

RESEARCH ON THE USE OF ELECTRONIC DICTIONARIES FOR LANGUAGE LEARNING: METHODOLOGICAL CONSIDERATIONS

YUKIO TONO, MEIKAI UNIVERSITY, JAPAN
y.tono@meikai.ac.jp

INTRODUCTION

This paper summarizes the current issues in research on electronic dictionaries and their use in the context of second or foreign language learning/teaching and discusses the methodological issues. In order to do this, I will first set the scene by describing the complexities of dictionary use. Then I will examine the following three areas of research: (1) dictionary interface, (2) dictionary skills-training, and (3) effective use in language learning.

This paper addresses some key theoretical and methodological issues in these three areas, but is not intended to provide definitive answers to them. Rather, it aims to encourage more rigorous empirical research into these areas. I will also situate lexicographic research in the context of L2 (second language) vocabulary learning and acquisition, which will help in identifying some of the important hypotheses related to dictionary use in the L2 context.

1. COMPLEXITIES OF DICTIONARY USE

I have already shown elsewhere (Tono, 2001) that the process of dictionary use involves many different factors. Let me illustrate this point by situating dictionary use in the L2 acquisition context.

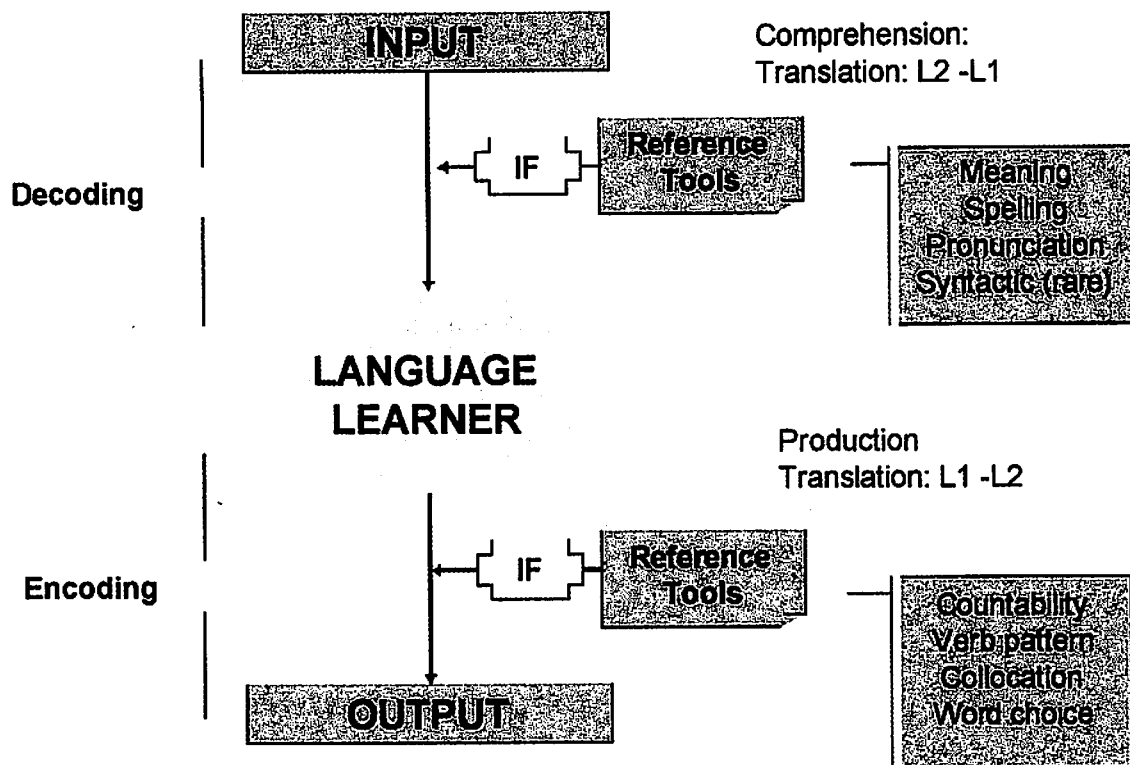


Figure 1: Context of dictionary use in L2 acquisition

Figure 1 shows this diagrammatically. If one wants to learn a second or foreign language, one has to have both input and output in that target language. Cognitively speaking, this process is equivalent to the processes of “decoding” and “encoding” respectively. The learner has to decode the message in order to process the input or “intake” structures or vocabulary. In order to be proficient in a language, however, it is not sufficient to be merely on the receiving end. The learner also needs to know how to produce output in the target language. This is the process of encoding the message he wants to communicate and producing the message in the target language.

This whole process (i.e. encoding and decoding) is done almost automatically if the learner focuses on the meaning or overall message in a spoken conversation. On the other hand, it will become a conscious cognitive process if the learner does the same task in reading or writing in an L2, although the automaticity of reading or writing skills varies depending on one’s proficiency level. This is usually where a reference tool such as a dictionary comes into play.

People need lexical support when they have great difficulty in processing the input or output while engaged in a task. Previous research shows that in

decoding activities the primary reason for looking up a word in a dictionary is to find the definition of a word. In other words, meaning is the information most frequently sought in decoding activities. Tono (1984) found that grammatical information (e.g. countability of a noun, verb patterns, etc.) in a dictionary is used not as a clue for finding the right meanings, but as a clue for rejecting wrong candidates. In contrast, in encoding activities, grammatical information such as countability or verb patterns is something which learners want most often in addition to more lexical information such as collocation or word choice.

2. LEARNER VARIABLES

This relationship between input and output in the language acquisition process and the role of reference media become more complex as we take into account additional factors: *learner variables*. Each individual learner has different cognitive as well as affective orientations, which makes language learning unique opportunities for each individual. If one wants to identify the effect of dictionary use in language learning, one has to be careful to examine the influence of cognitive factors, such as age or cognitive style. The age factor, for instance, plays an important role in the development of logical thinking (cf. Inhelder and Piaget, 1999), which is necessary for retrieving relevant information from a dictionary entry. Most studies conducted so far in dictionary user research have focused on university students. This is primarily because it is difficult for researchers to access younger subject groups, but there is also a hidden assumption that younger learners such as primary school children, for instance, should do manage their language learning without using a dictionary. This is a rather unfortunate assumption because there are no clear empirical findings concerning what level of learners do need a dictionary. Therefore, it would be desirable to conduct a study to examine the effect of age differences in the cognitive processing of dictionary information.

Another important cognitive factor is so-called "cognitive style". This includes such characteristics as holistic vs. analytical thinking or field dependence/independence. Holistic thinkers deal with the whole, not just parts, of something. In the case of dictionary users, holistic thinkers tend to understand the dictionary entry in its entirety. The same thing can be said about field-dependent learners. Field dependency refers to the characteristic of always

understanding something in relation to others. In contrast, field independent learners look at each phenomenon as something independent from the context. Thus they often understand things item by item, without taking the context into account. Such characteristics potentially play an important role in dictionary look-up, but not much research has been done yet to examine this.

Affective factors also affect the dictionary look-up. If a language teacher has a negative attitude toward dictionary use for developing reading skills, her learners are likely to have fewer chances to use dictionaries. Likewise, if a learner has a negative attitude toward the use of dictionaries in her self-learning environment, the amount of exposure to a dictionary will be significantly minimized. This is partly social in the sense that a particular socio-educational context forces a learner to have a particular belief toward a language or language learning, but this affective factor is also personal because one's attitude or motivation is multi-faceted.

3. INTERFACE ISSUES

What makes recent research on dictionary use in the L2 context more complicated is the fact that different types of sophisticated dictionary interfaces, especially those in an electronic format, have become very popular among users. A decade ago, we did not have to worry about this problem. We simply discussed the effects of microstructure in the paper formats of dictionaries. In the mid- and late 1990s, however, electronic versions of learner dictionaries started to appear in the market. At first, most of these were just electronic analogues of the paper dictionaries: information was simply transferred from paper to the electronic format without changing the layout very much. Later on, different types of interfaces were invented and new search methods and functions were introduced which have drastically changed the nature of electronic dictionaries.

Let me briefly summarize the major types of electronic dictionary interfaces below:

(a) Regular format

This usually provides the interface where information is displayed in mostly the same manner as in the paper dictionary. The CD-ROM versions of such dictionaries as *Cambridge Advanced Learner's Dictionary* and *Cambridge*

Learner's Dictionary can be classified as belonging to this type. These dictionaries usually have sophisticated search functions while the layout of the microstructure itself remains simple. See Figure 2 for an example.

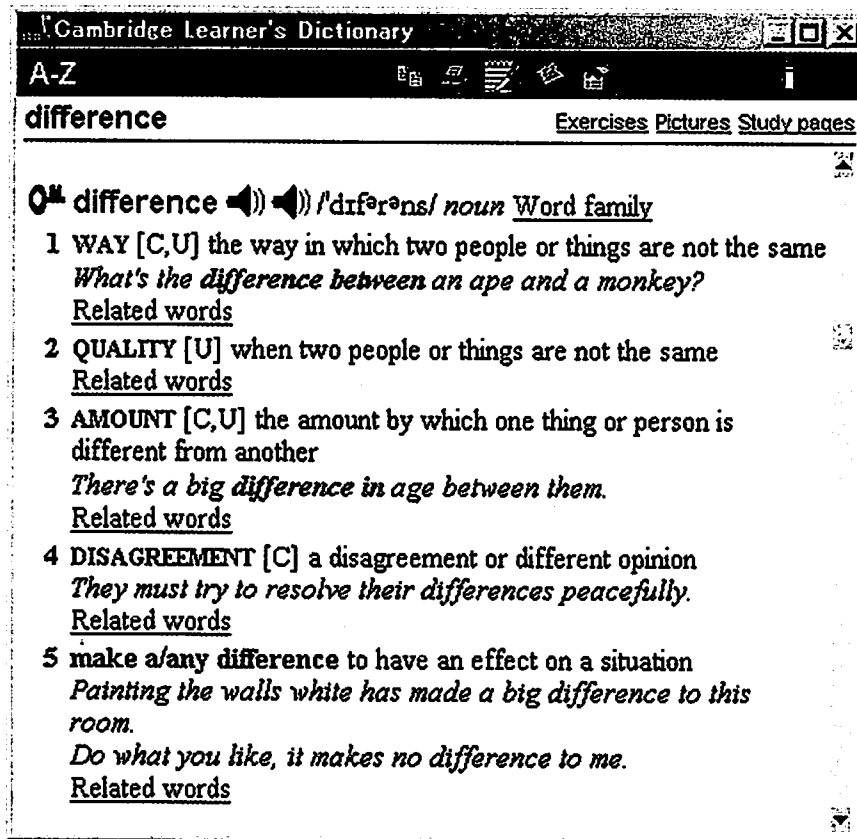


Figure 2: Regular format (CLD1)

(b) Hyperlink format

A second type of interface has the main entry page hyperlinked to other related information such as extra examples, usage notes, and so on. The third edition of the *Longman Dictionary of Contemporary English* belongs to this category (see Figure 3).

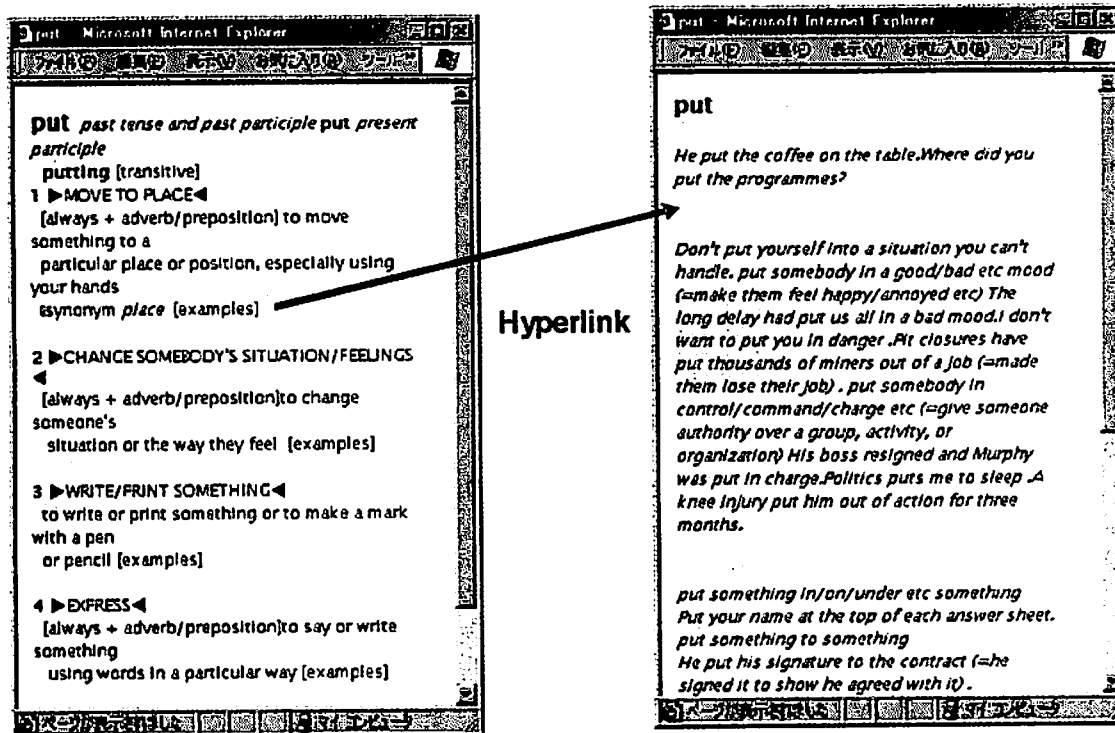


Figure 3: Hyperlink format (LDOCE3)

(c) Pop-up mode interface

Many recent versions of electronic dictionaries (e.g. *MED*, *LDOCE3/4*, *CALD*, *Babylon*) have both regular format and pop-up mode interfaces. With the pop-up mode interface, people do not have to keep the dictionary window open all the time. They can select the word they want to search while reading the text or the web page, and activate the dictionary with a combination of keys. A small dictionary window will pop up to give the meaning of the selected item. Figure 4 illustrates this process.

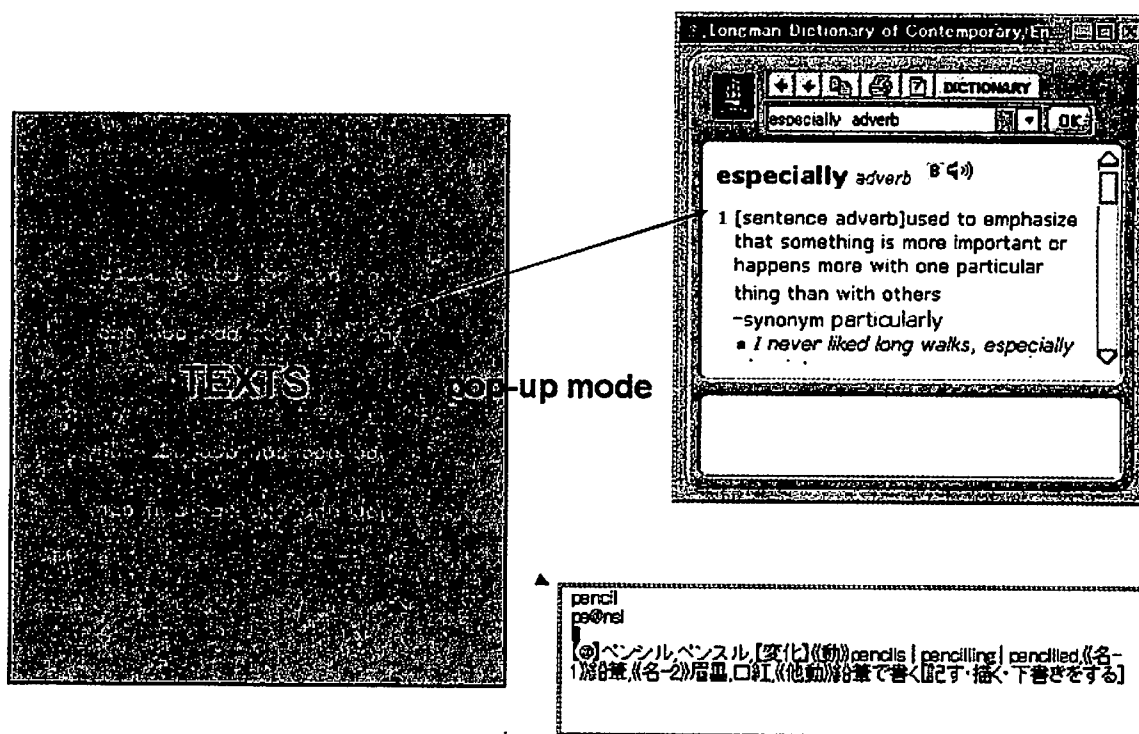


Figure 4: Pop-up mode interface (LDOCE3)

(d) Parallel format

The one-to-one parallel format has been increasingly popular in Japan. A project called “Electronic Dictionary Project”, composed of a group of professional translators, has created an electronic translation resource which the group continually updates. What they have done is to list all the important words and phrases that they previously translated in an English-to-Japanese parallel format. Their database *Eijiro* has more than 1.2 million items (not exactly entries), and includes various lexical items ranging from regular words, collocations, lexical chunks, and proverbs to proper nouns and compounds. Figure 5 shows the interface of *Eijiro*.

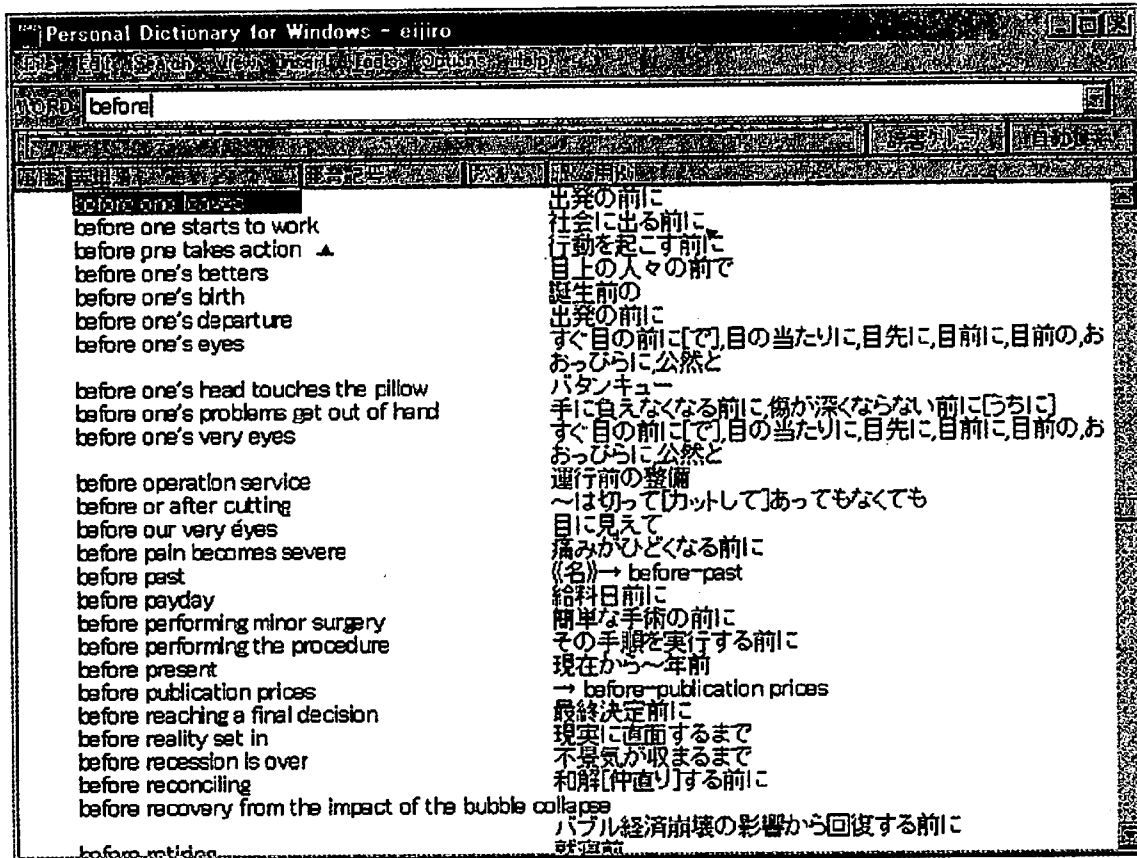


Figure 5: Parallel format (Eijiro)

(e) Pocket e-dictionaries

Another popular genre of the electronic dictionary is the so-called “pocket e-dictionary”. Electronic appliance manufacturers such as Casio, Seiko and Sharp have been producing various types of hand-held electronic dictionaries since the mid-1990s. Seiko SR-T6500, for instance, weighs 210 grams, and its dimensions are 137mm (W) x 88mm (D) x 15.4mm (H). This small e-device contains nine dictionaries. What is amazing is that most of these dictionaries are unabridged versions. The *Kojien Japanese Dictionary*, for instance, contains 230,000 entries. The four English dictionaries have a similarly large number of entries: *Kenkyusha's English-Japanese Dictionary for the General Readers* (270,000 entries), *An Encyclopedic Supplement to the Dictionary for the General Readers* (190,000 entries), *Collins COBUILD English Dictionary* (110,000 entries), and *Collins Compact Thesaurus* (300,000 entries).



Figure 6: Pocket e-dictionary (*Seiko SR-T6500*)

The interface is closely related to dictionary user's reference skills. Figure 7 illustrates that if an L2 learner as a dictionary user has good referencing skills, she would have no difficulty retrieving necessary information from the entry no matter what interface the dictionary has. Less skilled users, however, would face one problem or another in finding what they want in the entry. If the interface is designed in such a way that less skilled users can access the necessary information easily, the interface is then of major significance in predicting end-user experiences and outcomes.

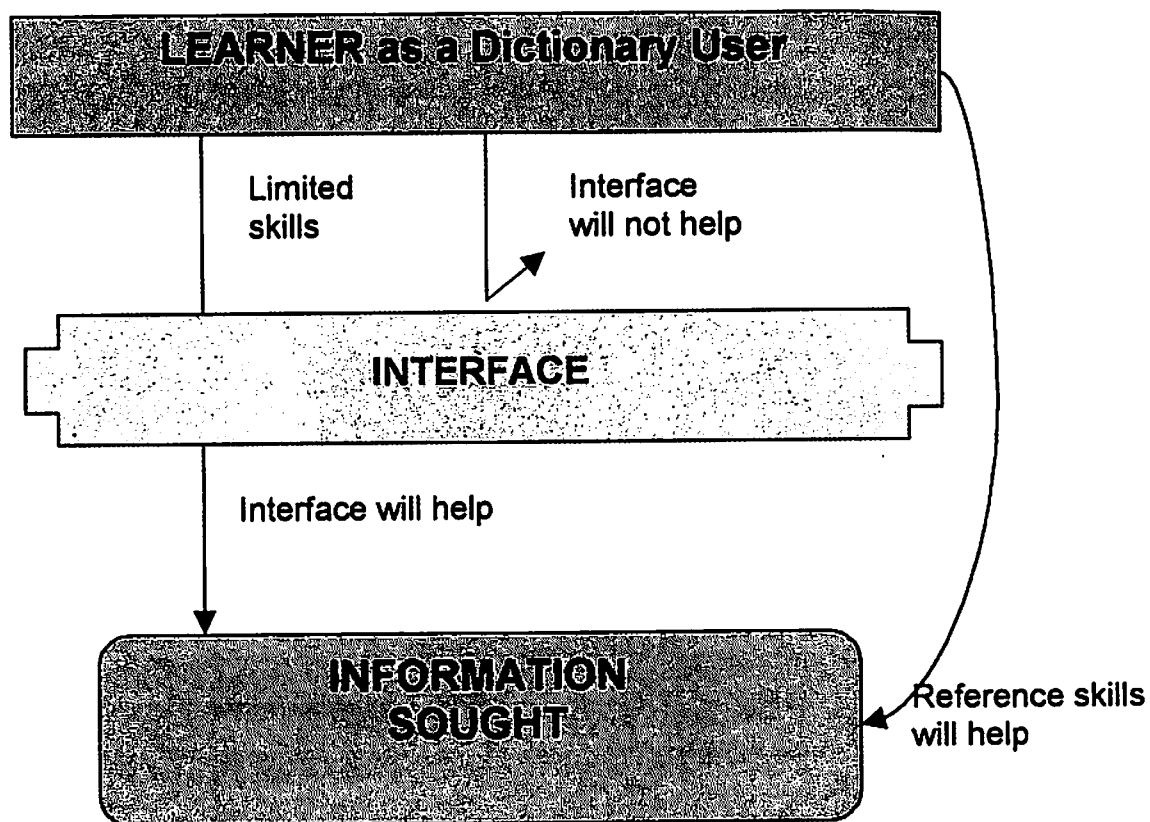


Figure 7: Dictionary interface and user's reference skills

I have done a series of empirical research on the effects of different dictionary interfaces on the look-up behavior of L2 learners of English. Research shows that users tend to look at the beginning of the entry only and that the menu of senses at the beginning of the entry should help users browse the contents (Tono, 1984). Tono (1992) examined the effects of the menu system on two groups with different dictionary skills. The study shows that the menu system works better for less skilled users, but no effects were found for more advanced users. In the same vein, Tono (1998) investigated the effects of signposts in LDOCE3 and guidewords in CIDE1. These are the keywords used to guide users toward the meaning they are looking for. The findings show that the terms used for signposts worked better in word association tests administered to the subjects, which suggests that the terms selected for signposts should be carefully chosen. Otherwise, it may confuse users more. Tono (2000) examined the effects of different electronic dictionary interfaces (paper, regular, hyperlinked and parallel). He found that the parallel interface outperformed the other interfaces (paper, traditional, hyperlinked) in the speed of retrieving target senses from the entries.

4. SKILL-TRAINING ISSUES

With such a variety of e-dictionary interfaces available, one might think that training in dictionary skills would be no more necessary in language teaching. This is not the case. It is certainly true that the electronic dictionary helps learners to access the entries more quickly and easily than paper dictionaries, especially in decoding activities, but it is at the microstructure level that learners really need to know how to retrieve the information they need. In the microstructure of the entry, dictionaries still have their own conventions such as using grammatical codes, listing incomplete phrases as well as complete sentence examples, highlighting certain usage points in boxes, among others. Users should be aware of the features as well as the conventions used in particular e-dictionaries. Otherwise, it would be almost as hard to get the right information out of e-dictionaries as is the case with paper dictionaries.

In encoding activities, users also have difficulty in, for example, choosing the right words, choosing the right collocations for a given word, and using the word grammatically. There are still very few dictionaries that have been designed for production (as opposed to receptive) purposes. Such dictionaries as *Longman Language Activator* or *Oxford Wordfinder Dictionary* are useful, but the issue of dictionary training still remains, in order for students to take full advantage of these useful tools.

One of the conclusions Nesi (1994) drew in her PhD thesis was that overall productive success is unaffected by the presence or absence of examples. This is an interesting, but rather counter-intuitive claim. Do illustrative examples not play any role in a dictionary for encoding purposes? Is it simply a matter of the lack of proper training in learning from examples? This type of empirical question has to be examined in a longitudinal case study, where proper dictionary training has to be provided, along with a control group. In this type of research, it is important that reference skills should be operationally defined so that they can be differentiated from the L2 learner's "language proficiency".

5. EFFECTIVE USE ISSUES

My final point concerns the effective use of dictionaries in language learning. Until recently, research on dictionary use has been conducted quite independently from L2 vocabulary learning research. Recent growth of research papers in L2

vocabulary learning has led both groups sharing information and findings with each other. For instance, such occasions as the 34th IATEFL symposium on lexical reference media (speakers: Hilary Nesi, Michael Rundell, Anthony Bruton and Yukio Tono), the AILA-EURALEX symposium on Electronic Dictionaries in Second Language Comprehension and Acquisition at Euralex 2000 (speakers: Batia Laufer, Yukio Tono, Hiroaki Sato and Krista Varantola) and the special symposium on electronic dictionaries for language learning at AILA 2001 (speakers: Batia Laufer, Yuko Tono, Kazumi Aizawa and Alan Hunt) all indicate that interaction is now very common between researchers of dictionary use and those of L2 vocabulary acquisition.

Figure 8 illustrates current issues in L2 vocabulary learning research and the role of dictionaries. Research shows that there are two kinds of vocabulary learning: incidental and intentional. Incidental vocabulary learning is the process of learning vocabulary *incidentally* through extensive reading or listening: the L2 learner does not consciously set out to acquire vocabulary and the main focus is on the message. What role does a dictionary play in this particular type of learning? With a paper dictionary, learners are often reluctant to look up words because it takes too much time. The emergence of various electronic dictionaries has now made it possible for learners to look up words very quickly and easily. If learners can look up words in a dictionary without too much trouble, chances are that they will read more texts with ease, which might consequently lead to more input and thus more incidental learning. Therefore, hypothetically, the ease of looking up words in a dictionary could be a definite plus for incidental learning. No research has been done to empirically verify this yet.

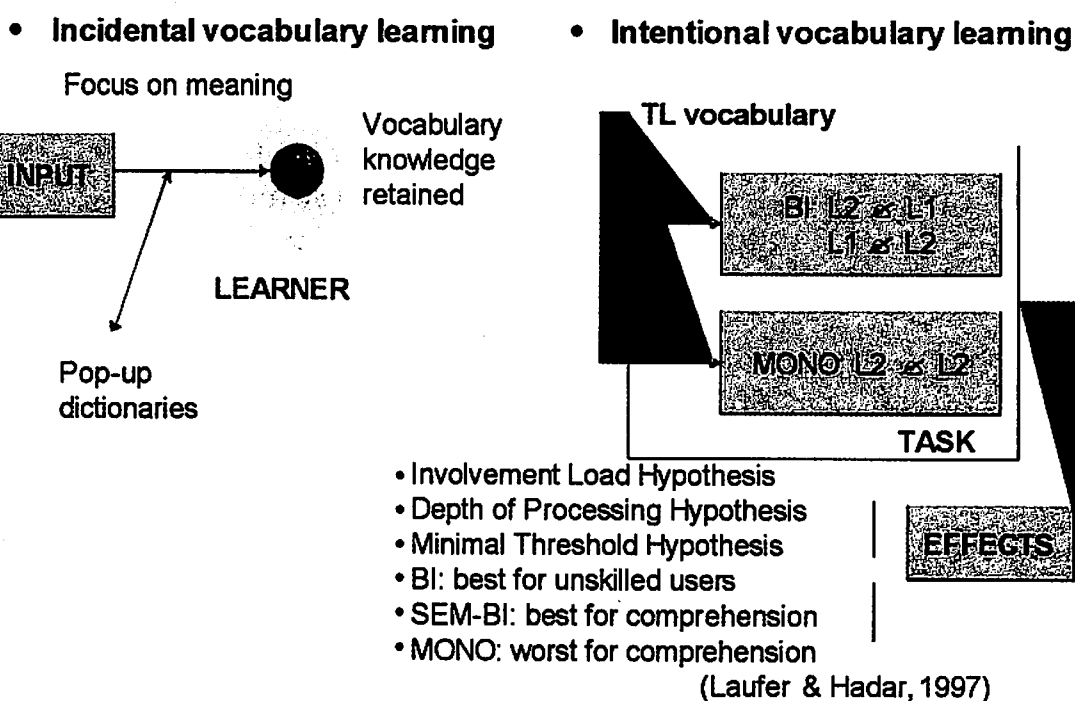


Figure 8: Vocabulary learning and dictionary use

Intentional vocabulary learning takes place when a person focuses on learning vocabulary through exercises designed to build up vocabulary. Research shows that while incidental learning does play a role in vocabulary acquisition, it is not very economical in that a lot of time and a lot of input are necessary to acquire only a small amount of vocabulary incidentally. Thus, people now believe that intentional vocabulary learning is indispensable. The issue then is how to implement this kind of learning. There are several interesting hypotheses proposed by Hulstijn, Laufer and their colleagues. For instance, the Depth of Processing Hypothesis (originally the notions described by Craik and Lockhart, 1972), which later was integrated into a new hypothesis, the Involvement Load Hypothesis (Laufer and Hulstijn, 2001; Hulstijn and Laufer, 2001), claims that a motivational-cognitive construct of *involvement* consists of three basic components: *need*, *search*, and *evaluation*. The need component is, according to them, the motivational, noncognitive dimension of involvement, which has two degrees of prominence: *moderate* and *strong*. Need is moderate when it is imposed by an external agent. Need is strong when it is intrinsically motivated, self-imposed by the learners (Hulstijn and Laufer, 2001: 543). Search and evaluation are the two cognitive dimensions of involvement, contingent upon allocating attention to form-meaning relationships. Search is the attempt to find

the meaning of an unknown L2 word or the attempt to find the L2 word for expressing a concept by consulting a dictionary or another authority. Evaluation entails a comparison of a given word or its meaning with other words or its other meanings. Dictionary use provides L2 learners with the opportunity to find out the meaning of an unknown L2 word and evaluate the search in context.

Hypotheses such as the above state explicitly the role of dictionaries in vocabulary learning, which will help meta-lexicographers working in the field of research on dictionary use put their work into perspective. More rigorous research into the role a dictionary plays in L2 vocabulary learning will be needed in the future.

6. ELECTRONIC DICTIONARIES: FUTURE PROSPECTS

In conclusion, I will discuss briefly what the prospects are for electronic dictionaries:

(a) Pocket e-dictionaries

Pocket e-dictionaries will contain the full contents of various types of dictionaries. Users will have more choice in terms of language, level of dictionaries, functions, and so on. Hardware specifications will also improve: higher resolution displays will be able to show more information, in full color, and users will be able to select or add more packages to their machine via the Internet.

(b) PC-based dictionaries

Web-dictionaries will become an integral part of the browser (e.g. Sleipnir). One-click pop-up dictionaries linked to Internet resources will be available free. Existing CD-ROM dictionaries (e.g. LDOCE4, MED, CALD) will become even more sophisticated, possibly to the point where they may become too sophisticated for novice learners to take full advantage of. Many of the functions of CD-ROM dictionaries will serve language teachers rather than learners. Thus more simplified interfaces will become popular again. Dictionaries will be closely linked to vocabulary learning tools (e.g. *Gakujiro*, with ALC SVL 12,000).

(c) Corpus resources as reference tools

Parallel corpora will become invaluable resources for translation and production activities. Using native corpora for pedagogical lexicography will reach the saturation stage, where all learner's dictionaries will be based on more specialized corpora such as learner corpora, ESP corpora, etc. The need for ever larger corpora will lead to more experiments in using the entire Web as a corpus. This will give rise to heated debates over the issues of what is authentic, or what is real English, and what is a balanced corpus, among others.

The future of electronic reference media looks very bright but dictionary researchers will have to tackle the same old questions in new guises. How do language learners as dictionary users process information in a dictionary? How does it relate to the entire process of decoding or encoding? What is the effect on L2 learning of accessing and retrieving information from a dictionary? How does the interface affect the look-up process? Electronic dictionaries hold great promise, but how they will aid L2 learning will depend a lot on how effectively learners can use them.

REFERENCES

- HULSTIJN, J. AND LAUFER, B. 2001. "Some empirical evidence for the involvement load hypothesis in vocabulary acquisition". *Language Learning*, 51: 539-558.
- INHELDER, B. AND PIAGET, J. 1999. *The Growth of Logical Thinking from Childhood to Adolescence: An Essay on the Construction of Formal Operational Structures* (International Library of Psychology). London: Routledge.
- LAUFER, B. AND HULSTIJN, J. H. 2001. "Incidental vocabulary acquisition in a second language: The construct of task-induced involvement". *Applied Linguistics*, 22: 1-26.
- LAUFER, B. AND HADAR, L. 1997. "Assessing the effectiveness of monolingual, bilingual and 'bilingualised' dictionaries". *The Modern Language Journal* 81 (2): 189-196.

- NESI, H. 1994. *The Use and Abuse of EFL Dictionaries: How Learners of English as a Foreign Language Read and Interpret Dictionary Entries*. Unpublished PhD thesis. University of Wales, Swansea.
- TONO, Y. 1984. *On the Dictionary User's Reference Skills*. Unpublished B.Ed. Dissertation. Tokyo Gakugei University.
- TONO, Y. 1992. "The effect of menus on EFL learners' look-up processes". *LEXIKOS 2* (1992): 229-253.
- TONO, Y. 1998. "Interacting with the users: dictionary user research". In T. MCCARTHUR AND I. KERNERMAN (eds.) *Dictionaries in Asia*, 97-118.
- TONO, Y. 2000. "On the effects of different types of electronic dictionary interfaces on L2 learners' reference behaviour in productive/receptive tasks". In HEID, U., EVERT, S., LEHMANN, E. AND ROHRER, C. (eds.) *Proceedings of the 9th EURALEX International Congress, EURALEX 2000*. Stuttgart: Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart, 855-862.
- TONO, Y. 2001. *Research on Dictionary Use in the Context of Foreign Language Learning*. (LEXICOGRAPHICA Series Maior 106) Tübingen: Max Niemeyer Verlag.