Population Tests in Lexicography[1]

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This study discusses the use of a population test as an empirical method in exploring semantic content of near-synonyms for use in electronic dictionaries. Chapter 1 reviews some of the problems of a conventional dictionary, and suggests how an electronic dictionary could meet these challenges. Current lack of semantic information in linguistic literature hampers the development of electronic dictionaries, which has raised an urgent need to study the implicit knowledge of native speakers. Chapter 2 describes the present study, which aims at exploring what types of semantic information can be obtained with population tests. In this study, the test field comprised of twenty-one Finnish verbs all used to describe a complaining speech act. Many of these words are defined as synonyms in mono- and bilingual dictionaries, and many of them are also classified as expressive (onomatopoetic-descriptive) words, which are especially numerous in the Finnish language. The test population (informants) consisted of 154 (16-18 yrs.; 95 women) native speakers of Finnish. Five semantic features (gender and age of the agent, level of anger, volume of voice, and furiousness of the patient) were tested with multiple choice and open-ended tasks. Chapter 3 discusses the results of this study in the context of their potential use in electronic dictionaries. Population test methodology *per se* will also be discussed. It seems that population tests are able to give remarkable amount of new information to objectively distinguish near-synonymic words from each other. This test type could offer effective tools for exploring the dimensions of semantic contents of words, which would directly serve in construction of electronic, multidimensional dictionaries.

1 Introduction

The dramatically increased international mobility and communication of people together with shrinking of the world have led to a drastic need of better dictionaries. Hence, the 21st century has been called a century of dictionaries (e.g. Wierzbicka 1996: 257). Learning a foreign language often takes place in a non-native environment. This leads to a situation where dictionaries are requested to provide a user with all the diversity of information normally present only in the native use of the given language(s).

1.1 Near-synonyms – a problematic part of a dictionary

One of the ambiguous features in the current dictionaries has been the way synonyms are defined. Finding half a dozen or more synonyms in a target language without any differentiating explanations usually leaves a user helpless and frustrated. An ideal dictionary provides a user with information about the meaning and the use of words to such an extent that near-synonyms (Lyons 1995: 60) may be reasonably well distinguished. The strictly linear order of presentation and the very limited space in conventional dictionaries unavoidably lead to an oversimplified description of the use and the meaning of words. For instance, a search in a conventional English-Finnish dictionary for the Finnish equivalent of the English verb *to nag* returns a long list of words (e.g., *nalkuttaa, motkottaa, jankuttaa, tankata*). While virtually every native speaker obviously has a clear implicit knowledge about the difference between these near-synonyms, such lexical information is absent in the bi- and monolingual dictionaries, and even in the existing lexical literature.

Useful definitions of words are needed to describe the near-synonyms which rarely contain exact equivalents in different languages. Interaction of society is based on a proper use of words

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(e.g. Wierzbicka 1996: 237): choosing a wrong word easily leads to misunderstandings. Most of the mono- and bi-lingual dictionaries simply sustain the messy use of language by giving long, plain lists of somehow related words. This is largely due to the current situation that several parts of the lexicon (e.g., adjectives, verbs, expressive vocabulary in general) are rather easily bypassed by lexicographers with excuses like "people can not learn the meanings of these lexems without live contexts" and "it is too dangerous to give any definitions because they would be too narrow anyway".

1.2 What the current electronic dictionaries do offer – and what they do not

New techniques used in the modern web-dictionaries enable completely new constructs in dictionaries. There is now room for definitions, explanations, figures, examples, pictures, and repetitions. Also, the border between mono- and bilingual dictionaries and between a dictionary and an encyclopedia has become unimportant. By using hypertexts and inter-linked databases, it is possible to add any kind of detailed lexical information as needed, and this information can be easily updated when the lexical knowledge accumulates. The purpose of adding semantic information of this kind is obvious, but what is the current situation with electronic dictionaries? Let us take a closer look at three different editions:

One example of an exciting and technically well developed dictionary is The Plumb Design Visual Thesaurus, which is based on WordNet database. Words of interest are connected by radiating lines to a set of other, more or less interrelated words forming a nice umbrella type layout. This dictionary does not contain semantic information or clues as to how these words are related to each other, which leaves a user alone with a bunch of words. However, I feel that this type of visualization could offer a very useful alternative layout for a well-made semantically oriented dictionary.

Wordsmyth and WordNet are technically much less exciting but semantically speaking considerably more serious dictionaries. While the structure in these dictionaries is basically very similar to good conventional printed dictionaries, they have one technical improvement: different entries are linked with each other making it very easy to find all the words somehow related to one another. However, in the absence of comparative information the basic questions are still without answers: *how* are the words really related to each other? How can a user identify the most appropriate of them for each occasion? Indeed, a user often gets a quite confusing list of words classified as *synonyms, similar words, related words, exact synonyms,* and *near synonyms* (see Wordsmyth). For a nonnative speaker, the logic of those relations is extremely hard to follow (see the definitions of the terms in lexical semantics e.g. Lyons 1995: 60-65). The links presented in the above mentioned dictionaries work mainly as good hints in word hunting; as themselves they do not provide a user with any answers.

An obvious reason for the shortage of semantic information in dictionaries is the lack of semantic information in general. At the same time, however, there are highly innovative and theoretically interesting methods on lexical semantics, starting with applied componential analysis. While some attempts have been made, there has been a general lack of successful cooperation between lexicography and experimental lexical semantics (e.g. Wierzbicka 1996: 258). The sometimes intense confrontation about defining a word between lexicographers and semanticists has come to a new step: lexicographers no longer have the excuse of limited space, while semantists are now demanded to test and prove in practice which kind of methods are really useful when gathering semantic information for dictionaries.

Furthermore, the ultimate tasks and goals of a dictionary seem to be sometimes obscure. At a practical level, a dictionary has two main tasks: to give a content to a form and to give a form to a content (Aitchison 1987: 165). A dictionary should be made for nonnative speakers, who really have no clue about the semantic relationships and choosing the right words. Sometimes it might be hard for lexicographers to see the world through the eyes of nonnative speakers and to realize which are their very problems. But how do we find the appropriate semantic information that could be used in electronic dictionaries?

1.3 Seeking semantic information of near-synonyms

There are at least two relevant methods to explore the very fine semantic and pragmatic components of vocabulary. First, text corpora, and second, empirical population tests. The latter method, called also as an *intersubjective method* (Raukko 1999), provides a tool to test the implicit knowledge of native speakers in a standardized fashion. This method has been recently succesfully employed in studies on polysemy of the English *get* (Raukko 1999). There are plenty of studies on synonymy based corpus linguistics, like a study on the English *big, great* and *large* (Biber et al. 1998), and on Finnish *keskeinen* and *tärkeä* ('important, pivotal') (Jantunen 2001).

Perhaps it is due to the rapid development of electronic corpora that corpus linguistics has often been understood as an incomparable method on lexical studies. However, the information reached by corpus linguistics is mainly based on collocation, which is only one type of lexical relationship (Lyons 1995, Cruse 1986, Saeed 1997, Sinclair 1998 etc.). The findings are interesting and clear, but one cannot assume that collocation would be the only or the most relevant relationship to define meaning and use of words. Even though collocations are relatively easy to study, and for that reason quite popular, there is a serious need to develop other methods for fruitful lexical research. In my study, native speakers of Finnish were asked to define meanings of given words, and to compare the meanings of certain near-synonyms. There appeared to be a lot of semantic features which are not discoverable by the methods based on the use of corpora, while they are relatively easily explored with empirical population tests.

2 Would Population Tests Reveal Novel Aspects?

The objective of this study was to explore the possibility of a set of population tests to measure how native speakers comprehend 21 verbs (see Table 1), and whether these verbs could thus be experimentally distinguished. Finnish monolingual dictionaries (Nykysuomen sanakirja [Dictionary of Modern Finnish] and Suomen Kielen Perussanakirja [Basic Dictionary of the Finnish Language]) define many of these verbs as complete synonyms (*marmattaa, motkottaa, jäkättää; ruikuttaa, vaikeroida, nurista* – see Table 2). Many of them are also classified as expressive (onomatopoetic-descriptive) words.

Table 1 A list of the Finnish verbs studied, followed by their equivalents in English, edited from Finnish-English General Dictionary.

jupista	mutter, mumble; grumble (at something)
jurnuttaa	*(colloquialism); (impersonal verb)* annoy, vex (it annoyed me that that)
jäkättää	*(colloquialism)* [yackety-]yak; *(nalkuttaa)* nag (about something; at somebody)
marista	whine (about something; at somebody), whimper; fret (over about), grumble
marmattaa	grumble (about something)
motkottaa	carp, *(nalkuttaa)* nag (at somebody; about something)
mukista	grumble, grouse
napista	grumble (at somebody; about, over something), gripe (at somebody, about something); murmur (at, against something)
nurista	grumble (at somebody; about, over something)
purnata	grouse, grumple
ruikuttaa	whine, whimper; *(valittaa) (also)* complain, *(colloquialism)* moan (about something); wail [over] (whine about); *(colloquialism)* pester
urputtaa	(not found)
vaikeroida	moan; groan; wail; lament, bemoan
valittaa	1. groan, moan; wail; lament. 2. complain of. 3 complain about, of
voihkia	groan, moan
voivotella	moan; whine; *(formal)* bewail

Table 2 A list of the verbs studied, followed by a list of verbs they are defined with in the Basic Dictionary of the Finnish Language (PS). Note the extent of cross referencing, which is pointed out with color coding of some words.

jupista	mutista, mukista, nurista, napista
jurnuttaa	murista, nurista, purnata; murjottaa, mököttää, jurottaa
jäkättää	nalkuttaa, narista, motkottaa
marista	mankua, valittaa, ruikuttaa, napista
marmattaa	marista, mankua, nurista, motkottaa, nalkuttaa
motkottaa	jankuttaa, moittia, nalkuttaa, jäkättää
mukista	jupista, nurista, napista
nalkuttaa	moittia; motkottaa, naputtaa, jankuttaa, jäkättää
napista	nurkua, nurista, marista, valittaa, sanoa vastaan
nurista	valittaa, nurkua, marista, ruikuttaa
purnata	mutista, napista
ruikuttaa	valittaa, vaikertaa, voivotella
urputtaa	purnata
vaikeroida	valittaa, voivotella, vaikertaa
valittaa	vaikertaa, voivotella; moittia
voihkia	valittaa, voivottaa
voivotella	< voivottaa (voivottaa - valittaa, vaikeroida, ruikuttaa, marista)

The test series included both multiple choice and open-ended questions, and the test was focused on five semantic features: gender and age of the agent (agent = a speaker in a speech act), level of anger, volume of voice, and furiousness of the patient (patient = a listener in a speech act).

2.1 Study setup

The test population included 154 (16-18 yrs.; 95 women) native Finnish speakers. The data was collected in May 2001 in three high schools in Finland. Two of the schools are located in small towns in Eastern Finland: Varkaus (n=96) and Leppävirta (n=25) (populations 23 000 and 11 000). The third school is in Espoo (n=33), which is a larger city (population 218 000) in the suburban area of Helsinki. All testing sessions were conducted in controlled situations during regular Finnish language classes, and the whole test sessions lasted for 10-22 minutes. The testing sessions were also tape recorded for later evaluation of oral instructions and possible environmental interferences.

2.2 Questionnaire

Every informant was given a 3-8 page questionnaire (completely in Finnish), which varied slightly between class groups. In order to minimize possible interferences between test types, the informants were required to complete the open-ended tasks before they answered the multiple choice tasks. In the following sections, some selected samples of the questionnaire have been translated into English.

2.2.1 Gender and age of agent

Four different tests were used to explore the gender of the agent. The questions about the age and the gender of agent were usually placed on the same test sheet (see Figure 1).

WHO SAYS TO WHOM? Choose the best alternative.
One choice per side only!

	male to male	male to female	female	female to male	middleaged to female schooler	highschooler to high-	to middleaged
Don't *jurnuta*!	___	___	___	___	___	___	
Don't *jäkätä*!	___	___	___	___	___	___	
Don't *valita*!	___	___	___	___	___	___	
.							
.							
.							

WHOSE SPEECH DOES THE VERB DESCRIBE? Choose the best alternative.
One choice per side only!

	male	female	child	young	middle-aged	aged
*jurnuttaa*___	___	___	___	___	___	
jäkättää ___	___	___	___	___	___	
valittaa ___	___	___	___	___	___	
.						
.						
.						

Figure 1 Examples of the test sheets used to study the gender and age of the agent. In addition to these samples, another series of questions included pairs of sentences with slight difference (gender or age of the agent), and the informants were urged to choose the one which sounded more natural.

2.2.2 Volume of voice, anger of agent, and furiousness of patient

In the following test types, the informants were asked to rank the verbs on a scale between 0 and 5 (see Figure 2). Three features (volyme of voice, anger of agent, furiousness of patient) were tested with one test type and with smaller test groups, and this was mainly done for future reference.

WHAT VOLUME DO YOU ASSOCIATE WITH THE FOLLOWING VERBS?
Please mark. 1 – silent voice, 5 – loud voice

	0	1	2	3	4	5
*jurnuttaa*___	___	___	___	___	___	
jäkättää ___	___	___	___	___	___	
valittaa ___	___	___	___	___	___	
.						

HOW ANGRY WAS YOUR MOTHER?
Compare the given sentences. 1 – a little bit angry only, 5 – very angry

	1	2	3	4	5
Yesterday I came home late and Mom *jäkätti*.			___	___	___	___	___
Yesterday I came home late and Mom *valitti*.			___	___	___	___	___
Yesterday I came home late and Mom *marisi*.			___	___	___	___	___

HOW FURIOUS DID YOU BECOME BECAUSE OF MOM'S SPEECH?
Compare the given sentences. 1 – a little furious only, 5 – very furious

	1	2	3	4	5
Yesterday I came home late and Mom *jäkätti*.	___	___	___	___	___
Yesterday I came home late and Mom *valitti*.	___	___	___	___	___

Figure 2 (cont't from the previous page) Examples of the test sheets used to study volume of voice, furiousness of the patient, and anger of the agent.

2.2.4 Open-ended tasks

The main purpose to incorporate open-ended tasks into this series was to collect spontaneous answers which could aid in generating new test series. Also, open-ended tasks can help validate the results of the multiple choice questions. In the next test type (Figure3), the informants were urged to define a given word and/or to describe the differences between two words. With some of the words, the informants were directly asked to answer questions like "In your opinion, what's the difference between the meanings of the following words?" or "Define the meanings of the following words. Do the meanings differ from each other? If so, how?". Alternatively, some of the tests presented a real life situation, in which the informants were asked to use their native language skills.

Complete the sentences. For the subject, write anything but s/he.

_____ *jurnutti* _____
_____ *voivotteli* _____
_____ *jäkätti* _____
.

Figure 3 An example of an open-ended task used to explore the differences between two near-synonyms.

Your foreign friend knows Finnish very well. Now s/he would like to know the difference between *nalkuttaminen* and *motkottaminen*. How would you explain this to her/him?

_____
_____

Figure 4 An example of the open-ended test type used to explore typical agents of the verbs.

For more about the design of the study and the test series, see Vanhatalo (2002).

2.3 Results

A general finding was that in all the tests used in this study, there is a significant semantic differentiation in all features studied. The results can be analyzed at two different levels. First, one can focus on the method and try to figure out how the test series worked. Second, one can focus on the verbs studied, in order to gather practical lexical semantic information for dictionary definitions. In this paper, I'll focus on former, methodological questions. Individual findings will be only cursorily mentioned.

2.3.1 Gender of agent

Figure 5 summerizes the results concerning the gender of the agent. One can see that there are some verbs which are very clearly considered to refer to a female agent, while some others refer to a male agent. The results shown above are based on 154 informants (232 answers). The verbs considered more feminine are located towards the left side. The verbs located in the middle of Figure 5 showed no clear preference of gender.
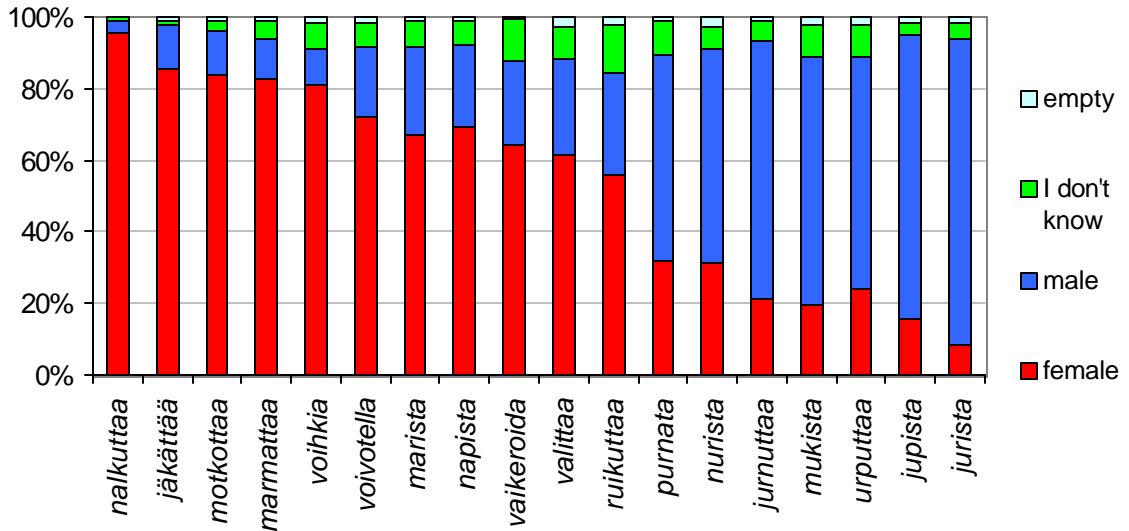
Figure 5 Gender of agent

2.3.2 Age of agent

Figure 6 shows the results of tests exploring the age of the agent, one can see that there are some verbs which are very clearly considered to refer to a middleaged agent. In general, that age group seems to be the most popular with complaining verbs. However, there are still some verbs with a clear feature of other age groups. These results are based on 154 informants (176 answers).

Figure 6 Age of agent

2.3.3 Volume of voice, anger of agent and furiousness of patient

Looking at the Figures 7-9 one can see that there is a clear differentation between some synonomeus synonomeus verbs according to these variables. The results shown above are based on 22-33 informants.
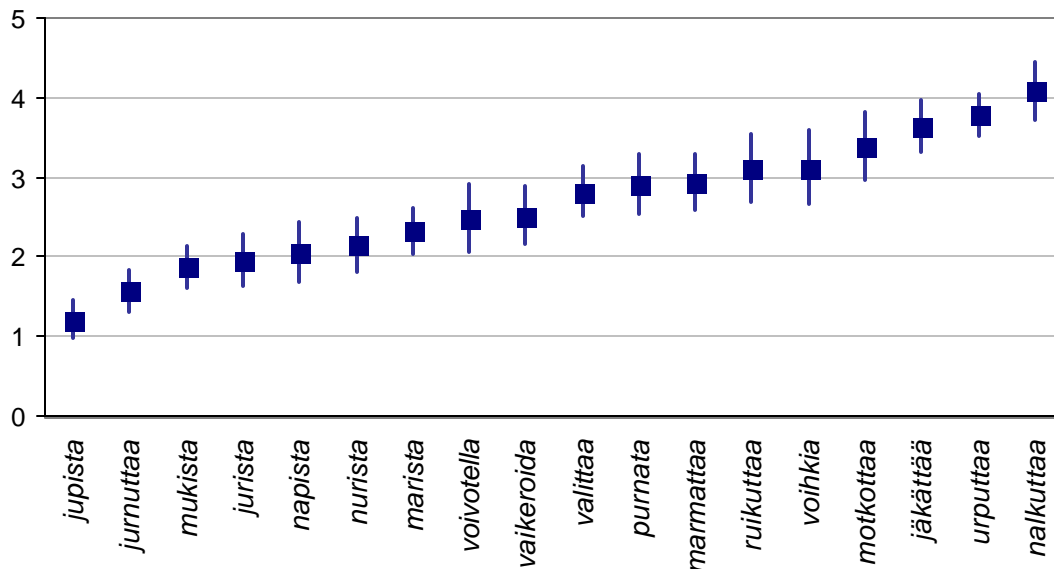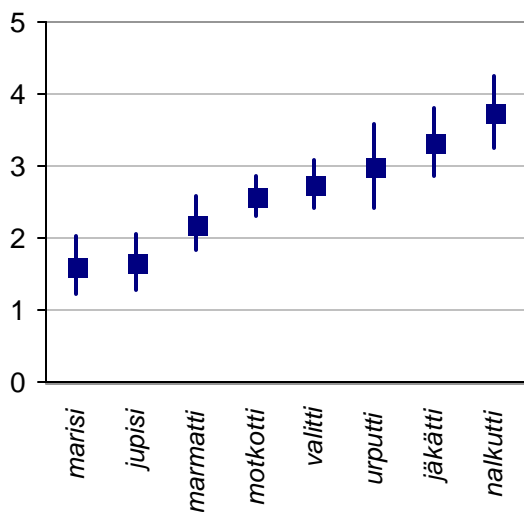
Figure 7 Volume of voice
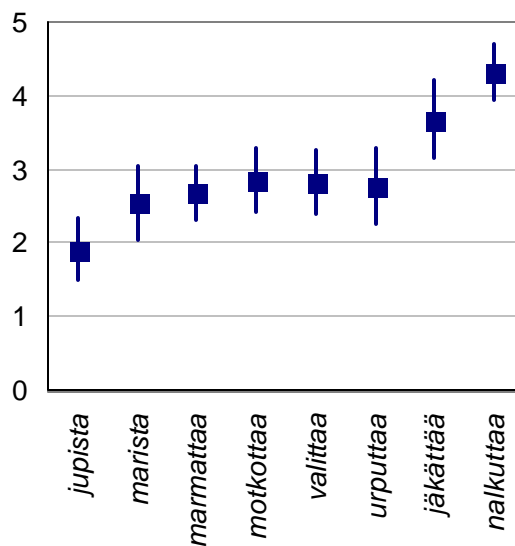
Figure 8 Anger of agent   **Figure 9** Furiousness of patient

3. Discussion

The present study strongly suggests that population tests are able to give clear cut information concerning the comprehension of native speakers about meaning and use of near-synonyms. With some of the words studied the informants seemed to have a great consensus (e.g. gender of agent on verb *nalkuttaa*), while with other words (e.g. age of agent of verb *voihkia*), the view was more variable. This observation *per se* raises the intriquing idea that significance of features varies between different words.

3.1 Using the results in electronic dictionaries

Let us take one of the verbs of interest – *nalkuttaa* – into closer observation and consider some of the features pointed out by the results, see Table 3.

Table 3 Comparison of the definitions for the word *nalkuttaa* in current monolingual dictionaries.

Finnish	English translation
Nykysuomen Sanakirja:	Dictionary of Modern Finnish:
nalkuttaa katkonaisesta, yksitoikkoisesta, usein jatkuvuudellaan hermostuttavasta, ärsyttävästä äänestä; usein: motkottaa, toruskella	about incoherent, rambling, monotonous, often continuos and therefore irritating, annoing voice; often: *motkottaa, toruskella*
Suomen Kielen Perussanakirja:	Basic Dictionary of the Finnish Language:
nalkuttaa jatkuvasta, ärsyttävästä moittimisesta; motkottaa, naputtaa, jankuttaa, jäkättää	about continous, irritating criticizing; *motkottaa, naputtaa, jankuttaa, jäkättää*

To begin with, the present results suggest plenty of new semantic features to be added into the current definitions. The agent of this verb is very typically female, and she tends to be middle-aged. This verb is very seldom used to describe the speech of a child. This speech act is very loud compared with the near-synonyms: it is louder than *motkottaa* and almost as loud as *jäkättää*. Compared with the near-synonyms, this kind of speech act makes the listener very furious. The person who is described with this word is very angry. According to the answers from the open-ended tasks, the agent often does not have an obvious reason for this speech act (unlike the person in a speech act described with the verb *motkottaa*). Furthermore, the agent tends to repeat the same complaints time after time, and tends to complain about everything, etc. - Although these are based on one test series only, and the definitions cannot be understood as the final truth, it is surprising how much information can be gathered.

3.2 How do we find the problematic part of the lexicon?

It would be practically impossible to study the whole vocabulary in the manner presented in this paper. There are fortunately several relatively clear entities of vocabulary, e.g. the majority of substantives, which the traditional dictionaries are able to describe easily. However, the problems arise with many adjectives and verbs, especially with those referring to abstract concepts or implicit side contents. One very typical word group of this kind is that of the expressive (onomatopoetic-descriptive) words. Although many such words have low frequency (Sivula 1989: 180), this group is common and quite productive in the Finnish language, and therefore deserves serious studying. Another highly challenging task is to define and to translate emotional vocabulary (see e.g. Wierzbicka 1999). In fact, it is often relatively easy to see the problematic word groups in dictionaries: just look for the entries which lead to an endless circle of cross references (examples in English, see e.g. Wierzbicka 1996: 240). Another way to learn the problematic vocabulary is to ask learners of second languages to explain their personal difficulties.

3.3 How do we find the right features for testing?

Finding the right features for testing the semantic differentiation is probably the most exciting and most creative part of study on near-synonyms. How to get started? Which features are worth testing? In the very beginning, the more features we have for testing, the better. A large enough test population will soon make it clear which of the features are significant and which probably have no value concerning some particular word. In this study, the starting point was a speech act: an agent, a patient, and the situation. There were some very pioneer informants who were asked to do some brainstorming with the given verbs. From the list of putative features (like "the person who speaks in this way is usually a nasty woman", "really irritating", "continuous", etc.), five were chosen for the first multiple choices tasks. Some of these features, like gender and age of agent, were chosen because of the possibility of comparing these results with the ones found from corpora.

3.4 Exploring the language or exploring the world?

Studies of this kind are intimately bound to discussion about stereotypes, and one may often ask what is actually being studied: does the questionnaire explore the word or an entity? If the verb *nalkuttaa* is connected with a female agent, is the activity described with that particular verb femine, or is feminity one feature in the meaning of this verb? This topic has been a subject of an endless conflict. However, from the very practical point-of-view of dictionaries, it is to be remembered that native speakers tend to use certain words in certain contexts. If native speakers do it, why shouldn't nonnative speakers use the language in the same way? It may rather be that generalizations and stereotypes are an essential, inborn part of the implicit knowledge of native speaker, and therefore they are well worth bringing forth in the dictionaries as well.

3.5 Who are the relevant informants?

Choosing and reaching relevant informants means balancing between idealism and realism. It would be nice to get infinite number of informants, with equal distribution over gender, age groups, socioeconomic and educational backgrounds, dialect areas etc. However, in order to get reasonably large groups of cooperative informants into a controlled test situtation, one needs to make some compromises. This study was made in high school settings and on high-school students, and the following information was collected from the informants regarding their sociolinguistic background: gender, age, place of birth, dialectological home area, and the hometown. In addition, studying in high school (equivalent to US college) *per se* implied an interest towards higher education. The following chapter will shortly discuss gender as one sociolinguistic factor in this study.

3.5.1 Gender-based differences between informants

Large numbers of studies have been published about linguistic differences between men and women. Those have mostly focused on phonology (e.g. Eckert 1998), and usually in the English language. It is obvious that gender makes some difference, but other studies have also clearly indicated that gender should be considered as just one of the main sociolinguistic variables (see e.g. Eckert 1998), with considerable situational variations. Given these considerations, there are still at least two good reasons why the gender-based differentiation should be of significant interest in studying Finnish lexicon. First, gender-based differences obviously vary between languages, and yet the present literature does not handle very much the Finnish language (see e.g. Lappalainen 2001). Second, present literature on this field has concentrated on phonology, while the questions concerning lexical differentiation between male and female speakers are more unexplored.

Due to the absence of previous lexical studies like this on gender orientation in the Finnish language, all the new concepts arising from other languages need validation in Finnish as well. While men and women obviously share the same vocabulary in each language, any data concerning gender-based differentiation deserves mentioning in the forthcoming wider electronic dictionaries.

In this study, most of the results were analyzed irrespective of informants' sociolinguistic variables. However, as a curiosity, the results of gender of agent were analyzed also with respect to informants' gender. This analysis shows that despite of certain clear differences with single words, there are not very striking overall differences between men and women in comprehensing the gender of agent (data not shown here). Based on the whole current test population, this analysis

suggests that the results of a larger informant population also would be reliable without separate splitting of informants by their gender.

3.6 Forcing the informants to answer or giving *"I don't know"* –alternatives?

One noteworthy aspect in population tests are the indifferent (*"I don't know"* or *"There is no difference")* -answers. Except for one test group (n=21), these choices were excluded on purpose. This study aimed at clear demonstration of whether the population test may be used for this purpose in general and/or for testing chosen features. It was hence necessary to keep the questionnaire very simple. Intriguingly, it seemed that the indifferent answers tended to be associated with certain verbs more than with others. Some informants tended to have notably many more of these answers than the others, which raises the idea that probably choosing this option reflects more about the informant than the word of interest. However, many words certainly possess features which are considered to be possible but not necessary. This kind of uncertainty would be found with *"I don't know"* -answers. The ambiquity of a word can be, however, also found with population tests with a large enough sample size.

4. Conclusions

This paper discusses the tremendous demand for real life semantic information that would be needed for electronic dictionaries. Based on the results shown above, population tests seem to be a remarkably efficient method of gathering information about semantic features of certain words (e.g. adjectives, verbs, expressive vocabulary). With this innovative and very adaptable method, it is possible to obtain the exact data as needed. The results show that these kind of population tests are able to give a remarkable amount of clear, new information regarding the differences of near-synonomic vocabulary in Finnish. At present, this kind of information is not found in any of the current dictionaries. The results suggest that population tests would offer effective tools for exploring semantic contents of words in future electronic, multidimensional dictionaries. This approach is proposed to be especially useful for studying e.g. expressive vocabulary, and some other "hard-to-define" adjectives or verbs. An attractive and obviously very important feature of this empirical method is that this explores the use of live language and the implicit knowledge of native speakers, which may be ultimately even quantified in a standardized manner.

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