

## **WHAT CAN BE, BUT IS NOT (AND WHY), IN LEARNERS' MRDS**

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### **Abstract**

Modern Machine-Readable Dictionaries (MRDs) offer users an unprecedented richness of content and form, and gradually oust traditional paper-based word books out of existence. Despite the breathtaking developments of hard- and software, however, popular MRDs, especially those made for learners of foreign languages, are still deficient in a number of respects. Two of these are dealt with in this paper: (a) width and flexibility of user access to the riches of lexicographic content, and (b) the degree and (artificial) "intelligence" of user modelling and customisation. It is argued that the two deficiencies are not due to any inherent technological obstacles, but rather to the conservatism of dictionary makers and users (both learners and teachers). A few examples of functionalities "which could be, but are not" are provided in a hypothetical case study of EFL student Tom and his MRD.

### **Introduction**

Electronic dictionaries (computer dictionaries, machine-readable dictionaries – MRDs) are now commonplace in research, education, tourism and a number of other human pursuits around the globe. There are many reasons why they are gradually ousting traditional paper-based printed dictionaries from all these spheres and others: they are fast and convenient to use, they are up-to-date, they are small in terms of physical size (palmtops are portable), but large in terms of coverage, they are lavishly multimedialized with sound, photos, animations and video, they are often equipped with a suite of lexical exercises, games and frills of all kinds (e.g. personal notepads), and they are computer-based, a thrill for the novice, and a must for a guru. Additionally, some MRDs are partly authorable, mostly in that they offer some expansion facilities (but never allow actual editing of the firmware contents), and customizable in terms of some user interface options. They are also fashionable, and this factor of their popularity should not be taken lightly.

The variety of MRD types, hardware-, software- and content-wise is amazing. In terms of hardware, there are those on CD-ROMs to be used in ordinary PC workstations and notebooks; there are handheld devices, both dedicated MRDs and those integrated in a larger system, usually a downgraded implementation of Windows; and then there are the virtual

Internet dictionaries, with no physical carrier whatsoever (at least from the point of view of the user). Software-wise there are MRDs for all popular platforms: Windows, Mac, Unix (and especially Linux), and the remains of DOS. The client-host architecture, where the user's machine is just a terminal for a remotely located MRD, works not only for the Internet (www mostly), but also for a variety of intranet setups. Finally, and most interestingly from our point of view, the variety of lexicographic configurations reflects, and expands, that of traditional dictionaries. There are mono-, bi- and multi-lingual MRDs; there are those for native speakers and those for learners; there are "ordinary" dictionaries providing meanings for forms (semasiology) and thesauruses, doing the opposite (onomasiology); there are general dictionaries and special-purpose ones, and the latter can have coverage limited macrostructurally (e.g. a dictionary of fishing or acronyms) or microstructurally (e.g. an etymology, a pronunciation or a picture dictionary); there are MRDs with minimal content (word-lists) and those whose lexicographic and encyclopedic richness far supersedes that of large multi-volume traditional word-books. Hartmann (2001) has a readable and fairly comprehensive overview of the available plethora of lexical reference sources, with the unavoidable English focus.

With all this variety, coverage, multimediality, user-friendliness and on-line availability, one would be excused for thinking that contemporary MRDs have already reached a summit of functionality, with virtually (pardon the pun) no improvements possible. This is certainly the picture painted by reviewers of popular MRDs in computer magazines occupying at least one shelf in newsstands the world over. The gripes they do have, if they have any, relate to the absence of this or that lexical item from the entry list, some abstruse installation problems, one or two incorrect factual references, or the quality of the onboard multimedia.

And yet, there are crucial areas in MRD design where dramatic improvements are possible and necessary for the dictionaries to reach a vastly higher level of functionality than they have been on so far. The two areas which I will briefly sketch below, using a hypothetical case study, are (1) access flexibility and (2) user customization. The treatment is brief of necessity; interested readers are referred to my book on EFL MRDs ([Sobkowiak 1999](#)), from whose chapter 3 the following material is a revised excerpt. There, I develop the concept of a [Multi-Access Dictionary](#) (MAD), in which virtually all lexicographic content is available to the user for active query, and to the system for intelligent customization to the dynamically constructed profile of the user. These ideas are based not only in good pedagogical and lexicographic theory/practice, but also flow directly from a rather uncontroversial conception of linguistic data, as seen by computational linguists, a conception which is aptly encapsulated

in the following quote: "The data are multidimensional, so the computing environment must be able to attach many kinds of analysis and interpretation to a single datum. The data are highly integrated, so the computing environment must be able to store and follow associative links between related pieces of data" (Simons 1998:24; my emphasis – WS; see also <http://www.sil.org/computing/routledge/simons/summary.html>).

Surprising as it may sound in view of the above exhortations of MRDs, a fair proportion of the content of contemporary electronic dictionaries is treated as one-dimensional in Simons's sense, and hence its actual multidimensionality is not available to the user. The integrated nature of lexicographic data is at best seen in the option of hypertextual link from word X in the definition or example of an entry to entry X (not all MRDs offer this functionality). Thus, user's access to the wealth of the "multidimensional" and "integrated" linguistic and multimedia content of an MRD is typically highly restricted. Similarly, only the rather superficial customizing options are offered, such as, for example: (a) ignoring certain elements of the entry (micro)structure for screen display (e.g. phonetic transcription) or in full-text search (e.g. example sentences), (b) hiding certain word categories (e.g. compounds), (c) changing font size, style and colours, (d) manipulating toolbars, and the like. All these must be deliberately toggled by the user, with the system not even attempting a more intelligent approach to customization, which could capitalize on the observed exploitation by the user of the many dimensions and associative links inherent in the dictionary.

These deficiencies of MRD design are not due to any hardware shortcomings, of course. Nor is there lack of artificial intelligence, at least not the AI which could run the relatively simple user profile generator necessary to accomplish better MRD customization (see for example Bielawski & Lewand, 1991, Shapiro et al., 1992, Prat, 1994, Tarantowicz-Gasiewicz, 2000 and the references therein). The main causes why no innovative design of MRD is apparent (at least in the senses sketched above) appears to be the conservatism of dictionary makers and publishers on the one hand, and users on the other. These two types of conservatism are mutually reinforcing, of course: lexicographers claim that there is no demand for access-wise more powerful and flexible systems with built-in artificially intelligent customization; users can see no such dictionaries on the market, and are of necessity satisfied with what they have got. Realizing the hidden potential of a computer application takes a fair amount of practice, expertise and frustration with the unavailability of a useful functionality. And, as it turns out, there is very little MRD practice, at least in the Polish educational setting. In one questionnaire study only 26 out of 712 EFL students (3.6%) in all types of schools in Poland have ever used an EFL MRD (Lew, forthcoming; personal communication).

In a highly competitive market the questions of capital investment risk and return are also of paramount importance to MRD publishers, of course, even if they need not detain us here. Yet one more reason why no multi-access self-customizing MRDs are available may have to do with scarcity of (meta)lexicographic research in the field, both theoretical and empirical.

This short paper, as well as the book chapter on which it is based, is a modest attempt to suggest new areas for such research. The central part of it is a "case study" of a hypothetical Tom, a student of English as a foreign language (EFL) who is using his intelligent multi-access MRD every day. The context, in terms of some of the variables mentioned above, is thus: (a) intensive use of a learner's general mono/bilingual EFL MRD on an MS Windows platform, (b) intranet and Internet connection and full functionality, (c) educational institutional setting, further circumscribed to academic-level English philology studies. It is by looking at Tom's interaction with his dictionary that I will try to answer the question "what can be, but is not, in learners' MRDs".

### **1. MRD access and customization**

The maximally user-customized multiple-access dictionary will require a fair amount of artificial intelligence to organize a smooth interaction between the lexical database and the user. With so many access options built into the system it would be dysfunctional to query the user every time about the desired search criteria or settings. Some of these will of course be fixed as defaults, to be changed from appropriate configuration menus. Some others must indeed be user-input every time to ensure the retrieval of just the right information at the right time. But there are areas of MRD-user interaction where the dictionary can actually dynamically adapt to the changing needs and activities of the user which will be stored in his/her user profile file. Such adaptive systems were first prophesied in the eighties (e.g. Dodd, 1989, Jonassen, Mandl, 1989, Kay, 1991), and are now being gradually introduced in hypertext access software engineering, as is evident from the growing number of books (Brusilovsky, Kobsa, Vassileva, 1998), theses ([Bontcheva, 2001](#)), periodicals (*User Modeling and User-Adapted Interaction*) and conferences (flexible/adaptive hypertext/hypermedia workshops and conferences; for example in [May 2002, at the University of Málaga](#), Spain) devoted to this subject.

These developments - while being to quite a degree instigated by arguments and forces outside of the educational scene generally, and foreign language teaching and learning in particular - indirectly correspond to the contemporary learner-centred and learner-autonomy paradigms in language pedagogy. It is the learner who is supposed to formulate his/her own

educational needs and preferences, who must (in collaboration with the teacher) take the burden of designing his/her own syllabus and curriculum, of selecting his/her own learning resources and materials (including dictionaries), of fixing the short- and long-term didactic aims, of settling on the preferred learning strategies, of actively searching for information, explanation and advice, of self-evaluation and post-hoc analysis (see Wenden, Rubin, 1987, Nunan, 1988, O'Malley, Chamot, 1990, Wenden, 1991, Oxford, 1993, Rubin, Thompson, 1994, Reid, 1995, Tutor, 1996, Ely, Pease-Alvarez, 1996, Naiman et al., 1996, Benson, Voller, 1997). If such is the expectation of a (good) learner, computer-assisted foreign language resources should be adapted accordingly. Providing for maximum customization with quasi-intelligent computer assistance is one method of promoting learner autonomy.

There is hardly a limit of which data can be profitably stored and manipulated in the MRD user profile file. Age, sex, proficiency in the foreign language are obvious choices. To users who only need the MRD for ad-hoc translation from L2 the system would show a "different face" of the dictionary than to those who use it as a learning resource in acquiring new vocabulary. Those who mainly need the dictionary for encoding would see it differently from those who mostly decode. The pronunciation-oriented learners would have a Phonetic-Access Dictionary (PAD; Sobkowiak, 1994, 1998, 1999) in front of them, whereas those who need a dictionary for writing in a foreign language would have one which would focus on spelling and style analysis and correction. Those users who customarily refer to one variety of the foreign language, say American English, would have this variety foregrounded across different levels of dictionary content and use: spelling, pronunciation, grammar, stylistics, examples, realia, exercise module, etc. The system would keep a running log of the different circumstances of use to 'guess' what is the currently best MRD profile to present to the user.

In a flash of foresight, Dodd (1989: 92) sketched the following customizable elements in his "personal dictionary": "Each of the various styles of definition that are stored could be to the liking of a given user or group"; the "profile would cover everything from the choice of colours used to pick out different elements displayed, to the sorts of information proffered by the machine and the order in which they were presented"; "some would want etymology, history and evolution of words; others would actively avoid this". Between 1989 and now, other elements joined the customizable user profile thanks to the developments of computer technology and programming. The following is my own vision, suited to the needs of a prototypical Tom.

## **2. Tom and his MAD: a case study**

Tom is a first-year student of English as a foreign language in a neophilology department of a Polish university, a higher vocational school (*wyższa szkoła zawodowa*) or a teacher-training college. He is using the networked version of a customizable bilingual multi-access machine-readable dictionary of English for his work in preparing class assignments and in preparation for the practical English exam at the end of the semester. Most of the time he needs to look up difficult words which he finds in the assigned reading which comes from British magazines and newspapers as well as American literature readers and anthologies. From time to time he must write a narrative essay on an assigned topic. After a few sessions, Tom's user profile will start to adjust to his needs and preferences.

**First**, Tom is never interested in pronunciation so this aspect of lexical information is switched off. Words appear without phonetic transcription and the audio icon is hidden. Phonetic access functions (for example requesting words with a given number of syllables, or with a given stress, or containing specified sounds, or differing between British and American accents) are backgrounded, as are phonetic drills in the exercise module. The [phonetic difficulty index](#) (Sobkowiak, forthcoming), tagging each headword in the dictionary for pronunciation problems, is unplugged from the exercise module. Tom can, however, be alerted to the particularly high value of the index, if he wishes so (and sets the index threshold appropriately).

**Second**, as Tom is a highly advanced learner, some of the more common and "easy" senses of most lexical items are hidden or demoted to the bottom of the entry [1]. Tom is unlikely ever to look up the word-senses of words like *write*, *like*, *make*, *water* which are normally listed at the top of their entries. On the other hand, he may need senses such as: "to raise the par value of (issued capital stock) without a corresponding increase in the real value of assets" (28th sense of *water* in [Collins](#)) in reading the assigned [Economist](#) article, and he may need "any fluid secreted from the body, such as sweat, urine, or tears" (7th sense of *water* in Collins) to understand the graffiti inscribed on the table where he is currently working: *All is shit except water*. These senses will, then, be retained.

**Third**, a complex syntactico-semantic network will be in place to assist Tom in his essay writing: (a) comprehensive coverage of collocations [2] (not only *mistake* will be listed, but also its left- and right-hand collocates: *make a mistake*, *by mistake*, *serious mistake*, *mistakes creep in*, *mistakes abound*, *to mistake sb/sth for*), (b) easy listing of words falling into particular morphosyntactic categories or "parts of speech": non-ly adverbs, pluralia tantum, hyphenated vs. spaced compounds, etc., (c) prompts of useful lexico-semantic relations (see [Wordnet](#)), such as: antonyms (*mistake* ---> *accuracy*, *precision*), hypernyms (*mistake* --->

*failure, dog* ---> *canine*) or hyponyms (*mistake* --> *blunder, faux pas, goof, slip-up, oversight, typo*).

**Fourth**, because Tom has often opened the British and American "culture component" of the dictionary where he consulted some vocabulary entries of strictly contemporary relevance, e.g. *militant, molestation, cloning, Bin Laden, Euro*, this stratum of the dictionary will henceforth be highlighted: contemporary cultural items will be preferentially linked to the properly formatted (keyword-in-context concordanced) text-corpus and on-line multimedia evidence, their multiply conditioned frequencies will be displayed, and the vocabulary exercise module will grade them as especially desirable in constructing tests and exercises (plus many other adjustments, of course).

**Fifth**, the advanced L2-to-L1 decoding view of the MRD will be prioritized: only the monolingual English dictionary will appear as default, with no restriction on the [definition language](#) (Sobkowiak, Kuczynski, forthcoming) or presented grammar coding (Tom has rarely looked up words from the definition or part-of-speech and subcategorization codes). When Tom requests to see the encoding Polish-English view, *woda* will not be there (pending his decision to change the default), but there will be cross-references to *Euro* from *złoty, zjednoczony* and *waluta*.

**Sixth**, because Tom' special preoccupation is with British journealese and American literary language (which the system discovered from a number of sessions Tom had with it), this will be the bias of the lexical frequency data when Tom requests it. The figures will be taken from British contemporary press corpora on the one hand, and from the American prose of the period Tom has mainly consulted through the built-in encyclopedia and literature reader, on the other. Unless of course the targeted corpus turned out to be too small to generate reliable frequencies for the requested lexical items, or unless Tom wanted custom-weighted frequency figures, in which case the system would act accordingly.

**Seventh**, as Tom has not shown a special predilection for MRD multimedia elements in the past, the picture library option is dimmed and the [videos showing WTC blasts](#) and Bin Laden's TV releases are not linked to the headword *terrorism*, while the animation explaining AIDS infection is not connected to *HIV*. The recorded (or text-to-speech synthesized) audio accompanying the animation in the multimedia view is displayed as plain text instead. All this subject to deliberate override from Tom, of course.

**Eighth**, because Tom has checked the advanced exercise module option, each of the words he looks up is linked to a number of appropriate exercises. For example, *HIV* appears in a word-formation exercise on the Latinate forms with <o>-final prefixes (*immuno-*) as well as in an

irregular plurals exercise as a distractor (*virus* pluralizes regularly), and in an acronym deciphering exercise. Advanced level exercises are offered only, with little Polish involvement and no phonetics, but with an enhanced cultural content and a rich supply of mnemonic devices (imagery keywords, etc. [3], see Hulstijn 1997 for an overview), all of this according to Tom's profile.

**Ninth**, because Tom needs to make frequent notes about, and bookmarks to, the visited entries and MRD areas, this option is elaborated and always active: all searches take it into account, the notebook is interactively connected with Tom's favourite word-processing package and the Internet, the line drawings and sketches which Tom makes there can be converted into search keys, so that ☺ will retrieve *smiley* (among other hits), the word which he temporarily forgot, and whose Polish equivalent escaped him, too. Needless to say, entering search parameters such as "round and red on green background" will retrieve pictures and photographs of, among others: rose, cherry, tomato, beef patty, blood drop, ruby on green velvet, etc. (see, e.g. [Blobworld](#) or [Google's image search facilities](#)).

**Tenth**, if Tom ever needed on-line help, a text-oriented English-only facility would be activated, explaining the topic required in advanced English, with roughly the same amount of detail which Tom always requested from the dictionary in his past sessions with it. American English would be used for help because this is the option which Tom selected in his previous encounters with the help facility.

**Eleventh**, because the system is networked, Tom can access some statistics on dictionary use in his school as a whole (and beyond [4]). Other users' preferred choices and shortcuts can be accessed, so that he can indirectly learn from his colleagues how to put the dictionary to even better use. Indeed, the system itself will be able to gain from a variety of user profiles. If it discovers that 87% of all student users in the school prefer to have phonetic transcription placed after the English equivalent in a Polish-English encoding view of the dictionary, it will duly be placed there (this is the actual proportion obtained in my questionnaire study of 645 students; see Sobkowiak 1999, insert after p. 148). If it takes most users longer to locate entry senses when they are arranged by their etymology/chronology (as they are in [OED](#), for example), the system will reorder them by frequency of occurrence, or by whichever order which has proved empirically to ensure fastest lookup (with the current population of users).

**Twelfth...**

### 3. Why not?



Such MRDs do not exist yet. But the direction in which electronic lexicography is moving is exactly this: towards more content, more flexibility and customization, more user-friendliness, better access and more connectivity with other sources of knowledge, lexicographic and beyond.

If there is anything worrying in this generally optimistic picture, it is the tempo at which the changes are taking place. In his "after-cocktail fantasies" of 1984, David Crystal predicted voice-operated multimedia remote-access lexicopedias with some of the functionalities which are now standard in EFL MRDs, and some which are still not. His "ideal users in their ideal lexicographical world" would access their lexical database which

"is now available in electronic form, which their terminal allows them to access, and to which they can plug in one of several lexicographical computer games. If they wish to look something up, they have the option of referring to their lexicopaedias, or addressing the data base direct through their [voice-activated terminal](#). They know their access code words. [...] 'Meaning', 'Pronunciation', 'Usage', 'History', 'Picture', 'Spelling', 'Idioms', or whatever, as required — the information to be made available in sound, on screen or in print, depending on which mode selection they make" (Crystal 1986:79; my hyperlink -- WS).

Similar prophesies were made by many other lexicographers and media specialists at that time, which saw the beginning of the global computer network connectivity (e.g. McArthur, 1986: 174, 179). Ten years later, and two computer generations further down the line, in a skeptically titled paper of 1994, "Have we wasted our time?", Nancy Ide and Jean Véronis, two of the leading MRD lexicographers, prophesied that:

"future dictionaries will likely be very similar to linguistic workstations, and provide many of the same facilities [...] Computerization of dictionary-making at the semantic level could involve things such as the creation of explicit semantic links (hypernym, part, colour etc.) between words or entries in electronic (hypertextual) dictionaries with sophisticated navigation and query capabilities. Information could be linked to images and sounds, and displayed in template form; or ultimately, we could achieve real-time/on-line generation in natural language in any desired form (concise version, learner's version, full-blown version, etc.) from a common internal representation. The possibilities are endless" (Ide, Véronis, 1994: 1).

Eight years later, precious little of their vision has come true in popular marketed MRDs, or even in this paragon of all modernity, web-based dictionaries and encyclopedias. The problem

does not appear to be a lack of lexicographic or computational expertise and advanced technology. Rather, as it turns out, language education - native and foreign alike - is not yet ready to apply machine-readable dictionaries and encyclopedias on a large scale. The potential of electronic lexicography remains unexplored because educators and educatees see no place for multiple-access electronic dictionaries of radically innovative design in the process of language acquisition, be it in school [5] or at home. Sadly, this conclusion is not terribly revelatory either. In her 1995 paper on "Machine-readable dictionaries and education", Kegl agreed that "little in the way of progress has been made" since a large policy-charting conference on educational uses of word processors with dictionaries had been held thirteen years before (Kegl, 1995: 271). Her closing line also remains valid today: "the best future applications of MRDs in education will be those most able to respond to the insights and the needs of their users" (ibidem: 280). It is predominantly with users in mind that I have, in this paper, sketched the shape of things to come.

### Notes

1. Modern learner's dictionaries provide for an expanding window of proficiency: the more advanced the target user is the larger the dictionary will be. Yet, this is wasteful of space and resources because the learner will gradually "grow out of" some basic lexicographic information, which can, then, be deleted. I believe the right metaphor to apply here is a dynamically moving proficiency window, where the discarded information does not burden the dictionary. The issue deserves a separate discussion, of course. See Béjoint, 1994: 95-7, 153 and 186, Scholfield, 1997: 281 and Perry, 1997 for recent short appraisals of this idea. As early as 1984, Kipfer noticed that "it would probably be best if some words were presented in chronological order, others were presented in decreasing order of frequency, and still others presented by grouping basic meanings together into subcategories" (ibidem: 108).
2. Because "users may simply wish to know which word, or words, function at *one structural point* other than that of the headword consulted" (Cowie, 1999: 137). For ingenious ways to extract and access collocations in an ordinary general bilingual dictionary, see Fontenelle, 1997.
3. Building mnemonics into "teaching" dictionaries has been suggested a few times, for example by Nation, 1989: 69 or Scholfield (1997: 298): "...compiling L2>L1 bilingual dictionaries (or L1 specific monolingual dictionaries) with suggested keywords added to entries, so that when an item is looked up, a means of actually retaining the information is directly offered by the dictionary".
4. Compare this vision of Aust, Kelley, Roby (1993: 72): "Wide-area databases could then compile data on such variables as the most commonly looked-up words, which texts prompted the greatest number of consultations, and the percentage of consultations by part of speech. These data would assist educators in teaching reading and vocabulary more effectively...".
5. These trends extend more widely to any FLT computer use in a formal educational setting in Poland, as demonstrated in a number of empirical studies (see Sobkowiak, 2002).

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