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A Critical Review of the Theory of Lexicographical Functions

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1. Introduction

This paper is based upon an academic exchange of opinions, information, and critical comments between Professor Henning Bergenholtz, the Director of the Centre for Lexicography, Aarhus School of Business, University of Aarhus, Denmark and the present author. After the successful International Symposium on Lexicography, organized by the Centre for Lexicography at University of Aarhus in May 2008, I stayed in contact with the Centre to have further discussions on theory and practice in lexicography. The Centre for Lexicography is unique in the sense that they have developed a lexicographical theory, which is very theoretical in orientation, but, at the same time, very practical in actual applications. Henning Bergenholtz and Sven Tarp are the two primary figures who have developed the theory, called the “theory of lexicographical functions” (e.g. Bergenholtz and Tarp 2003), and I visited the Centre again in the summer of 2008 as an invited professor to discuss further details about their theory, as someone with experience in the field of dictionary user research (Tono 2001).

In the course of reading the papers by Bergenholtz and Tarp (2003, 2004), many questions arose as to their view about currently prevailing lexicographical practices as well as the approach that they have taken in their theory construction. I had a number of opportunities to present my views on user perspectives and a critical appraisal of the theory of lexicographical functions at the research meetings by the Centre staff. In response to my critical comments, Bergenholtz presented very inter-

esting counterarguments to the approach I have taken in my user studies. This led to a series of stimulating scientific discussions regarding the central issues of theory construction in lexicography and how user studies could possibly contribute to empirical validation of the theory. These activities gave us a growing awareness that more intensive theoretical discussions on various aspects of lexicographical practice are definitely needed.

This paper is an attempt to reproduce some of the discussions, but at the same time is an extension and further development. First, the theory of lexicographical functions will be briefly introduced. Then some of the fundamental questions about theory construction in lexicography will be raised, focusing on issues such as:

- (i) Do we really need a “theory”?
- (ii) Why bother to construct another theory of lexicography?
- (iii) Can lexicography be really an independent scientific discipline?

Thirdly, some methodological issues in dictionary user studies will be discussed. The basic approach of user studies will be presented together with Bergenholtz’s critical assessment regarding the outcomes of those studies and the need for more research focusing on user functions. Then I will discuss the nature of scientific inquiry and how user studies in lexicography should be conducted in light of this. Finally, comments will be made as to what steps should be taken in order to approach the construction of lexicographical theories from a much broader perspective, by taking into account what is happening in the real world and what dictionary users really need.

2. A theory of lexicography: a brief introduction

In this section, I will briefly outline the function theory developed mainly by Bergenholtz and Tarp (2003) during the last 15 years at the Centre for Lexicography, University of Aarhus. This integrated lexicographic theory, known as function theory, is characterised by a concept of user needs, where the needs, by definition, are related not only to a specific type of user, but also to the specific types of social situation

where this type of user may have a specific type of lexicographically relevant needs that may lead to a dictionary consultation (Bergenholtz and Tarp 2003). In this theory, dictionaries are considered utility tools conceived to satisfy specific types of human needs.

According to Bergenholtz and Tarp, function theory is not only applicable to what are frequently called general dictionaries, including learner's dictionaries, but also to every kind of specialised dictionary, including such lexicographic products as lexicons or encyclopaedias. Whatever methods and techniques are used in their conception, production and final presentation, they are all utility tools whose quality (i.e. usefulness) can be analysed and evaluated according to function theory.

The idea that dictionaries should be based on their users is actually not new. For instance, at the end of a classic conference on lexicography in the 1960s, Fred W. Householder made a famous recommendation that has been quoted repeatedly ever since, not least in English-language lexicography:

Dictionaries should be designed with a special set of users in mind and for their specific needs. (Householder 1967: 279)

Whilst it is hard to disagree with this recommendation, Bergenholtz claims that it lacks one vital factor that makes it difficult to use dictionaries in practice, and which therefore allows far too much latitude for subjective interpretations and preferences. That is, Bergenholtz believes that the needs of potential users are not clearly definable or circumscribable. No user has specific needs unless they are related to a specific type of situation. Consequently, it is not enough to define which types of user have which needs, but also the types of social situations in which these needs may arise. However, not all such situations are relevant for lexicography, only those in which the needs that may arise can be satisfied by consulting dictionaries.

It is claimed that this close relation between types of user, types of social situation and types of user need is the very nucleus of the lexicographic function theory. In this respect, a lexicographical function is defined as the satisfaction of the specific types of lexicographically rel-

evant needs that may arise in a specific type of potential user in a specific type of extra-lexicographical situation (Tarp 2008a). According to this definition, each type of user in combination with each type of user situation triggers off a separate lexicographic function.

A specific dictionary may have one, two or several such functions. In order to produce a high-quality dictionary — but also to review such a dictionary in a qualified way — they argue that it is not enough to discuss or look at the dictionary “in itself”, i.e. in terms of the data contained, access routes and overall design. If this discussion is not related to the ostensible or declared functions of the dictionary, it runs the risk of derailing and turning into some academic exercise that is not relevant to actual users.

Many theoretical contributions discussing user needs do not relate them to specific types of users with specific types of needs. In most cases, the needs are determined with reference to user research without taking into account the specific characteristics of each type of user. In this way, specific needs are overshadowed by the battle to the abstract needs.

In order to draw a lexicographically relevant profile of potential dictionary users, a number of criteria should be taken into account. The most basic criteria are the following:

- Mother tongue (Danish/Japanese/etc.)
- Mother tongue ability
- Foreign language
- Foreign language ability
- Ability in a specific LSP domain in their mother tongue
- Ability in a specific LSP domain in a foreign language
- General cultural knowledge
- Knowledge of culture in a specific foreign-language area
- Knowledge about a specific subject or science

Based on these criteria, which are the most important lexicographically relevant criteria, it is possible to draw up a user typology for each dictionary.

A similar method should be used in order to determine the lexico-

graphically relevant user situations, which are frequently called extra-lexicographic as they should be conceptually separate from the dictionary use situations. These use situations are traditionally divided into cognitive and communicative situations (although recently a third type of situation, the so-called operational situation, has been proposed, cf. Tarp 2008b). Cognitive situations refer to situations where the users for one or the other reason need to add to their existing knowledge, e.g. about a specific topic or a specific LSP, independently of a particular text, whereas communicative situations refer to situations where they have doubts or problems in a specific text-dependent context (Bergenholtz & Kaufmann 1997). There are various such communicative situations, of which the most important are:

- production of text in the mother tongue
- reception of text in the mother tongue
- production of text in a foreign language
- reception of text in a foreign language
- translation of text from the mother tongue into a foreign language
- translation of text from a foreign language into the mother tongue
- translation of text from one foreign language into another

In each of these seven types of user situation, a user with specific characteristics may have specific types of needs that can be met by consulting the lexicographic data contained in well-conceived dictionaries with easy access routes. In this way, the user needs, which are no longer defined as an abstractum, are the starting point that determines the data selection, access routes and the overall design of a given dictionary.

3. A theory of lexicography: speculations about its value

As I read the papers by Bergenholtz and Tarp about their theory of lexicographical functions, my first reaction was “Another theory?” and “Why bother?” There is an independent field “*metalexicography*” distinct from “lexicography”. The former is concerned with meta-research on the latter, which is practice of dictionary-making. My view is that

“lexicography” is not a science but the art and craft of dictionary-making, while “metalexicography” is an independent science, which has several subfields such as history of lexicography, general theory of lexicography, research on dictionary use, and criticism of dictionaries (Wiegand 1984). Some people (e.g. Hartmann and James 1998) do not like the term “metalexicography”, preferring instead to talk about *lexicographic practice* (dictionary making) and *lexicographic theory* (dictionary research).

The field of metalexicography or dictionary research, whatever you choose to call it, is certainly necessary. It is important to do research on how to make dictionaries, how people use dictionaries, and how dictionaries can be improved on the basis of such research. However, I was not fully convinced we should have a “set theory” of lexicography for a number of reasons. First, there are many dictionaries already available on the market, most of which, I assume, were not based upon any particular theory of lexicography. Of course, there are some systematic steps or procedures of dictionary making, but by and large their products are the results of such practical considerations and not at all the end results of any single, unified theory of lexicography. They still exist, however, and people seem to find them useful. Secondly, even though people do not generally rely on a particular theory of lexicography as they produce dictionaries, they do follow a set of guiding principles in dictionary making. As is well expressed in Atkins and Rundell (2008), we do have a set of procedures to produce dictionaries and is it not sufficient? This is partly due to the negative connotations of the term “theory” for some people and the wrong impression that it may give of the relationship between theory and dictionary-making. The word “theory” often implies that your approach is superior to others. It is not a hypothesis, but a theory, which can explain something about life or the world. In a sense, it is a very strong claim that you are making when you claim that you “have a theory,” because people usually never call for a theory in dictionary making after all. Also the word “theory” has more associative links with the hard sciences. A discipline such as lexicography is not considered a science by ordinary people,

thus it has no need of a theory. This is, in my opinion, rather a natural reaction toward the claim by Bergenholtz and Tarp.

It would also be interesting to ask whether it is necessary to claim that lexicography is an independent field of science. Whether or not a particular field of research is considered an independent field of science is mostly down to an individual researcher's point of view, since there are many subdivisions of science it is sometimes difficult to tell whether any one branch is independent or not. Some people feel that lexicography is a branch of applied linguistics. Many issues in lexicography are interrelated with other disciplines such as corpus linguistics, information sciences, language learning, and linguistics. Therefore, sometimes I feel it is more appropriate to study the role of dictionaries in each separate discipline, e.g. the use of corpora for dictionary making, the difference between dictionaries and search engines, the role of dictionaries in learning a foreign language, the refinement of linguistic descriptions in a dictionary based on current trends of linguistics and so on.

4. The value of constructing a theory

As we discussed the value of constructing a theory of lexicography in its own right, Bergenholtz pointed out a few important issues (Bergenholtz, personal communication). He said that, to him, as a university professor in a specialized field of lexicography, it is a matter of course to construct a theory in order to better understand his subject area. If your goal is simply to produce a dictionary for commercial purposes, you may not need a theory. You should be only concerned with practical considerations of how to produce it. However, if one wishes to do research in lexicography and consider it as an independent field of science, it would be definitely important to think about a theory and look at the phenomena from your theoretical perspective. Bergenholtz believes that whether you call that specialized field of research "metalexicography" or "dictionary research" does not really matter: it is more important to make a specific claim about a theory of lexicography and how to produce a dictionary.

While admitting the fact that there are many dictionaries in the real

world that were compiled without any explicit theoretical bases, Bergenholtz maintains that this should not be the reason for degrading the value of theory construction itself. Also he sees it from a slightly different viewpoint. First, many dictionaries were compiled based on certain guidelines or principles. He claims that some of the dictionaries have features which arguably stem from some kind of theory. For example, the first Danish monolingual dictionary was compiled by a Danish priest who had a very specific user situation in mind. The dictionary was first published in 1800, and the intended user group was young people whom he knew had serious reception problems in reading devotional literature. The subtitle of this dictionary gives a good description of its intended function: "*Dansk Glossarium—til at hjælpe de af Lægfolk tilrette, som gjerne gad læst en dansk Bog*" (*Danish Glossary — to help those laymen who would like to read a Danish book.*) (Leth 1800). With this user group and this text genre in mind and with the knowledge of certain reception problems, the priest came up with a description of the function of the dictionary. Every decision in the dictionary making process was made based on this function: in particular, lemma selection and the style and extension of the meaning items. Thus, in Bergenholtz's view, if dictionary-making is based on a very clear definition of target user profiles and user situations and very well-defined lexicographical functions in mind, such a work is highly theoretical even if it does not proclaim any particular theory behind it. Secondly, there are many dictionaries out in the real world, which have been produced by just following lexicographical traditions and conventions without seriously questioning the usefulness of the information they deal with. Bergenholtz believes that such lexicographical conventions need serious rethinking. For this purpose, he argues that we definitely need a theory such as his function theory in order to critically review the current products and shape the future of lexicography.

It is true that the theory of lexicographical functions (Bergenholtz and Tarp 2003) aims to be a very general, holistic theory of lexicography, overarching all the subfields of lexicography. In this sense, their theory is comparable to Wiegand's. The striking difference, however,

lies in the motivation for theory-building and the theoretical perspective regarding the role of lexicographical functions. In the view of Bergenholtz and Tarp (2003), the primary aim of theory construction is not to describe or systematically account for what has been done so far in the field but to construct a lexicographical theory to look ahead and produce something completely different and new for the future. This brings us to the distinction between *contemplative* and *transformative* theories (Tarp 2008b). Wiegand's theory is an example of a contemplative theory construction. A contemplative lexicography looks back on existing dictionaries, analyses the dictionaries and constructs a complete theory explaining the contents in those dictionaries. A transformative or generative lexicography will of course take current lexicographic traditions into account and try to build on existing dictionaries, but the real aim of their work is related to future dictionary-making and the construction of new concepts and theories based on a functionalistic view. Such new dictionaries could in part be similar to existing dictionaries, but normally they will not be, because they will usually be mono-functional or at least have a primary function and eventually one or more secondary or tertiary functions as well. They start from analysing user profiles, specific user situations and their needs, and decide which specific tools or dictionary functions should be developed to meet their needs sufficiently. The analysis of existing dictionaries also helps achieve this goal, but is not enough. A theoretical framework for lexicography should be clearly defined based on a function theory in order to produce lexicographical tools that can satisfy specific user needs. It is only through this kind of theory construction that new types of lexicographical tools can be imagined and developed. Therefore, their theory is looking ahead; it is a 'transformative' theory.

As I have argued earlier some people may react with "Not another theory!" Bergenholtz commented to me that it is quite natural that if one works in a certain disciplines of science, there are always more than a dozen theories. Sometimes they complement each other, sometimes they compete with each other. This is quite acceptable since they do not know for sure which one is the best. In many cases, theories are made

for small subsections of the field. In lexicography, there are many such detailed sub-theories (or principles or guidelines, depending on how you call them), but, in contrast, only a few *general* theories of lexicography, viz. those by Scerba (1940), Kromann et al. (1984), Wiegand (1998) and Bergenholtz and his colleagues. Thus they claim that their theory should be a welcome addition to the development of lexicography as a scientific discipline.

5. Theoretical positions of the function theory

In Bergenholtz and Tarp (2003), their primary concern is to refute some of the theoretical claims by Wiegand and make clear the differences between Wiegand's position and theirs. Both Wiegand and Bergenholtz and Tarp agreed that lexicography should stand as an independent discipline of science, but their theoretical foundations seem to be totally different. Bergenholtz and Tarp argue that the theory of lexicography must start from the careful analysis of situations and profiles of prospective users, which yield specific user needs, and that the function(s) of a dictionary should be determined accordingly. They criticized Wiegand because his theory was entirely dependent on existing dictionary typologies and linguistic criteria and was never based on user needs and dictionary functions. These arguments sound very convincing as far as comparisons with Wiegand's theory are concerned.

Bergenholtz and Tarp (2003) break down each user type and identify the needs for respective user type, and go on to determine the functions of a dictionary suitable for those needs. Here are some questions that may be asked:

- (a) Are they thinking about a different dictionary for a different function?
- (b) If so, how specific should each function be?
- (c) If poly- or multi-functional dictionaries are also acceptable, what are the criteria for deciding to make one dictionary mono-functional and another, multi-functional?
- (d) Since there are many different ways to profile user types and

situations, do they intend to be comprehensive or problem-oriented? If the latter is the case, is their theory going to determine the framework alone?

Since their theory is closely linked to user typologies and needs analysis, I think that my previous research on users should have a role in it, but what role? This is a truly important question, if we really need a theory and a theory has to be verified by empirical findings. There is a possibility that the theory developed by Bergenholtz and Tarp could be strengthened by user research like the ones I have done. Here, Bergenholtz cast doubt on the results of previous user studies, which led us to another round of debate.

6. How to define functions

I raised a few questions earlier about how to proceed with the decision-making process in terms of limiting the number of user functions, or whether a particular dictionary should be mono- or poly-functional, and so forth. Since their theory is mainly concerned with lexicographic functions, it would be ideal if each specific lexicographic function should be taken care of independently by a specific tool. There are a set of defining terms for describing user situations:

- Cognitive
- Communicative
- Operative
- Interpretive (Tarp 2008b)

The specification of individual user profiles and needs has to be dealt with in a specific theory of lexicographic functions. However, the above criteria will help to define a general framework, such as:

- Needs to solve knowledge problems about the history of Japan in the mother tongue
[cognitive] + [user profile: mother tongue/subject field]
- Needs to solve reception problems in reading newspaper texts in

the mother tongue

[communicative] + [user profile: mother tongue/subject field]

- Needs to know how to operate on a new machine in a foreign country
[operative] + [user profile: foreign language/subject field]
- Needs to know what a sign says in a foreign country
[interpretive] + [user profile: foreign language]

Bergenholtz and Tarp seem to be aware that sometimes having multiple functions may not be possible due to limitations of space or budget and a very practical decision must be made. One way to solve this problem is to design a dictionary in such a way that you give priority to the primary function and make it as complete as possible. It is possible to have other functions as well, but they are only of secondary importance. One cannot control target users too strictly. Moreover, there is always the chance of users using a tool with an intention totally different from its developer's, which cannot be helped (Bergenholtz, personal communication).

Such specific concerns, however, should not stop us from working out all the possible types and patterns of dictionaries for different user needs and functions. They claim that we first have to be freed from all sorts of practical considerations and start to think from scratch what kind of dictionary we can make when we focus on the user functions. Since this is a scientific endeavour, we need to distinguish what is theoretically possible from what is probable in actual situations. As Einstein once said, "To raise new questions, new possibilities, to regard old questions from a new angle, requires creative imagination and marks real advance in science." (Einstein and Infeld 1938, quoted in Tarp 2008c). This is why they emphasize *analysis* before *synthesis*.

7. Further thoughts on function theory

It is genuinely interesting to ask what an ideal receptive dictionary will look like and how it will be different from its productive counterpart. Function theory seems to aim at that sort of function-specific dictionary making. My next question would be, then, "Does it really make a dif-

ference?” According to function theory, the steps to producing a dictionary are as shown in Figure 1:

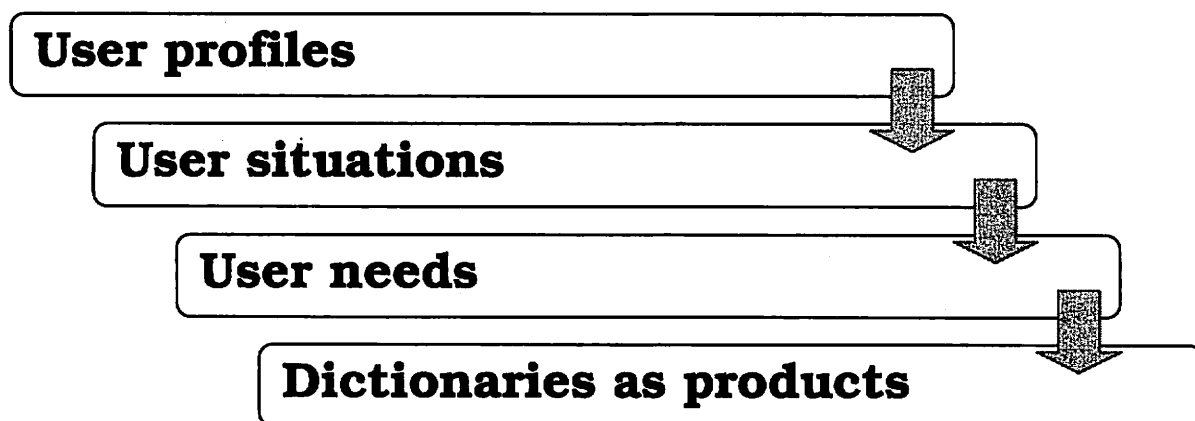


Figure 1: Steps to producing dictionaries (the function theory approach)

Function theory also defines clearly the classifications of dictionaries based upon user functions. Figure 2 illustrates the basic classifications. Lexicographical reference works should serve three major situations: (i) *communication*-orientated user situations, (ii) *knowledge*-orientated user situations, and (iii) both communication- and knowledge-orientated situations.

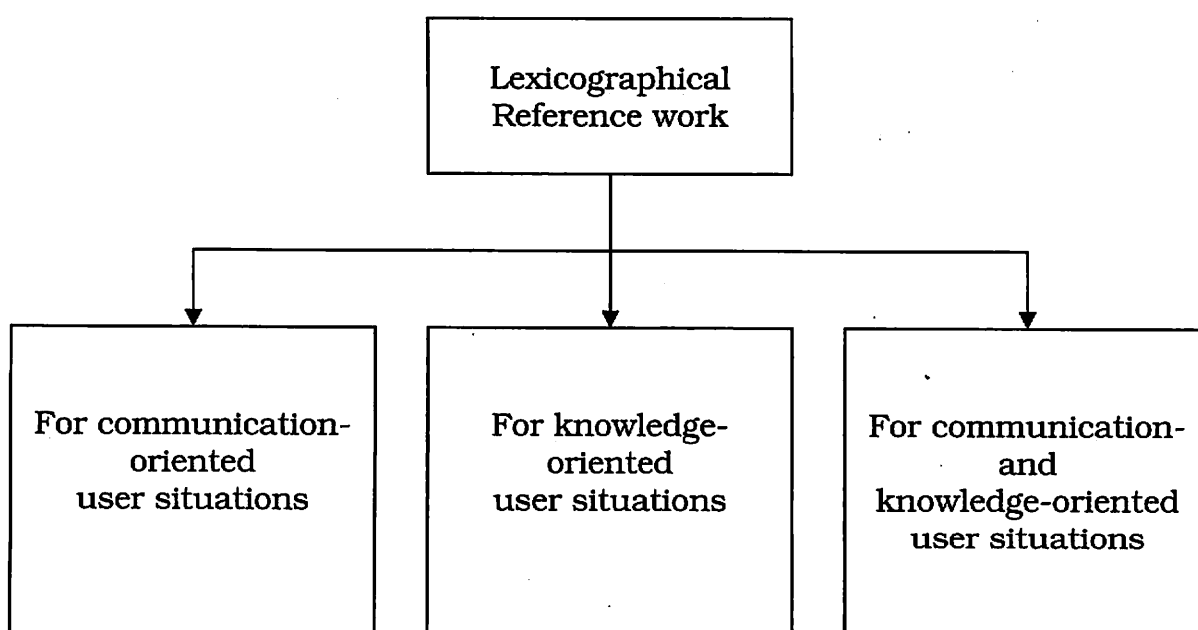


Figure 2: The classification of dictionaries in function theory

The next step for actual dictionary production will be the selection of dictionary information for each type of user situation. Thus the end-results look like the ones in Figure 3:

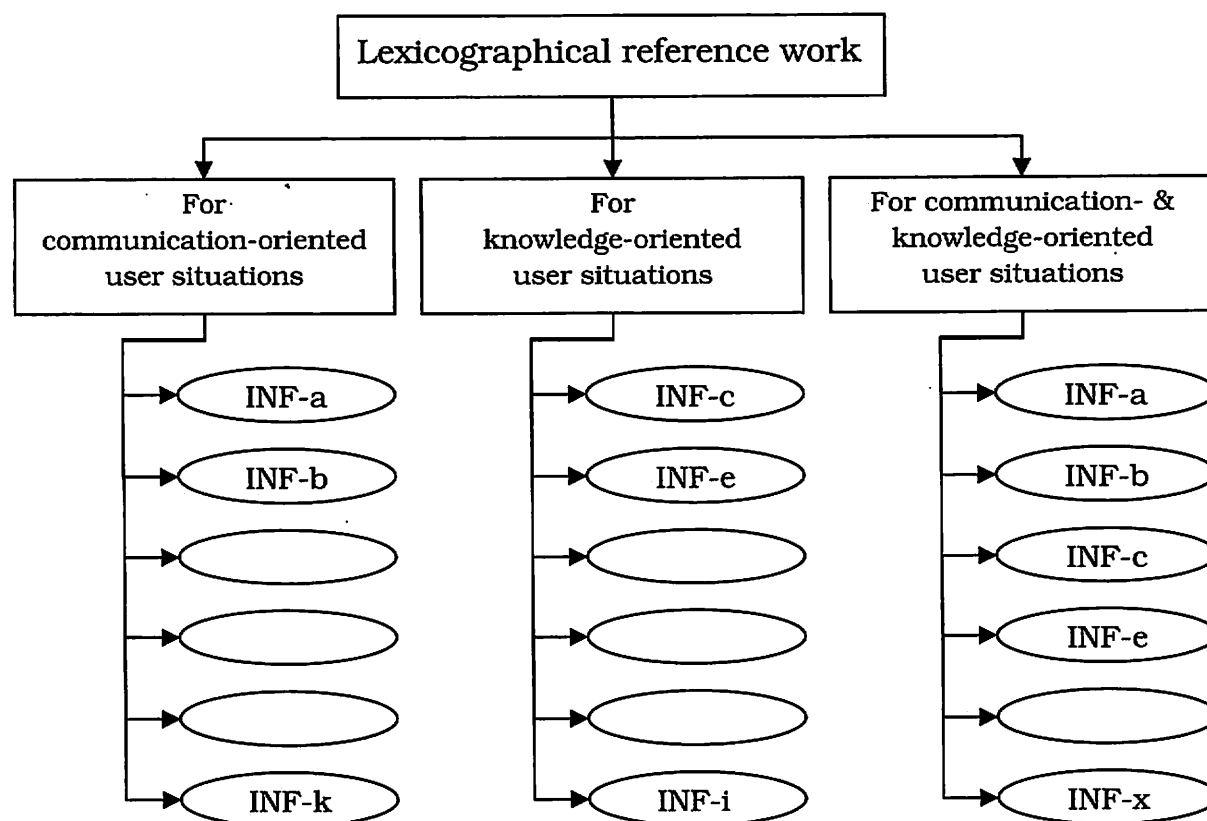


Figure 3: The function theory approach to information selection for different types of dictionary

Here, we need to have a set of procedures defining the following in order to produce each type of dictionary based on user functions:

- Categories of dictionary information (INF) to be included in a specific dictionary type
(i.e. specifications of INF-a, INF-b, etc. for a dictionary for communication-/knowledge-orientated user situations in Figure 3).
- Relative importance of the dictionary information categories
(e.g. INF-a is more important than INF-b, and so on)
- Relative amount of information for each information category
(e.g. INF-a will be 30% of the entire volume while INF-b should be limited to a half of INF-a)

- Relative importance and amount of information categories in the multi-functional dictionary

To my knowledge, there is no specific paper by Bergenholtz or Tarp, regarding the detailed procedure of selection of information categories for a particular function-based dictionary. If this selection procedure is not closely related to the typologies of user situations and functions, the final products could end up looking quite similar to existing dictionaries. Function theory does not have the power to produce anything new or different unless deliberate selections and weighting of the information specific to particular user functions are specified.

8. Critical evaluation of user perspectives by Bergenholtz

In the field of lexicographical research, there is an area called “dictionary user studies” or “research on dictionary use”. In the past few decades, there have been dozens of studies of dictionary users, but it is Bergenholtz’s belief that dictionary user studies require much rethinking and reformulating in their research questions and methodologies (Bergenholtz, personal communication). I will describe below some of his criticisms regarding user perspectives.

First of all, Bergenholtz believes that whilst it is important to investigate user needs in an empirical way, the range of target users seems to be very narrow and thus skewed. Most of the surveys conducted so far were based on student users. Bergenholtz claims that we need information from various other types of user, especially in such a case as his web-based Danish dictionary, where the target users are unknown, general users out there on the Internet. Very little research has been done on the behaviour of general users. The people at the Centre for Lexicography are planning to conduct a large-scale user survey using the log files of the web dictionary mentioned above. Care will be taken to select user groups properly from anonymous IP connections, and the information in the log files, such as how many people accessed which entries with which type of interfaces, will provide invaluable data on web dictionary user’s behavioural patterns (Bergenholtz and Johnsen 2005).

Secondly, he argues that the methods used in dictionary user surveys so far have been very indirect, and thus unreliable. Asking how users use a dictionary through a questionnaire is one of the worst ways to obtain behavioural data, as they will answer according to what they think they do (or ought to do), rather than what they actually do. He argues that we need to ask about user behaviour in a more direct way. He commented that some studies done by Lew (e.g. Lew and Dziemi-anko 2006) and myself (e.g. Tono 1984) are more sophisticated in this regard, though still not very reliable because they are based on relatively small samples and there have been no replications of the studies.

Thirdly, Bergenholtz contends that most user studies have not been based on any proper theory of lexicography such as his, thus end up reporting only anecdotal evidence of user habits and nothing very systematic in nature. Bergenholtz argues that the starting point for user studies should be the employment of more rigorous theoretical frameworks by defining user profiles more precisely and what variables to compare among different user groups that we can identify user needs and habits accurately and objectively.

9. Response to Bergenholtz's criticism of user studies

I agree with some of Bergenholtz's criticisms in the sense that most of the subjects in the user studies so far have been students and very little research has been done on general users. This is partly due to the fact that most user research has been done in the context of foreign language learning. I reviewed more than 20 to 30 previous studies in Tono (2001), and about 80 percent of the studies used students as their subjects, which is rather natural because their primary interest is in the behaviour of students. It would be interesting to conduct a survey of a much wider variety of dictionary users, including housewives, business executives, office workers, school teachers and their pupils, translators, doctors, scientists, etc. Bergenholtz (personal communication) notes, however, that the more specialized the professions of the subjects, the more likely it is that we would be able to identify their needs in dictionary use without doing any survey. This is an interesting claim, worth

investigating whether it is empirically true or not.

The second criticism relates to the issues of validity and reliability, which are very important in scientific research. Validity is the strength of our conclusions, inferences or propositions. If we want to know the needs of the dictionary users and link these needs to how often the subjects jog, our conclusion are likely to be totally irrelevant. Thus, in order to make your research valid, you will have to operationally define the *constructs* you will examine (e.g. users, dictionaries, user needs, user skills, etc.). I agree with Bergenholtz in that the research instruments employed in many user studies are very indirect and make it hard to identify actual user needs or behavioural patterns. Within the sciences, there are two different paradigms for research: normative and interpretive, as shown in Table 1.

Table 1: Differing approaches to the study of behaviour (based on Cohen and Manion 1994)

Normative	Interpretive
Society and the social system	The individual
Medium/large-scale research	Small-scale research
Impersonal, anonymous forces regulating behavior	Human actions continuously recreating social life
Model of natural sciences	Non-statistical
Objectivity	Subjectivity
Research conducted from the outside	Personal involvement of the researcher
Generalizing from the specific	Interpreting the specific
Explaining behavior/seeking causes	Understanding actions/meanings rather than causes
Assuming the taken-for-granted	Investigating the taken-for-granted
Macro-concepts: society, institutions, norms, positions, roles, expectations	Micro-concepts: personal constructs, negotiated meanings, definitions of situations
Structuralists	Phenomenologists, symbolic interactionists, ethnomethodologists

Researchers take differing approaches, depending on their orientation toward the behaviour they investigate. This difference is reflected in the way they design the research, collect and process the data, and in how they make sense of it. There are advantages and disadvantages to any research instrument, so what social scientists should basically try to do is to make every effort to investigate phenomena from multiple angles, with multiple instruments, using both qualitative and quantitative methods. This is what is meant by the term "triangulation" of data analysis: the bringing of multiple-methods to bear on a particular phenomenon.

Research should also be systematic in that all potential confounding variables should be controlled so that a third party can get the similar results to yours, or even interpret the results in a similar way. This is the concept of "reliability". Reliability is the consistency of measurement, or the degree to which an instrument (e.g. questionnaires, tests, etc.) measures the same way each time it is used under the same condition with the same subjects. Bergenholtz has criticized the published user studies, saying that they lack reliability. I would not agree with this statement because the lack of replication is not proof of unreliability. In the social sciences, as in the natural sciences, we do not have to replicate the experiments in our own single study. It is usually the case that someone else will replicate your study to reconfirm your results. It is crucial, therefore, to keep your research design as objective and explicit as possible for others to replicate it. If your design is low in replicability, then nobody can replicate your study and there is no possibility of refuting or falsifying your claims. This means that your study lacks *falsifiability*, thus will be dismissed as a bad example of scientific research. It is true that many of the present studies including mine have not yet been replicated by others, but this should not be taken as indicating that they have low reliability. Replication is a separate issue.

Bergenholtz's third criticism concerns the lack of theory. This seems to be a very important point. I must admit that the current dictionary user studies are mostly very fragmentary in nature. The findings are not very systematically analysed or interpreted, thus it is hard to obtain an

overall picture. One of the reasons is that, as Bergenholtz has noted, we do not yet have a comprehensive theory explaining user behaviour systematically. The theory of lexicographical functions might have great potential in this respect.

Another reason for the current lack of theoretical backing is that many dictionary researchers still believe that we are at the stage of “description”, and not “explanation”. In scientific inquiries, it is often the case that we will first start from *observations*. Accumulated observations will provide us with the overall picture, which then takes us to the next phase; identifying *correlations* between variables in the phenomena. After looking at various correlations, we will assume certain cause-effect relationships between particular variables, and this will take us to the next step, an *experiment*, in which we test the cause-effect relationships between variables by carefully manipulating independent (cause) and dependent (effect) variables and controlling extraneous variables. Experiments usually involve hypothesis testing. When you build your hypothesis, you will start thinking about your theoretical framework. After the experiment, you either validate your hypothesis or reject it and reconstruct your hypothesis. Alternatively, you can start constructing a theory to explain the phenomena at hand. So in short, this process of (i) observation, (ii) correlation, (iii) experiment, (vi) theory development, (v) verification of a theory, is a natural sequence in scientific inquiry. Bergenholtz’s criticism against the atheoretical user studies is partly valid because there have been no solid theoretical frameworks so far in most of the user studies. This is natural, however, because the user studies at present are still largely at the stage of *descriptions*.

10. Mutual benefits: how user studies could contribute to the function theory

In this section, I will consider how function theory can improve the way user studies are conducted, and how user studies can in return be used to validate some of the claims made by function theory, thus resulting in a mutually beneficial engagement of ideas.

Most of the user studies conducted so far do not have a clear theo-

retical framework, but this does not necessarily mean that the authors did not care about the details of the user profiles or situations. On the contrary, dictionary user researchers are always keen to define their subjects' profiles in a more systematic way and we welcome the possibility of doing this by using the function theory. For instance, the profiles of the subjects in my original study (Tono 1984) could be defined as follows:

- Common profiles:
 - Mother tongue: Japanese
 - Mother tongue mastery: native (university students)
 - L2: English as a foreign language (exposure in the classroom only)
 - Access to L1 during the learning process
- Subject-dependent profiles:
 - L2 proficiency level:
 - L2 learning experience:
 - Method of L2 instructions:
 - Textbooks used
 - Experience of dictionary skills training
 - Use of dictionaries in daily life

We could also define the user situations using the terms from function theory:

- Basically it is “communication”-oriented
- Dictionary use for foreign language learning:
 - Receptive purposes:
 - Decoding in L2 (reading comprehension)
 - L2/L1 translation (not as a professional translator, but as a method of teaching a foreign language)
 - Grammar exercises (multiple-choice; reordering)
 - Productive purposes:
 - Encoding in L2 (free composition)
 - L1/L2 translation (again, for practising language)

Function theory, by facilitating me in specifying the user situations for the subjects of my previous research more explicitly, it helps me identify the area which needs more improvement in design, especially regarding the definition of the subjects and the task selection. For instance, a more clear distinction should have been made between “cognitive” (thus, text-independent) and “communicative” (text-dependent) situations in the tasks given to the subjects, because, according to function theory, the information in the dictionary would be very different, depending on these different situations. Second, the tasks should also have been more carefully designed in order to distinguish simple reading comprehension from L2/L1 translation, both of which are quite distinct user needs in function theory. Third, in terms of user functions, it is not very clear which type of user needs and related information was investigated in my study. In sum, previous user studies could be reviewed and improved from the perspective of function theory. This may prove to be a useful new direction in the dictionary user research.

One thing which I do not yet have an answer to is the question of “how far can functions go?” In the case of Japanese-speaking learners of English, for example, it is common for them to have quite intensive grammar exercises using a grammar book as a part of their language tasks. If that is a specific user situation and need and if a dictionary has to be ideally mono-functional, can we make a dictionary for English grammar exercises? There seems to be no limit to such minor functions and needs, and thus no limit to the number of possible types of dictionary. Theoreticians can go on sub-dividing to infinity all these minor functions, but if it is a decent theory, it must have some sort of criteria for setting the thresholds in the number of functions to be included in a multi-functional dictionary or the thresholds in the granularity of the functions to be specified.

This is exactly where empirical validation is needed and thus the need for user studies. As Figure 4 shows, we can have a cycle of scientific inquiry as follows: (a) starting from function theory, (b) formulating specific hypotheses to be tested regarding the role of dictionaries

based on particular user functions in particular user situations, (c) designing and conducting research, (d) verifying or rejecting the hypotheses with empirical results, and (e) reformulating or modifying the theory if necessary according to the research results. This is the normal flow of scientific research, but very few dictionary user studies so far have taken this path, due to the lack of specific theories to fall back on. Function theory can be a good candidate for this if further refinements are made in line with specific areas of dictionary use.

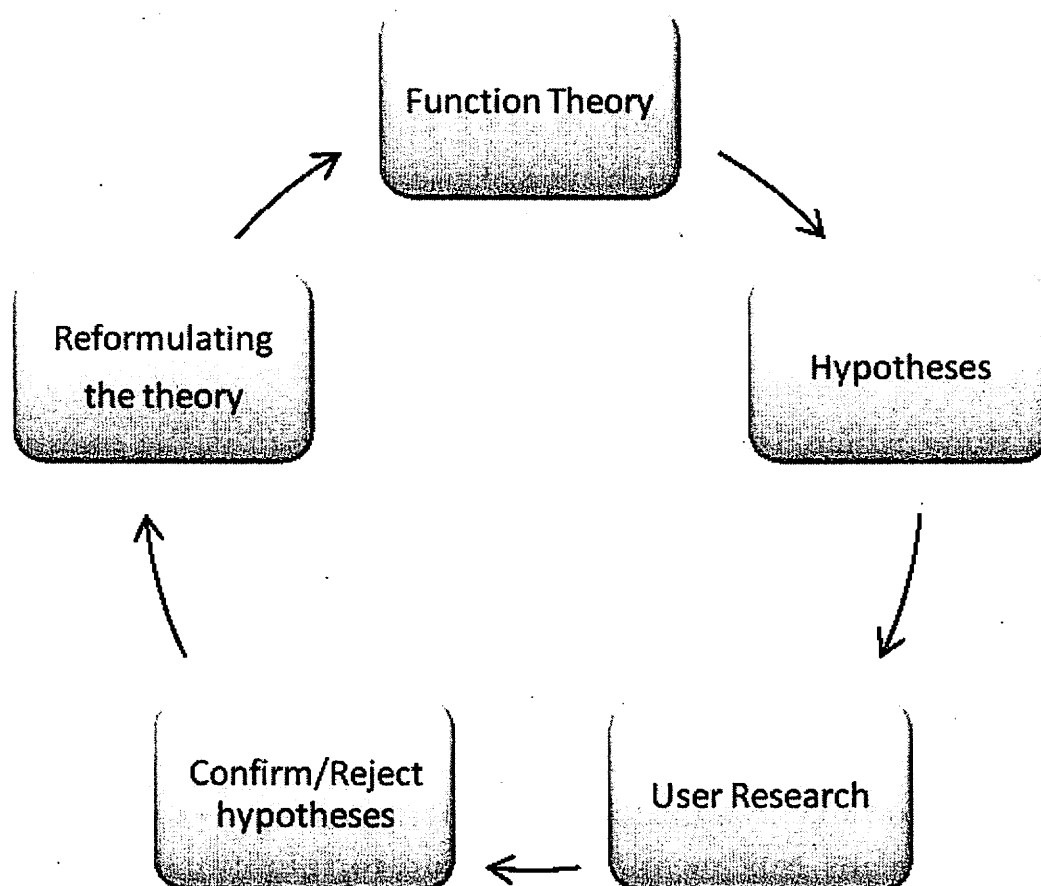


Figure 4: A cycle for improving function theory through dictionary user research

11. Concluding remarks

I have discussed the validity of theory construction in lexicography and how dictionary user studies can contribute to such theoretical development. It is worth discussing various issues in lexicography from the

perspective of function theory, as it sheds light on the problems with the current market obsession with multi-purpose, multi-functional dictionaries in the market.

The one thing that struck me most in my discussions with Bergenholtz is that he has a very flexible view of what constitutes a dictionary. For him, the glossaries attached to English textbooks might well be called dictionaries, and even a telephone directory could be a type of dictionary. I showed him a very popular foreign language survival conversation book published in Japan, which is usually never classified as a dictionary in Japan, but he said "That's a kind of traveller's dictionary." Bergenholtz has a very broad conception of "dictionary", and this must be kept in mind in order to understand his theory.

Since his view of dictionaries is so expansive, it made me wonder whether or not what he is doing is the same as what Google are doing in terms of multilingual text understanding/translation. Bergenholtz's answer is "It could be." However, his approach toward the same problem is very different. He is approaching the problem from a lexicographer's viewpoint, not a natural language processing one. Bergenholtz also welcomes various on-going attempts at creating new types of dictionary. He praised some of the projects in Japan, such as the *Eijiro*, an electronic dictionary project by a group of translators, who are donating English-Japanese translation pairs, which contains now more than 170 million entries. I will continue to discuss with him the possibility of redesigning the interface of pocket electronic dictionaries on the Japanese market on the basis of the function theory. It would be very interesting if all the different dictionary contents can be searched via a user function-based menu.

Although more specific theories of lexicographical functions and detailed specifications of such function-based dictionaries are yet to come, Bergenholtz and I are looking forward to the opportunity of working together to develop scientific research in concert with one another's approaches, which we hope will be beneficial for both theoreticians and practitioners working in the web of words.

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