UWM Olsztyn Acta Neophilologica, XV (2), 2013
ISSN 1509-1619

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ENTRY-INTERNAL NAVIGATION IN DICTIONARIES: A REVIEW OF THE LITERATURE

Key words: dictionaries, paper dictionaries, electronic dictionaries, monolingual dictionaries, bilingual dictionaries, entry-internal navigation, sense navigation devices, menus, signposts

Introduction

One of the main difficulties that students of foreign languages encounter during dictionary consultation is finding the right sense in an entry. All too often, selecting the appropriate definition of the item in question becomes too great a burden when having to deal with highly polysemous words. In such cases, dictionary users choose the wrong senses and erroneously decipher word meanings. One reason for this phenomenon could be that language learners lack the basic dictionary reference skills. Another grave problem is that students tend to resort to a meticulous analysis of only the initial sense in an entry and fail to even browse through its remaining parts, despite the high probability that the information that is needed is located in the middle or end of the entry [Tono 1984]. This type of behavior could possibly be justified by the fact that students do not have enough motivation and time to look for whatever explanation it is they are searching for. Therefore, lexicographers attempted to tackle these problems by inventing menus and signposts with the aim of assisting dictionary users in entry navigation. Such devices were hoped to improve sense selection accuracy and speed up dictionary look-up.

The recent introduction of menus and signposts in dictionaries has led some dictionary compilers to consider their usefulness in entry consultation. Intuition suggests that both of these sense navigation devices ought to be beneficial to their users, however, not much evidence has been amassed in this field so far that would incontestably indicate that these sense-guiding elements influence the process

of dictionary look-up positively. Dictionary users value their time and accuracy when searching for a word's definition and, as a consequence, a scrupulous examination of the effectiveness of menus and signposts must not be neglected. Other dictionary entry features which may be crucial for language learners who consult dictionaries on a regular basis include types of grammar coding systems, ordering of senses within entries, linguistic form of signposts and even their typography. All these compelling issues have aroused interest within the lexicographic community and will continue to do so until firm evidence is compiled about which precise characteristics of a dictionary entry contribute to dictionary look-up success, and which elements require further adjustments.

The present paper is a review of nine studies that focus on entry-internal navigation in both monolingual and bilingual dictionaries. It has been divided into six main parts.

The paper commences ("Introduction") with the author referring to the central topics of discussion.

The first section ("Research on menus") elaborates on the research findings regarding menus. The studies discussed zero in on the effectiveness of menus in dictionaries and effect that the users' proficiency level may have on the efficacy of this specific sense navigation device [Tono 1992; Lew and Tokarek 2010].

The second section ("Research on signposts") is a thorough account of three studies testing the usefulness of signposts. The first study is a comparison of LDOCE3 (*Longman Dictionary of Contemporary English*) signposts and CIDE (*Cambridge International Dictionary of English*) guide words [Tono 1997]. The second study is an investigation of the existing similarities and differences among the guiding systems found in LDOCE3, OALD5 (*Oxford Advanced Learner's Dictionary of Current English*), COBUILD2 (*Collins Cobuild English Dictionary*) and CIDE, and it focuses on how longer dictionary entries are scanned by more advanced learners of English [Bogaards 1998]. The third study is an analysis of the effectiveness of LDOCE4 signposts [Lew and Pajkowska 2007].

The third section ("Research on menus and signposts") describes three studies concerning menus and signposts. The studies [Lew 2010; Nesi and Tan 2011; Tono 2011] aim at comparing both types of sense navigation devices with the intent of determining the more dominant system. Also, some of the results from eye-tracking research [Lew et al. 2013] on bilingual dictionary entries are touched upon on account of providing valuable insight into the subject.

The fourth section is a brief discussion ("Discussion") of the main topics covered in the paper.

Finally, the paper ends ("Summary and conclusion") with some concluding remarks.

1. Research on menus

Tono was one of the first researchers who attempted to investigate the effect of sense navigation devices on the process of dictionary use. He conducted an experiment with a view to focusing on menus in order to discover whether they may somehow influence dictionary consultation. To begin with, two groups of subjects representing a higher and lower English proficiency level participated in the study [Tono 1992: 242–243]. Fifty-seven students of law were assigned to the former group and approximately three times as many students from a Japanese junior high school were respectively treated as the less experienced with regard to language proficiency level. All of the participants of the study were asked to complete nine identical tasks (15-minute tests on the whole); each task consisting of a sentence in English and artificial word. The subjects were supposed to search for the meaning of those unknown words in the mini-dictionaries that they had received (some of the dictionaries were provided with menus, others were not) and decide on the appropriate sense that corresponded to the meaning of the word in the given context. In addition, the students were told to translate the sentences into Japanese, which was their native language.

As far as the subjects of the lower-level group are concerned, those who were provided with menus in dictionaries scored significantly higher in sense selection as opposed to the non-menu group [Tono 1992: 244–246]. In contrast, the recorded differences between the menu and non-menu conditions for higher-level students were not statistically significant. All things considered, there is every indication to suggest that menus are not useful sense navigation devices for more skillful students; nevertheless, they are very beneficial for less experienced language learners. Menus appear to be a form of compensation for the less proficient students' poor language skills and consequently enable them to perform on a similar level as the excelling students in certain tasks. Such data clearly demonstrate that menus ought to be taken into consideration in the design of dictionaries for users with a low command of a foreign language.

The first study that focused on measuring the effectiveness of entry menus as sense navigation devices in bilingual electronic dictionaries was carried out by Lew and Tokarek [2010: 193–197]. An electronic dictionary interface was created in three versions: (1) without menus, (2) with menus, and (3) with menus and highlighted senses. Ninety subjects (pre-intermediate and intermediate level) were recruited to complete twenty tasks based on Polish-English translation of target items used in their less known meanings. The items appeared in sentences in Polish, while in the English sentences there was a gap in the place of the item. The subjects were also provided with bilingual dictionary entries in the three different conditions mentioned above. Dictionary entries were divided into shorter (4–6 senses) and longer (7–12 senses) entries. The time needed for the subjects to complete the tasks was measured.

One study finding [Lew and Tokarek 2010: 198–201] is that menus with highlighted senses shorten the time needed for dictionary look-up. The subjects who were exposed to the menu and non-menu conditions had to search for information longer. As for proficiency level, the intermediate group needed less time than the pre-intermediate group to find the target senses when being assisted by menus with highlighted senses and when having access to bare entries (without menus). Surprisingly, it turned out that having menus alone (without highlighting) is only beneficial to students of a lower level, while for the more advanced subjects menus were a hindrance. Despite being obvious, it was found that it took the subjects more time to look for meanings in longer entries rather than in entries of 4–6 senses. This tendency did not depend in any way on the experimental dictionary versions employed in the study. Finally, menus with highlighted senses reduced the rate of translation errors made by both proficiency groups to a considerable degree. The intermediate group achieved better translation accuracy in the condition without menus; however, this advantage dwindled when both groups were assisted by menus. By and large, menus with highlighted senses are very useful guiding devices for increasing translation accuracy and minimizing the time when searching for information. The study findings also suggest that menus alone influence higher-level students' performance negatively.

2. Research on signposts

Another experiment of Tono [1997] on the subject of sense navigation devices focused on a comparison of LDOCE3 signposts and CIDE guide words ("guide word" is the term for the incarnation of signposts used in CIDE). The study consisted of two tasks: an example search test and word association test. In the first test, fifty example sentences were chosen from both dictionaries (half of the sentences were taken from LDOCE3, half from CIDE) and the performance of the subjects was timed on an illustrative example search task which varied with respect to condition: the occurrence or absence of signposts and guide words and length of the entries. LDOCE3 and CIDE entries with no guiding devices appeared in the first condition (A), CIDE entries with guide words and LDOCE3 entries without signposts occurred in the second condition (B), LDOCE3 entries with signposts and CIDE entries without guide words were used in the third condition (C), and there were both types of guiding devices in the next two conditions (D and E), but condition D consisted of shorter entries than condition E. The word association test, on the other hand, was about associating as many words as possible with a given keyword and writing them down on a piece of paper. The words associated were then compared with the words used in LDOCE3 signposts and CIDE guide words to see whether there was a correspondence of any kind. Eleven graduate students participated in the example search test and forty-six undergraduate students took the word association test (all were students at Tokyo Gakugei University).

One of the discoveries of the study [Tono 1997] was that the process of dictionary consultation was slower in CIDE than in LDOCE3. Dictionary look-up performance did not differ between LDOCE3 and CIDE for condition A (lack of signposts and guide words). As for conditions B, C and D, performance was much better for LDOCE3 (see paragraph above for more information). However, it must be pointed out that working on longer entries took the subjects (those provided with LDOCE3 signposts) more time to complete the tasks. On balance, one general implication could be that LDOCE3 signposts are more effective sense navigation devices than CIDE guide words, nevertheless, not necessarily when it comes to longer entries. Given the word association test results, it appears that the words the subjects associated with keywords were more alike to the words and phrases used in LDOCE3 signposts. Therefore, these observations clearly indicate that LDOCE3 signposts contain more useful and accurate information than CIDE guide words.

The aim of Bogaards's study [1998: 555–559] was to carefully examine how long dictionary entries are scanned by more proficient learners of English. Fifty-four Dutch pre-university students who had been learning English for about seven years participated in the experiment. Every subject was instructed to complete twenty tasks. Each task consisted of a sentence in English with the target item underlined, its Dutch equivalent (sentence in Dutch) with a blank line which corresponded to the underlined target item in the English sentence and a dictionary entry underneath the sentences. The subjects were asked to underline in the dictionary entry the information needed for the translation of the target item, write down the time required for task completion and translate the target word into Dutch (translations were marked as either "correct", "nearly correct" or "incorrect"). In general, four test versions were applied. The twenty items were divided into four groups and the dictionary entries for each group were copied from either LDOCE3, OALD5, COBUILD2 or CIDE, depending on the specific test version that was used. When the test was finished the subjects were asked a few questions, for example, about individual dictionary preferences.

Several inferences were made once the data were collected and analyzed [Bogaards 1998: 558–561]. To begin with, "semantic guiding principles seem superior to access structures without clear guiding principles, and also better, but to a lesser degree, than access structures which are based on grammar" [Bogaards 1998: 561]. LDOCE3 and CIDE turned out to be the most effective in respect of entry consultation time and selection of appropriate information in dictionary entries. COBUILD2 (access structures heavily rely on grammar) was in third place, however, OALD5 (most vague guiding principles out of all four dictionaries) gave the worst results. The subjects who later openly expressed their opinions confirmed these findings. Approximately 50% of them liked CIDE most, whereas just a fraction over 2% of the students opted for OALD5. Furthermore, Bogaards noticed that searching for information in a dictionary is not always a very meticulous

process. Put another way, "[d]ictionary users like to take shortcuts and make use of search strategies which take them as fast as possible to the information they need" [Bogaards 1998: 561].

Lew and Pajkowska [2007: 235–241] endeavored to measure the effectiveness of LDOCE4 signposts with regard to the length of dictionary entries, proficiency level of subjects, duration of dictionary look-up, translation accuracy and sense selection accuracy. Fifty-one high school students participated in the experiment (twenty pre-intermediate, thirty-one intermediate). Each single test consisted of ten items. Every task had a sentence in English with an underlined target item and a Polish equivalent of that sentence with a blank line (to be completed by the subject) which corresponded to the target item in English. A dictionary entry was always located below the sentences. The subjects were told to translate the English target item into Polish and underline the information from the dictionary entry that was required for the translation. Significantly, the selection of the less common target items was done deliberately by the researchers. Moreover, half of the items in a test constituted short entries (no more than four senses) and the other half long entries (no more than ten senses). Approximately half of the subjects were exposed to the signpost condition, while the rest had to manage to complete the tasks without any guiding devices. Every single task of every subject was timed.

First of all [Lew and Pajkowska 2007: 241–249], it took the subjects less time to find the appropriate information for translation in dictionary entries when working with signposts. The difference was not statistically significant, but the size effect was considerable. Further, it was noted that signposts are equally useful for both the pre-intermediate and intermediate groups of students. Strikingly, no difference was recorded when signposts were applied in either longer or shorter entries. Nonetheless, some of the data demonstrate that it is most likely that less proficient students get more assistance from signposts in shorter entries, whereas the proficient students in longer entries. Notwithstanding better translation results of the intermediate students when being supported by signposts, the findings raise doubts about whether translation accuracy is affected by the presence of signposts. Likewise, it seems that sense selection accuracy was not influenced by signposts which once again brings into question the benefits of sense navigation devices in dictionaries. Peculiarly, the pre-intermediate students unexpectedly performed better than the intermediate group in sense selection tasks. On the whole, this does not mean that the theory of the usefulness of signposts ought to be debunked. Instead, more experiments need to be conducted and larger samples used.

3. Research on menus and signposts

Lew's study [2010: 1121–1123] aimed to compare the menu and signpost systems in a monolingual dictionary. The ninety subjects who took part in the study were grouped into levels A2 and B1 (Common European Framework of Reference for Languages). The participants were provided with two sentences on each page of the test: one in English and one in Polish. The English sentences contained a target item occurring in a less known sense, while the Polish sentences were incomplete translations of the English sentences. The Polish sentences had gaps which corresponded to the target items that were to be translated into Polish. The subjects were also provided with dictionary entries of the target items which either appeared with menus or shortcuts (the term for the incarnation of signposts used in OALD7, in the dictionary spelled as "short cuts"). The lexicographic data in the dictionary entries were taken from OALD7. Each test consisted of six target items that had to be translated. The subjects were also asked to underline the part of the dictionary entry that provided them with the information needed for translation. Importantly, the subjects were timed on their tasks.

As far as access time to target sense is concerned [Lew 2010: 1123–1127], there were no differences between the two tested conditions. The subjects needed almost the same amount of time for completing the tasks while working with either menus or shortcuts. On the contrary, shortcuts did turn out to be more effective than menus in relation to sense selection accuracy (this finding was not statistically significant, though) and translation accuracy. Furthermore, it was suggested by Lew that more attention should be devoted by researchers not only to the linguistic form of menus and signposts but also their typography and formatting.

In yet another study, Tono [2011: 124–129] applied the eye-tracking technique in order to accurately examine the processes of dictionary look-up. The eight subjects who took part in the study had been learning English for approximately six years in junior and senior high schools and for the purpose of the experiment were classified into two groups based on their proficiency levels: LOW and HIGH. The study primarily aimed to compare monolingual and bilingual dictionary entries, entry-initial and entry-final positions of target senses within dictionary entries and the usefulness of menus and signposts. The moderator variables in the eye-tracking experiment were the level of proficiency of subjects and look-up task success or failure. Conclusions were also drawn on the basis of the scan paths and cumulative fixation areas recorded by the eye tracker. As for the procedure, the subjects were asked to select the target sense of the word highlighted in red in the sentence provided. The information in the dictionary entries was manipulated in accordance with the study variables. The tasks were formed out of microstructure entries designed for MAKE and FAST, and the lexicographic content for this procedure was taken from LDOCE5 and MEDO (*Macmillan English Dictionary Online*).

The eye-tracking study [Tono 2011: 145–152] made a significant contribution to the field of dictionary use and entry navigation devices. First, dictionary consultation does not always result in finding the right meaning of a word. In spite of language learners not bringing back the appropriate information from a dictionary entry, the process of dictionary look-up still very much contributes to learning. Further, it appears that supporting devices such as signposts are mainly used by the more proficient students, whereas for the less advanced ones they are of little significance due to the students' lack of knowledge of what their function is. Other implications include ideas that some signposts tend to be similar in a number of ways (same association with a certain word or concept, similar words used etc.) and, as a consequence, may be misleading. Finally, signposts may sometimes also be too abstract. Importantly, Tono's data in the eye-tracking study support his claims from previous research [Tono 1992] that menus are useful tools for dictionary look-up procedures for students representing a lower level of language proficiency. The more proficient subjects from the eye-tracking experiment did not really use menus. In addition, a scrupulous scan path and fixation point observation revealed that dictionary look-up success or failure did not generally depend on the occurrence of either a monolingual or bilingual interface. It was rather the complexity of lexical information that led to retrieving information faster or slower and correctly or incorrectly. Noticeably, bilingual dictionary entries did increase the likelihood of correct sense selection in cases when the information needed was placed at the beginning of an entry; in contrast, the same could not be said about information that was located at the middle or end of a bilingual dictionary entry. It was also discovered that dictionary users have a tendency to disregard grammar codes. This finding does not necessarily indicate that grammatical information in dictionary entries is superfluous, but the fact that grammar coding systems should be as transparent as possible ought to be taken into consideration.

It seems that using eye-tracking technology in dictionary use research may soon become a popular trend. Some researchers have obviously been encouraged by the promising advantages that eye movement recording has to offer. A recent study of Lew et al. [2013: 233], which tested university students on their ability to scan polysemous bilingual dictionary entries (lexicographic data taken from NKFD – *Nowy słownik Fundacji Kościuszkowskiej. The New Kościuszko Foundation Dictionary*, and PWNO – *Wielki słownik angielsko-polski, polsko-angielski PWN-Oxford*), appears to contain information relevant to sense guidance in general. One inference [Lew et al. 2013: 252] is that sense indicators play a major role in bilingual dictionaries on account of dictionary users directing approximately 20–25% of their attention to sense-guiding devices during consultation. Another conclusion stemming from the research clearly contradicts one of Tono's eye-tracking observations [2011]. Unexpectedly, sense indicators were used by both proficiency groups to practically the same extent. These varying results suggest that more such experiments are needed.

Nesi and Tan's study [2011: 81–84] gathered data from online tests of 124 subjects. The target items chosen for their design consisted of eighteen items (nine nouns, five adjectives and four verbs) selected from MED2 (*Macmillan English Dictionary for Advanced Learners*). Each test contained eighteen sentences in English with the target item underlined. The subjects were also provided with dictionary entries (lexicographic data taken from MED2) in the following experimental conditions: entries with signposts, entries with menus, entries with no guiding devices. All subjects were exposed to all three conditions; the same items appeared in every test in one of the conditions mentioned above. By and large, three test versions were applied. The subjects' task was to decide which particular sense in a dictionary entry best fits the meaning of a target item in the context given. The students' level of proficiency in English was determined on the basis of their MUET (Malaysian University Entrance Test) scores. The target senses of items (each item had five senses in the experiment) were senses 1–5, with each sense being the correct answer on at least three occasions. The time for each test item was measured.

The research [Nesi and Tan 2011: 85–91] confirmed the superiority of signposts and clearly indicated that the higher the proficiency level of subjects the higher the probability of matching the target items' meanings with the correct sense. In addition, the less proficient subjects found it more difficult to go about the tasks when not supported by signposting. However, neither signposts nor menus contributed to lowering the time required for entry consultation in comparison with the situation in which there was no access to any sense navigation devices. Significantly, Nesi and Tan's findings show that the subjects performed best with regard to sense selection accuracy and consultation time when target senses were located either at the beginning or end of an entry. Interestingly, the entry-final senses contributed more to task success and better time results rather than the entry-initial senses. Also, the data in the present study suggest that signposts may play an important role in aiding navigation through dictionary entries formed of five or less senses, which seems contradictory to the belief that guiding devices are supposed to assist dictionary users with longer entries.

4. Discussion

Whether any relation between the usefulness of sense navigation devices and proficiency level of dictionary users exists is one topic which requires attention. So far the available evidence has pointed to the fact that students representing higher proficiency language levels do not necessarily benefit from menus to the same degree as those who are still at the early stages of their learning process. It goes without saying that less advanced learners need some sort of assistance when consulting the meaning of a given word in a dictionary due to their lack of

experience and knowledge of vocabulary or grammar in the target language. However, it seems highly probable that more proficient users need guiding systems during dictionary look-up almost as much as the less competent students. The purpose of inserting menus in dictionaries is to allow users faster entry navigation and correct sense selection or translation; hence, by no means can menus be a hindrance, as their role is to enhance performance rather than reduce it. Put another way, any kind of simplification of the dictionary look-up process is more advantageous than having to deal with no sense navigation devices at all. Language learners require menus or signposts in entries irrespective of their level of command of the target language. Recent eye-tracking research [Lew et al. 2013] appears to confirm this view. There is no doubt that only after a detailed investigation of the matter discussed above can the role of specific guiding devices in relation to the level of language mastery become less vague.

The misleading nature of signposts is an additional issue which remains unresolved. Tono [2011] reached the conclusion that signposts may tend to confuse learners, they can be too abstract and learners might associate them with the same concepts or words. This results in dictionary users finding it more difficult to select the right senses of words and, accordingly, bringing back the wrong meaning by choosing the wrong senses. The suggestions made by researchers that the linguistic form of signposts ought to be investigated is one way of approaching this problem and possibly achieving a solution in the long term. So far, the data of such research remain unknown or are not substantial enough, and as long as this is the case, lexicographers must rely on common sense and focus on making signposts as user-friendly and transparent as possible with regard to their relation to the headword.

Considering the positioning of target senses within entries, it appears that entry-initial and entry-final senses might be consulted most frequently by users. Unfortunately, it has not been established which target senses, whether those located at the beginning or end of an entry, serve a more facilitative function in sense selection and entry consultation time. Opinions differ and a definite consensus has not yet been reached. It is possible, though, that by finding the answer to this question lexicographers' universal practices in the process of dictionary entry design will be at least slightly modified.

Finally, resorting to eye-tracking research seems to be a step in the right direction for experimenters. The eye movement method has been gradually gaining more adherents in dictionary use over the recent years allowing lexicographers to analyze more closely what it is that subjects look at during entry consultation and for how long. Eye-tracking technology does indeed permit one to make a number of observations and enthralling conclusions, however, still the modest number of total subjects participating in such studies due to financial constraints obviously fall short of expectations. In order for it to become appropriate to generalize one's findings from eye-tracking research to the larger population, a solution leading to an increase in the number of participants in such studies must be found.

Summary and conclusion

A crucial discovery [Tono 1992] with respect to sense-guiding elements was that menus provide a marked degree of assistance to dictionary users, although only to those whose dictionary and language skills are poor. In addition, Tono [1997] arrived at the conclusion that LDOCE3 signposts are much more effective sense navigation devices than CIDE guide words. The LDOCE3 signpost system appears to be more efficient as it expedites entry consultation time and facilitates the process of finding pertinent information in an entry. However, Tono made it also clear that these remarks do not apply to longer dictionary entries where results turned out to be disadvantageous for LDOCE3 signposts. Tono's eye-tracking study [2011] substantiated his previous discovery [Tono 1992] that menus are useful sense navigation devices only for less skillful students. Other findings included:

- signposts are mainly used by more proficient language learners,
- more attention must be paid to the linguistic form of signposts,
- it is the complexity of lexical information that influences task look-up success or failure and not the monolingual or bilingual construction of a dictionary entry,
- dictionary users tend to omit grammar coding systems when searching for information in dictionary entries.

Nonetheless, a few of these observations must be treated with caution. Lew et al. [2013] found that sense-guiding elements in bilingual dictionaries are used equally frequently by both the more and less advanced students. This may imply that sense navigation devices in general should be an indispensable design feature of dictionaries for learners of English who represent different proficiency levels.

Bogaards [1998] came to the conclusion that semantically-based access structures are the most suitable in dictionaries. LDOCE3 signposts and CIDE guide words had the best results in Bogaards's experiment with regard to entry consultation time and selection of relevant information in entries. Importantly, even the subjects in the study (more than 2/3 of all the participants) chose LDOCE3 and CIDE as their first and second best options (out of four dictionaries).

Taking Lew's studies [Lew 2010; Lew and Pajkowska 2007; Lew and Tokarek 2010] into consideration, the data reveal various tendencies. According to Lew and Pajkowska [2007], the positive role of signposts on sense selection accuracy and translation accuracy is dubious. On the other hand, perhaps a larger sample in the study would have led to the reversal of the trend mentioned above. A favorable omen, though, might be that signposts shortened access time when searching for information in a dictionary entry and, interestingly, they were extremely useful for less proficient subjects in longer entries, whereas for the more advanced students signposts were beneficial when scanning shorter entries. As for the conclusions drawn from the study on electronic bilingual dictionaries [Lew and Tokarek 2010], the use of menus with highlighted senses in entries appears to be

very advantageous from the point of view of a dictionary user, but also proficient students of English tend to perform poorly when working with menus without sense highlighting. Finally, Lew [2010] infers from his research that both menus and shortcuts assist dictionary users to the same degree as far as entry consultation time is concerned, shortcuts outperform menus in relation to sense selection accuracy and translation accuracy, and lexicographers must start focusing on the linguistic form and typographical features of guiding devices.

Nesi and Tan [2011] report that users of dictionaries find it most convenient to correctly select the senses they are looking for when the senses are situated at the beginning or end of a dictionary entry. Given the two options, the senses that occupy entry-final positions are considered to be more beneficial. Further, it looks as if signposts are useful sense navigation devices for looking up shorter entries.

To summarize, dictionary-makers will hopefully delve into the subject in the near future by focusing their attention on sense navigation devices. Despite some negative results, the bulk of the available evidence suggests that sense-guiding elements play a major role in dictionary use for learners at all proficiency levels. Due to time constraints and sometimes lack of the knowledge required for efficient dictionary navigation, both menus and signposts undoubtedly aid dictionary users in finding the appropriate information to a considerable degree. To what extent they are useful, however, still remains a mystery. One important conclusion that could be deduced from the actual findings is that it is now the obligation of lexicographers to concentrate on making dictionaries as user-friendly as possible. Thus, more attention must be paid to issues such as: the linguistic form of sense cues, order of senses in dictionary entries, the decision of whether to employ or omit grammar codes etc. It is of utmost importance that the process of compiling dictionaries henceforth takes into account the needs of all types of dictionary users.

Bibliography

Dictionaries

CIDE = Procter, P. (ed.) (1995). *Cambridge International Dictionary of English*. Cambridge, Cambridge University Press.

COBUILD2 = Sinclair, J. (ed.) (1995). *Collins Cobuild English Dictionary*. 2nd edition. London, HarperCollins.

LDOCE3 = Summers, D. (ed.) (1995). *Longman Dictionary of Contemporary English.* 3rd edition. Harlow, Longman.

LDOCE4 = Summers, D. (ed.) (2003). *Longman Dictionary of Contemporary English.* 4th edition. Harlow, Longman.

LDOCE5 = Mayor, M. (ed.) (2009). *Longman Dictionary of Contemporary English.* 5th edition. London, Longman.

MED2 = Rundell, M. (ed.) (2007). *Macmillan English Dictionary for Advanced Learners.* 2nd edition. Oxford, Macmillan Education.

MEDO = *Macmillan English Dictionary Online*. Available on-line: <http://www.macmillan-dictionary.com>. Date of access: 15.01.2010.

NKFD = Fisiak, J., Adamska-Sałaciak, A., and Gąsiorowski, P. (eds.) (2003). *Nowy słownik Fundacji Kościuszkowskiej. The New Kościuszko Foundation Dictionary*. New York, The Kościuszko Foundation.
OALD5 = Crowther, J. (ed.) (1995). *Oxford Advanced Learner's Dictionary of Current English*. 5th edition. Oxford, Oxford University Press.
OALD7 = Wehmeier, S. (ed.) (2005). *Oxford Advanced Learner's Dictionary of Current English*. 7th edition. Oxford, Oxford University Press.
PWNO = Usiekniewicz, J. (ed.) (2002). *Wielki słownik angielsko-polski, polsko-angielski PWN-Oxford*. Warszawa, PWN.

Other references

Bogaards, P. (1998). *Scanning Long Entries in Learner's Dictionaries*. In: Th. Fontenelle, Ph. Hiligsmann, A. Michiels, A. Moulin and S. Theissen (eds.). *EURALEX'98 Actes/ Proceedings*. Liege, Université Départements d'Anglais et de Néerlandais, 555–563.
Lew, R. (2010). *Users Take Shortcuts: Navigating Dictionary Entries*. In: A. Dykstra and T. Schoonheim (eds.). *Proceedings of the XIV Euralex International Congress*. Ljouwert, Afűk, 1121–1132.
Lew, R., Grzelak, M., and Leszkowicz, M. (2013). *How Dictionary Users Choose Senses in Bilingual Dictionary Entries: An Eye-Tracking Study*, Lexikos 23, 228–254.
Lew, R., and Pajkowska, J. (2007). *The Effect of Signposts on Access Speed and Lookup Task Success in Long and Short Entries*. Horizontes de Lingüística Aplicada 6, 2, 235–252.
Lew, R., and Tokarek, P. (2010). *Entry Menus in Bilingual Electronic Dictionaries*. In: S. Granger and M. Paquot (eds.). *eLexicography in the 21st Century: New Challenges, New Applications*. Louvain-la-Neuve, Cahiers du CENTAL, 193–202.
Nesi, H., and Kim, H.T. (2011). *The Effect of Menus and Signposting on the Speed and Accuracy of Sense Selection*. International Journal of Lexicography 24, 1, 79–96.
Tono, Y. (1984). *On the Dictionary User's Reference Skills*. B.Ed. Thesis. Tokyo, Tokyo Gakugei University.
Tono, Y. (1992). *The Effect of Menus on EFL Learners' Look-up Processes*. Lexikos 2, 230–253.
Tono, Y. (1997). *Guide Word or Signpost? An Experimental Study on the Effect of Meaning Access Indexes in EFL Learners' Dictionaries*. English Studies 28, 55–77.
Tono, Y. (2011). *Application of Eye-Tracking in EFL Learners' Dictionary Look-up Process Research*. International Journal of Lexicography 24, 1, 124–153.

Summary

Entry-Internal Navigation in Dictionaries: A Review of the Literature

Selecting the correct sense in a polysemous entry may cause difficulty for language learners. Poor dictionary reference skills of users may account for the problems that students encounter in dictionary consultation. In addition, some dictionary users may have a tendency to consult the first sense of an entry and not the remaining senses [Tono 1984], although the information required for understanding the meaning of a word might be situated in the middle or end of an entry. For these reasons, lexicographers have started introducing sense navigation devices in dictionaries: menus and signposts. The main role of these devices is to assist dictionary users in entry consultation by helping them find the right meaning of a word as quickly as possible. The present paper is a review of nine empirical studies [Tono 1992,

1997, 2011; Bogaards 1998; Lew 2010; Lew et al. 2013; Lew and Pajkowska 2007; Lew and Tokarek 2010; Nesi and Tan 2011] focusing on the effectiveness of sense navigation devices in dictionaries. In general, the studies investigate how menus and signposts in dictionary entries affect sense selection accuracy and entry consultation time. Furthermore, observations are made regarding the effect of entry length and proficiency level of users on sense selection accuracy and entry consultation time in the context of menus and signposts. Also, menu and signpost systems are compared.