

Development of English Word-Study Tool with the Indo-European Roots

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Abstract

An English word-study method using Indo-European root information is better than other conventional methods. Actually, the user of the Hyper-dictionary requested something that English word-studying support tool, a type of quiz for English word-study support tool using Indo-European-Roots information is developed as a web-application. The main purpose of this thesis is to develop a method of studying English using Indo-European Root information. By developing this web-application, it is expected that this method of studying English using Indo-European Root information will become a more general method in the future.

1 Introduction

1.1 Background

English education is very important in Japan, as English is a required subject in Japanese junior and senior high schools. Nowadays, the global standard for language education has progressed in Japan, and many English schools have opened with the number of students enrolled on the rise. English classes for small children (3-5 years old) in English schools, in particular, have increased. A plan to carry out English education for kindergarten and elementary school students is considered by educating English specialists.

To better understand English words and sentences, it is necessary for Japanese learners to increase their English vocabulary. When learning English words, studying English which uses Indo-European-Roots is more efficient than other learning methods. We explain this fully in the next section.

1.2 About Indo-European-Roots

1.2.1 What is Indo-European-Roots?

An Indo-European root is a type of parent language that assumes that English, the languages of almost the entire Europe continent, the Iranian language of Asia, Indian, etc. originated from one single parent language. For example, the most primitive form of the English word "early" is "ayer," or "early" can be derived from the root "ayer". When "early" is searched in a Hyper-dictionary, the following result is displayed [see Figure 1].

early		
[adj.] / 初期の		
印欧語根 ayer-	この印欧語根を持つ英単語	日・一日、朝を表す (early など)。
印欧語根 #ik-	この印欧語根を持つ英単語	体、形・姿を表す。 each , like , like などの由来。

Figure 1: early

Proto-Indo-European, which is the ancestor language of Indo-European languages, is not a natural language that existed as an actual language.

In previous research it was proved that 70 to 80 % of modern English words have Indo-European-Roots. Proto-Indo-European is a virtual language. It was created by comparative linguistics which developed rapidly in Europe from the 19th century. Theoretical re-construction follows the regular phono-rhythmic changes found in Indo-European languages. Now, research has focused on discovering the social system of people who used Indo-European-Roots[1].

Proto-Indo-European existed from West Asia to Europe about 7,000 years ago. Proto-Indo-European's stem was structured a patterns groups called Indo-European-Roots[1]. There are 12 groups of Indo-European-Root derivatives. They include Anatolian, Indo-Iranian, Greek (Hellenic), Italic, Celtic, Germanic, Armenian, Tocharian, Balto-Slavic, Albanian, and other Branches. The population of people using Indo-European-Roots occupies half of world of people groups forming the most important groups, and these groups include about 70 languages[1].

1.2.2 Usable of Indo-European-Roots

Characters in the Roman alphabet have no meanings as hieroglyphs do in Chinese characters. There is almost no specific role in English for an ideograph like a Chinese character or a hieroglyph, etc. Even if the row of a character is perceived, it is difficult to clarify the origin

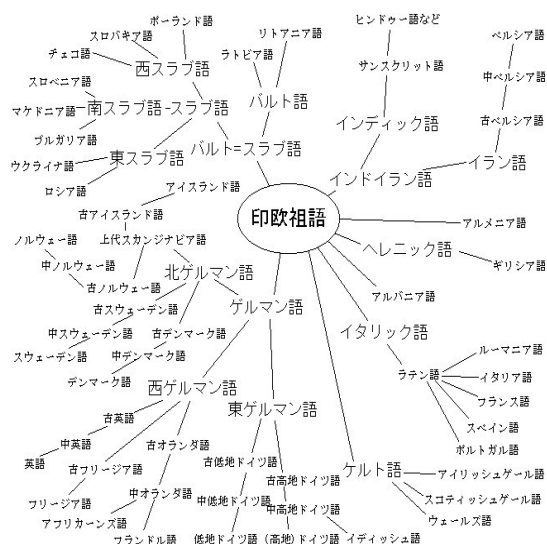


Figure 2: Proto-Indo-European

of the meaning of a word. But the English-word learning method using an Indo-European-Roots, information-based hyper dictionary is an effective learning method compared to using only a typical English dictionary or wordbook. English education has changed from "memory" method to "learning" study method[2].

1.3 About the English-Japanese Hyper Dictionary

1.3.1 Characteristics of the English-Japanese Hyper Dictionary

The "English-Japanese Hyper dictionary" was created using Indo-European-Roots information which can be found on the World Wide Web. It was, produced by Ikebe of the CAI Laboratory at the University of Tsukuba and other graduates of the Mathematical Foundation of Computer Science Laboratory of University of Aizu in 2001. This dictionary is superior to a typical dictionary and has the following important characteristics:

- It can be used by anyone, everywhere, at anytime on the World Wide Web.
- It has a simple database, so it is easy to add, delete, and update data.
- All English words having the same Indo-European-Roots can be learned.
- It displays various meanings of a synonym, and contrasts them with an antonym by going back to by Indo-European-Roots.

In order to help Japanese students of English, the hyper dictionary includes Prefix data and stem data in the English word data. Prefixes and stems judged to be important are classified by referencing the American Heritage Dictionary third edition (AHD). So it can classify languages that have the same Indo-European-Roots and different prefixes. It can also classify some words that do not have Indo-European-Roots.

Research in this English-Japanese hyper dictionary uses 596 kinds of Indo-European-Roots as classified in the American Heritage Dictionary (AHD), which is one of the most commonly used English dictionaries in the United States.

1.3.2 Function of English-Japanese Hyper dictionary

Functions of the hyper-dictionary include the following:

- English words can be accessed from the front word concordance.
- Indo-European-Roots can be accessed from the front word concordance.
- Middle change words can be accessed from the front word concordance.
- Synonym lists.
- Indo-European-Root lists.
- Prefix lists.
- Stem lists.

2 Discussion

2.1 Purpose of this research

There was no English-Japanese web dictionary using Indo-European-Roots until now, but I do not know about Indo-European-Root. While studying Indo-European-Roots, I used an Indo-European-Root based English-Japanese hyper dictionary. As stated in section [1.2.2], one can learn English words efficiently by using Indo-European-roots. But there is no English learning web-application using Indo-European-Roots, so research to learn English web application using Indo-European-Roots is needed.

2.2 About using some technology for research

The technology of this Web-application is introduced next.

OS	RedHat 7.3J
Java Environment	J2SDK 1.4.1-01
Servlet Container	Tomcat 4.0.6
RDB Server	MySQL 3.23.49
JDBC Driver	mm.mysql

Table 1: Technology of web-application.

2.2.1 About servlet

Servlet is one type of the ServerSide Java technology and has the same ability as Common Gateway Interface(CGI). First, Servlet reads data from the form tags of a web page or Java applet. It is possible to learn about a browser's ability and type, information about cookies, as well as client user data. Second, the Servlet processes these data. The result is created by HTML. Finally, Servlet sends HTML to the client and the result is shown in the browser.

2.2.2 About JSP

Using Servlet, HTML must be written in source code, so the programmer has to compile all source code if he/she wants to slightly change the HTML code. In order to make up for the Servlet's weak points, JSP was created. JSP has the following characteristics:

- Using JSP with Servlet, a programmer can use both static and dynamic HTML.
- JSP is basically written in HTML. Java source code is written in tags called Scriptlet.
- If JSP is called by Servlet, the source is compiled. Then, JSP obtains the data and creates HTML.

2.2.3 About MySQL

MySQL is a free Relational DataBase (RDB) server, that has a simple function. The search speed of MySQL is the faster than that of any other RDB server. MySQL adopts GNU General Public License.

2.2.4 About JDBC

JDBC (Java database Connectivity) is developed by JavaSoft.com. It is necessary for connecting MySQL, JSP and Servlet. API (Application Program Interface) can be used regardless of the kind of database in Java, and it is JDBC.

2.3 About web-application and purpose

2.3.1 Function of this web-application

We next explain the English word-study support tool using Indo-European-Roots information its function in this

section. First, this web-application has the following functions:

1. An Indo-European-Root is selected from 1,348 roots and a question is made automatically from it.
2. Question is displayed in 1-5 textboxes (2-1) and English words for a hint (2-2), and it displays some means (2-3).
3. This web-application user answers the question using examples from English words for hint (2-2) and some means (2-3), and moves to the next question.
4. After the user answers the question, it displays a sufficient answer (4-1) and a score (4-2). The user can check the sufficient answer (4-1) and score (4-2).

This function enables students to learn English more efficiently [Figure 3 & 4]. This web-application is evaluated by users highly, and the this learning method will be used widely. It is one of the purposes.

2.3.2 Characteristic of web-application

This web-application uses the database of the Hyper-dictionary, so if information of Hyper-dictionary is upgraded, the web-application is upgraded together.

But the original database for Hyper-dictionary has the following adverse effects:

1. There are no English words that can be randomly and automatically selected from Indo-European Roots of 1,358 roots in the hyper-dictionary database.
2. The Hyper-dictionary database has English words which have no meaning.
3. This web-application programs cannot discriminate when an English word has more than two meanings in the database of the hyper-dictionary.

In the case of 1 and 2, it is a problem for this web-application and hyper-dictionary too, these words were dropped from this web-application, so this trouble was solved. Case 3 is explained with following example. "fan" is entered in the database of the hyper-dictionary.

This a database, when "fan (1)" became a question in the web-application, "fan (1)" is the correct answer in textbox, but when "fan" is the wrong answer, it is cut "(1)" or "(2)" in this web-application, and it is solved.

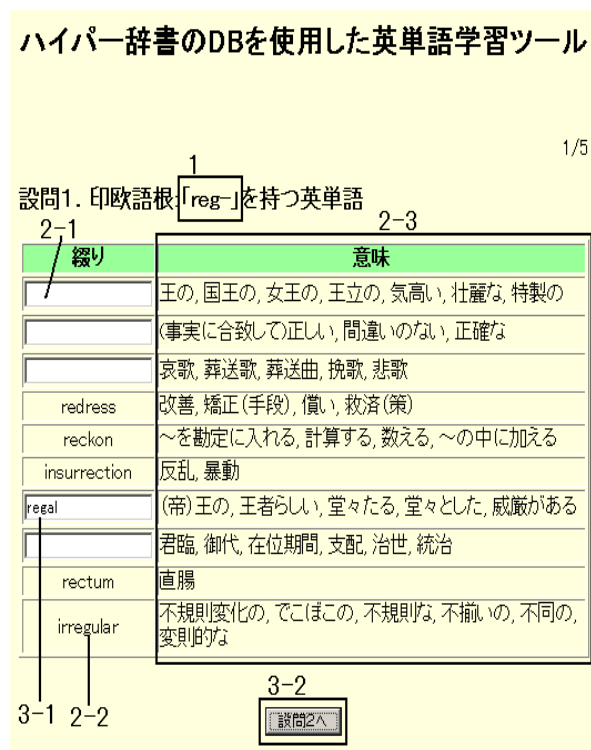


Figure 3: Exam page



Figure 4: Answer page

Spell	Mean
fan(1)	扇風機
fan(2)	ファン, ~狂

Table 2: fan

3 Conclusion

By developing a web-application, we learned programming technique of java and JSP, usability of a Indo-European-Root, and the making and design of web-application for this web-application users, and configuration of this web-application systems, etc.

By using the database of the Hyper-dictionary in web-application development, we could better understand the design of this database, its characteristic, and some issue points.

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