green arrows in Fig. 2).



Fig. 2. The user interface for video fragment extraction

It is possible to attach a flashcard in case the subtitle contain a new word. The user can improve vocabulary at the same time with listening skills. The program stores the information about all video fragments in the database. The user can repeat previously extracted fragments (see Fig. 3). He can slow the speed down if the speech is too fast or unclear. Pimsleur language learning system is also based on spaced repetition. It has been gaining popularity since 1967 when it was developed.

5 Work sequence

The user should stick to the special order while he is working with the application (See Fig. 4). There are three activities the fragments extraction, the first repetitions and the spaced repetitions. The user should start with watching the video and extracting fragments from it. He should repeat them on the next day with care. The first repetition is usually more difficult than the next repetitions (the spaced repetitions). It is worth noting that the user should work with the application every day and spend about 2 - 2.5 hours. We presented estimated durations for each type of activity in Table 1.

6 Research

When the user finished a season from some TV series, the application can calculate the average number of extracted fragments per episode. The user can

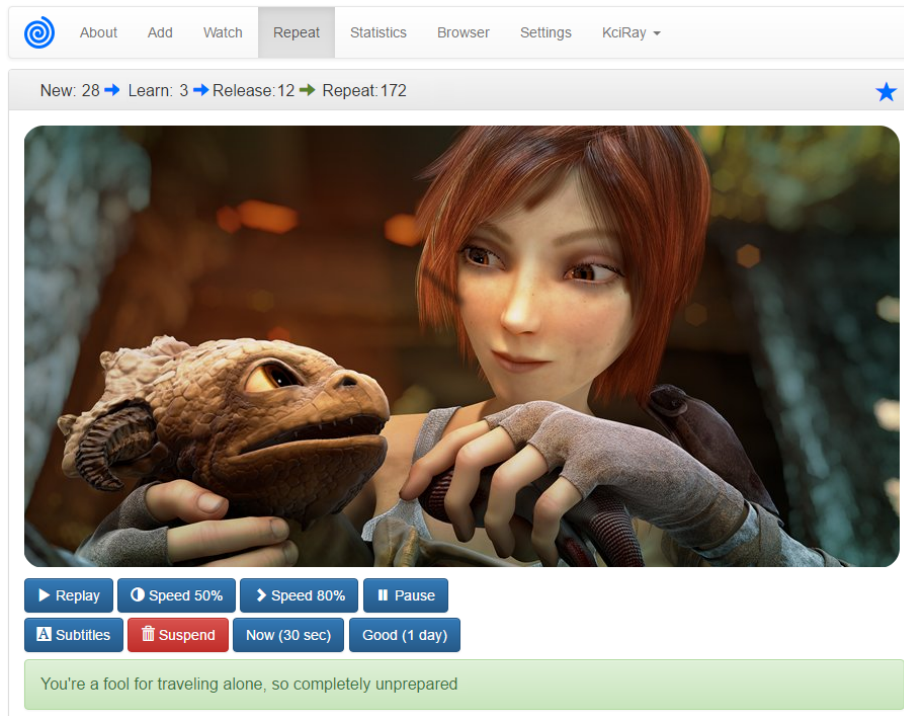


Fig. 3. The repetition panel

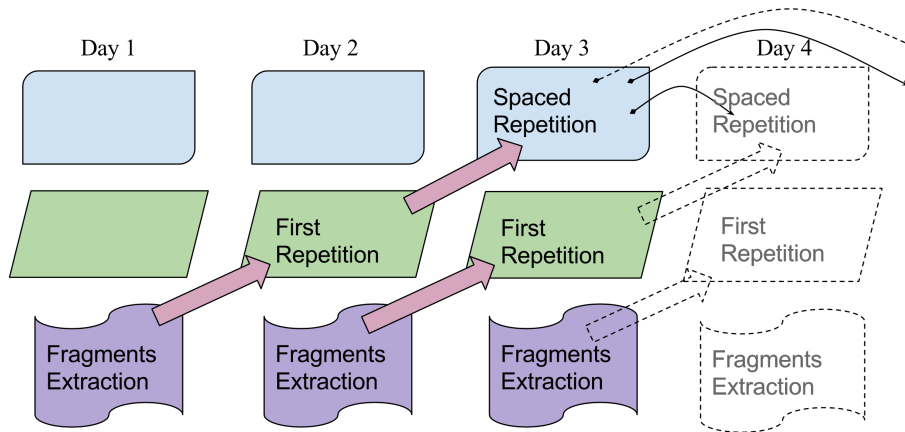


Fig. 4. The work sequence

Table 1. Activities

Activity	Duration (min)	Efforts
The fragments extraction	40 – 60	Hard
The first repetitions	30 – 40	Middle
The spaced repetitions	1 – 30	Easy

estimate his skills by this value and track their development from season to season. This method is very precise because episodes tend to have the same length.

The assistant extracted about 7000 fragments during the three-month period (from April to June 2016) and processed four seasons from Friends (Table 2). The average fragments decreased from 100.15 to 51.33. Thus, the assistant improved his listening skills twice. This is a very good result because many people spend years to achieve the same result.

7 Technical aspects

The developer wrote the application in Java/Groovy and HTML5 mainly. It based on client-server architecture and uses Spring Framework on the server side and AngularJS on the client side.

The video player is based on HTML5 `<video>` element. Thus, there are three supported video formats: MP4, WebM, and Ogg. However, the user should check if his browser supports particular codecs.

The database is stored in a file. The application works through Hibernate Framework and uses H2 Database as an engine. Many additional libraries and frameworks were used, such as Apache commons, Jsoup, Jetty, Twitter bootstrap and VTT JS.

Table 2. Statistics

Season	5	6	7	8
Episodes	24	25	24	24
Fragments	2404	2067	1367	1232
Average Fragments	100.15	82.67	56.96	51.33
Flashcards	260	270	245	202
Average Flashcards	10.83	10.80	10.21	8.42

8 Conclusions

We have proved that the spaced repetition technique is useful for improving listening skills. The user can use the application IceMemo [1] to automate this process. We published the article on the Internet [2], and two hundred of users

downloaded the application from our server and checked it out. Some of them contacted us a few months later and declared that their listening skills were improved significantly.

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