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Abstract: The concept of Simultaneous Feedback (SF) is introduced, a theoretical framework for the production of modern dictionaries in which the user takes centre stage. During compilation, various types of feedback inform the compilation itself. In its electronic adaptation, Fuzzy SF, the concept can also refer to a type of intelligent and adaptive dictionary in which customization is performed in real time online. In addition to a novel type of (electronic) dictionary, such a reference work also allows for a new type of research into how (electronic) dictionaries are really used.

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Three main keywords: Simultaneous Feedback (SF), Fuzzy SF, log files

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34. The Concept of Simultaneous Feedback

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1. Simultaneous Feedback (SF)

The theoretical concept of Simultaneous Feedback (henceforth 'SF'), introduced in 1997 and described in De Schryver's (1999b) MA dissertation, was devised in response to the need for a framework for the swift yet sound compilation of Bantu-language dictionaries. Since then, it has been applied to the compilation of numerous reference works across the world. In a nutshell, and as initially conceived, SF can be understood as entailing a dictionary-making method in terms of which the release of several small-scale parallel dictionaries triggers off feedback that is instantly channelled back into the compilation process of a main dictionary. This process is shown schematically in Fig. 34.1. In this representation, one recognises the three primary constituents of any dictionary compilation process, viz. target users, compilers and dictionaries. The framework itself should be read from left to right, and from top to bottom -- [1] through [10]. The compilers' central

task is the compilation of a main dictionary -- depicted by the central, downward arrow. The first component in Fig. 34.1 is also the first task. That is, the formulation of a theoretically motivated model for the structure and contents of the dictionary to be compiled must be followed by a preliminary analysis of the desires of the potential target users -- [1]. It is of paramount importance that, from this initial stage onwards, information concerning these target users' desires be gathered through informal and formal consultations with the future target users. As such, feedback is simultaneously introduced right from the very start. Since any modern dictionary is to derive its data from a corpus, the compilers have to build and query an electronic corpus for the specific language(s) 'first'. As a result, the compilers cannot start the compilation of the main dictionary right away and are moreover confronted with the prospect of an extremely time-consuming undertaking. In order to overcome this deadlock, the main dictionary project is instantly complemented with a series of small and inexpensive parallel dictionary projects -- [2], [6], [10], etc. These parallel projects have basically the same structure, contents and target users as the main project and

are to derive their data from small-scale parallel test-corpora. From the release of the first parallel dictionary onwards, informal and formal feedback is received from the parallel projects and channelled back into the time-consuming main project -- [3], [7], etc. From that instant, the compilation of the main dictionary becomes a true work in progress with simultaneous feedback from the target users to the compilers. The parallel projects are thus used as experimental tools to test a plethora of strategies in order to refine both the information and the presentation thereof in the main project under construction. Once a structured main corpus has been built, various frequency studies can be undertaken to assist the lexicographers in the compilation of the lemma-sign list of the main dictionary -- [4]. Subsequently, concordance lines, also derived from the main corpus, supplement the compilers' intuition during the compilation of the main dictionary articles -- [8]. Until completion of the main project the parallel projects continue to elicit feedback -- [5], [9], etc. All this simultaneous feedback ultimately enables the compilers to select the most appropriate blend of lexicographic procedures to ensure the most effective retrieval of information by the target users in the main

140 dictionary. It is important to stress
the fact that the target users guide the
compilers near-simultaneously during the
entire compilation process. The unabated
retrieval of feedback should thus be
145 considered as the main pillar of the
methodology.

Early bilingual (parallel)
dictionaries compiled within this
framework include reference works for
150 Cilubà (De Schryver/Kabuta 1997, 1998;
De Schryver 1999a: 55-87) and Northern
Sotho (Prinsloo/De Schryver 2000; De
Schryver 2001). Currently, and as
another example, all eleven South
155 African National Lexicography Units
periodically release parallel
dictionaries within this framework, and
this approach is also followed in Gabon
(Mavoungou 2002). For article-length
160 descriptions of all aspects involved,
see De Schryver/Prinsloo (2000a, b).

2. From SF to Fuzzy SF

165 In the Cilubà and Northern Sotho
projects referred to in section 1, the
retrieval of feedback has followed the
channels of such standard approaches as
(natural) participant observation,
170 formal and informal discussions,
anonymous mail survey questionnaires,
controlled tests, etc. Through a cross-
comparison of the results of the various

types of feedback, the idea has been to
175 arrive at a representative body of
users' desires for each of the
respective target user groups. Still,
the realisation that none of the
employed feedback methods is devoid of
180 problems, and that even the balancing
out of different types of feedback is
only approximate, prompted the search
for a straightforward, automatic,
neutral and invisible arbiter. Such an
185 unobtrusive arbiter was found in the
form of electronic-dictionary log files.
In other words, instead of compiling
various parallel hardcopy dictionaries
(blocks [2], [6], [10], etc. in Fig.
190 34.1) for the purposes of retrieving
feedback (blocks [3], [7], etc.) --
feedback that is instantly fed back into
the compilation of a main dictionary --
the idea is to make the dictionary
195 available online on the Internet while
it is still being compiled, and thus to
be able to log and use feedback truly
simultaneously. With this one has
arrived at a bold compilation strategy
200 indeed, as users are not only invited to
be spectators of 'in progress dictionary
compilation', but are also, implicitly
and informally, led to provide crucial
feedback while using that in-progress
205 work. From a dictionary-compilation
strategy angle one has thus moved from a
discrete approach to retrieving feedback

for a group of users to a continuous one
for single users, which is why the
210 'electronic adaptation' of SF has been
baptised 'Fuzzy SF'. In addition, Fuzzy
SF allows for (in-progress) dictionaries
to be made continually available, and
this from the moment work on them has
215 begun. Fuzzy SF thus enables to have
'dictionaries now'. A dictionary
compiled within the framework of Fuzzy
SF is known as a 'Fuzzy SF dictionary'.

Compared to any principle currently
220 utilised in dictionary-making and
compared to any existing multimedia
reference work, the following ten key
novelties of Fuzzy SF are either absent
from or would constitute important
225 improvements over what is done or
available at present (for a full
description, see De Schryver/Prinsloo
2001):

(1) In addition to data being
230 continuously available online, parallel
packages (both in print or in electronic
format) may be released throughout the
endeavour to compile a main package,
answering an urgent desideratum to
235 provide users with dictionaries now, and
enabling the inclusion of feedback into
the very compilation methodology itself.

(2) Since a completed package has been
thoroughly 'tested' before it is
240 released, it contains user feedback
right from the start; and once it is

used it (preferably) gathers its
feedback indirectly, informally and
unknowingly, eliminating any barriers
245 between compilers and users.

(3) The package offers fully fledged
default dictionaries, just like any
other hardcopy or electronic dictionary,
and, additionally, each user can
250 retrieve a personally tailored reference
work in print or in electronic format.

(4) The package is a family reference
work that can be customised for several
users, and is continuously re-customised
255 for each single user over time.

(5) The package is primarily
descriptive, and includes tools for
user-initiated modifications.

(6) The package provides for all
260 linguistically sound lemmatisation
approaches in parallel, allowing users
to decide on the one(s) appropriate for
them at the time of consultation.

(7) Both the access to and the visual
265 presentation of the data slots are such
that the distinction between
onomasiological and semasiological
dictionaries tends to disappear.

(8) The package endeavours to be all
270 dictionaries in one, moulding itself
according to specific needs and varying
with time as a decoding or encoding,
monolingual, bilingual or hybrid
dictionary, with adjustable / graded
275 difficulty levels.

(9) The package contains a set of fully integrated built-in multimedia (sub)corpora (i.e. text, computer graphics and audio), from which data are
280 generated automatically when needed (i.e. are queried unperceivingly by the software), and which can also be accessed interactively (i.e. are queried knowingly by the users).

285 (10) Finally, all multimedia data slots -- whether they have been prepared by the lexicographers, have been culled automatically or interactively from the sub(corpora), or have been supplemented
290 / supplied by the user -- are hyperlinked in the package on all levels and in all directions.

In retrospect, a Fuzzy SF dictionary
295 puts into practice quite a number of Abate's (1985) and Dodd's (1989) far-sighted suggestions for the electronic dictionary of the future. In addition, of all prototype electronic dictionaries
300 proposed in the 1990s, a Fuzzy SF dictionary comes closest to Atkins' (1996) 'virtual dictionary'. Yet, whereas the latter is mainly created at the time of dictionary consultation,
305 Fuzzy SF aims to build a true user profile, through the continuous retrieval of feedback, with which a tailored reference work is simultaneously assembled.

310 Not surprisingly, the compilation of
the latest Cilubà and Northern Sotho
dictionaries proceeds within the
framework of Fuzzy SF, see Kabuta et al.
(2006) and De Schryver/Joffe (2003)
315 respectively. As another known and
acknowledged example of dictionary
compilation within the framework of
(Fuzzy) SF, in Slovenia a hypertext
dictionary of Japanese lexical units for
320 Slovene students of Japanese is being
developed in real time on the Internet
(Hmeljak Sangawa 2002; Erjavec et al.
2003, 2004).

325 **3. From Fuzzy SF to Modern Dictionary Research**

In implementing Fuzzy SF, one is not
only confirming the feasibility of Fuzzy
330 SF as a dictionary compilation
methodology, nor just providing
dictionaries now, but in reality also
undertaking modern dictionary research
in addition. In the present section
335 Fuzzy SF will be approached from the
latter angle.

Although the proposal to draw upon log
files in order to improve dictionaries
was already expressed in the mid-1980s
340 (Abate 1985; Crystal 1986), and although
numerous researchers have reiterated
this idea in recent years
(Hulstijn/Atkins 1998; Sobkowiak 1999;

Docherty 2000; Harley 2000; Sato 2000;
345 Pruvost 2003; Varantola 2003), very few
reports have been published of real-
world dictionaries actually making use
of this strategy. Notable exceptions are
Löfberg (2002), Prószéky/Kis (2002),
350 Jakopin/Lönneker (2004) and
Bergenholtz/Johnsen (2005). Instead,
electronic dictionaries cum log files
seem to be more popular in research
environments focusing on vocabulary
355 acquisition (e.g. Hulstijn 1993; Knight
1994; Hulstijn/Trompetter 1998; Laufer
2000; Laufer/Hill 2000). When it comes
to electronic dictionaries, statements
regarding log files are often
360 hypothetical, such as in: "A log file of
user access and queries is kept that
should serve to give insight on how such
a service is used" (Popescu-Belis et al.
2002: 1144 [emphasis added]). What is
365 true for log files, is also true for the
utilisation of direct feedback, whereby
users are encouraged to comment online
(Dodd 1989; Carr 1997; Considine 1998;
Harley 2000; Nesi 2000; Warburton 2000;
370 Campoy Cubillo 2004; Ne'eman/Finkel
2004); that is, reports on what is done
with this type of feedback are hard to
come by.

One of the earliest implementations of
375 (the first stages of) a Fuzzy SF
dictionary on the Internet was for the
Online Northern Sotho - English

Dictionary (De Schryver/Joffe 2003). Of
the five novelties introduced in that
380 reference work (cf. De Schryver 2003: 5-
10), one is highly relevant here, namely
the so-called 'dynamic metalanguage
customisation'. This means that,
depending on the interface-language
385 chosen, the output-language of all
metalanguage such as POS tags, usage
labels, cross-reference marker texts,
etc. is customised. A world's first for
any online dictionary at the time (and
390 to this date), this metalanguage
customisation is realised in real time
and thus dynamically on the Internet,
and as such this was a first (timid)
step towards a true Fuzzy SF dictionary.

395 An article-length analysis of the log
files attached to this dictionary, as
well as of the online feedback forms,
may be found in De Schryver/Joffe
(2004). Of notable importance are the
400 unobtrusive studies of dictionary look-
up behaviour for particular users. In
Fig. 34.2, for instance, some of the
searches made by one of the many regular
visitors, here between 19 June and 12
405 September 2003, are shown. During the
studied period this visitor performed
168 searches, looked up in both Northern
Sotho and English, and did not use the
dictionary on weekends (grey). The word
410 hlogo 'head; prefix; heading; principal'
being rather polysemous, it is not

surprising it was looked for repeatedly;
yet the two searches for 'woodpecker'
suggest that there was no long-term
415 retention for the ways to express this
word in Northern Sotho. The data also
indicate that users seem to take the
compilers -- and with this perhaps even
Fuzzy SF -- seriously. In Fig. 34.2, the
420 first search for 'cellphone' (on August
15) was unsuccessful. During this user's
next visit (on August 28), the feedback
form was filled in with a request that
the compilers come up with a translation
425 equivalent for this word. Already four
days later (on September 1) this user
checked again, yet the matter was still
being researched. Three days later an
acceptable translation (mogalathekeng)
430 was found and uploaded. A third search
for 'cellphone' (on September 12) then
returned a hit. Note, in passing, that a
Fuzzy SF dictionary may thus also be
viewed as a service to the community.

435 This brief presentation of the Online
Northern Sotho - English Dictionary --
lest it be forgotten, a real electronic
dictionary used in a natural setting
with no manipulation of research
440 variables whatsoever -- shows that with
the discussed tracking function, any
number of individual user's look-up
strategies may be monitored over time,
which is especially relevant for
445 studying vocabulary retention and for

drawing up user profiles needed for an intelligent and adaptive Fuzzy SF dictionary. Generalisable user profiles are indeed becoming visible, although
450 formalising these remains to be done for this dictionary. As far as Fuzzy SF as a dictionary compilation methodology is concerned, the very fact that an in-progress dictionary is available and is
455 used (while still being compiled) indicates that the approach is feasible. Revisions and improvements of an online dictionary may indeed successfully be based on a semi-automatic analysis of
460 log files, in combination with follow-ups on feedback received electronically.

4. From Modern Dictionary Research to Open Questions

465

While the research results presented in section 3 indicate that unique user profiles can indeed be drawn up with which tailored dictionary data may then
470 be presented to those users, there are also aspects of dictionary look-up behaviour which seem not to be predictable (cf. De Schryver et al. 2006). In this section, a few of these
475 are highlighted, using some of the log-file statistics attached to the Online Swahili - English Dictionary (Hillewaert/De Schryver 2004), for which a good amount of data is available.

480 With regard to online dictionaries,
the metalexigraphers Bergenholtz and
Johnsen (2005: 122) boldly wondered:
"Will all lemmas in the dictionary be
looked up in time when the dictionary
485 has had many more users? Or are there
some lemmas that will never be looked
up? If future dictionary makers knew the
answers to those questions, they would
not have to waste time describing words
490 of no interest to the users." Are there
indeed lemmas that are of no interest to
anyone? To test this hypothesis, the
first half a million searches logged for
the Online Swahili - English Dictionary
495 may be looked at in order to see which
percentage of the dictionary is being
returned as the number of searches grows
over time. Taking a snapshot every one
thousand searches, the graph shown in
500 Fig. 34.3 is obtained.

The bottom curve indicates that over
86% of the material has been searched
for directly, while the top curve
indicates that close to 98% of the
505 dictionary data have been returned when
one also includes the cross-referenced
material (which is shown on the same
output page for this dictionary).
Looking at the trend of these curves, it
510 should be clear that all dictionary data
will indeed be seen over time. This thus
means that there is no shortcut to
dictionary compilation here, as all data

are indeed being looked up at some point
515 in time.

The next logical question is whether
there are perhaps lemmas that are more
likely to be looked up than others. With
over half a million dictionary searches
520 at one's disposal on the one hand, and
with corpus-derived frequencies on the
other, it becomes possible to calculate
various correlation coefficients between
the two sets of data. Reformulated, one
525 can effectively take a list of corpus
words, and compare that list word for
word with actual dictionary searches,
and/or one can take searched-for items
in a dictionary, and compare those with
530 the corpus. There are different ways to
approach this question, but one of the
most straightforward ones is as follows.
In a two-dimensional plane one could
plot the corpus data (as frequencies or
535 ranks) on one axis, and the
corresponding actual dictionary lookups
(expressed as a count or also as a rank)
on the other axis. If corpus-based
lexicography indeed reflects (or rather
540 'pre-empts') what users look up (or
'will look up') in a real dictionary,
then the most frequent word in the
corpus should also correspond with the
word most frequently searched for, the
545 tenth most frequent corpus item should
correspond with the tenth most frequent
lookup, the one hundredth with the one

hundredth, etc. In this ideal situation, the result would be a straight line out
550 of the intersection of the axes in the two-dimensional plane. Allowing for (small) deviations, the straight line would turn into a 'scatter plot', with a cloud of dots 'around' the imaginary
555 straight line. Mathematically, the straight line corresponds with a Pearson correlation coefficient of 1.0, while deviations result in lower values. The actual scatter plot for English is shown
560 in Fig. 34.4, where each dot represents the dictionary lookup rank of a particular word versus the corpus rank for that word in the BNC (British National Corpus). If one zooms in on the area around the intersection of the axes
565 in Fig. 34.4, or thus the top ranks, then one does see some kind of vague correlation (of around 0.2), but as one moves along the axes, this correlation
570 vanishes entirely. Therefore, while there is indeed some minor correlation between corpus ranks and actual dictionary lookup ranks for the first few thousand words (up to around rank
575 5,000 for English in this online dictionary), beyond that point there simply is no correlation whatsoever.

This is a hugely important -- albeit shocking -- revelation, as it looks as
580 if it is simply impossible to 'predict' which words will be of interest to the

dictionary user. To make this conclusion more tangible, take for example Fig.

34.4 at the BNC rank 15,000, which could
585 be the cut-off point for a dictionary with an upper limit of roughly fifteen thousand entries. Looking upwards from that point in Fig. 34.4, it should be clear that it is unfortunately so that
590 virtually any word may be looked up with any frequency at this cut-off point.

According to the computational linguist Adam Kilgarriff, however, it is still possible to predict what users
595 will need: "They'll tend to look up the contentious ones, the ones that are hard to spell, the ones with odd origins, obviously the rude ones. There's no obvious relation between these factors
600 and frequency, but why should there be?" and he further suggests: "One would start expecting the correlation to become serious much further along the frequency range -- words after 200,000
605 in the corpus (and hence well outside most speakers' experience) receiving fewer lookups than words before."

(Kilgarriff 2006, personal communication). Clearly, one would need
610 much more evidence, and thus much more data, to properly study these hypotheses. As such, this, for now, remains unresolved, and is an open invitation for other researchers to join
615 the research.

One of the exciting developments in present-day lexicography revolves around electronic dictionaries in which the potential is explored to link an automatically derived dynamic user profile to the proffered multimedia lexicographic output. As a product, such (adaptive) dictionaries were referred to as Fuzzy SF dictionaries. However, Fuzzy SF is also a new approach to compiling dictionaries, given that it is the electronic adaptation of the dictionary-compilation methodology known as Simultaneous Feedback. A Fuzzy SF dictionary as a product, then, is first compiled within the framework of Fuzzy SF. A Fuzzy SF dictionary is furthermore -- by design -- an excellent tool to study genuine dictionary use, which in turn leads to exciting answers to age-old as well as new lexicographic questions.

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Fig. 34.1

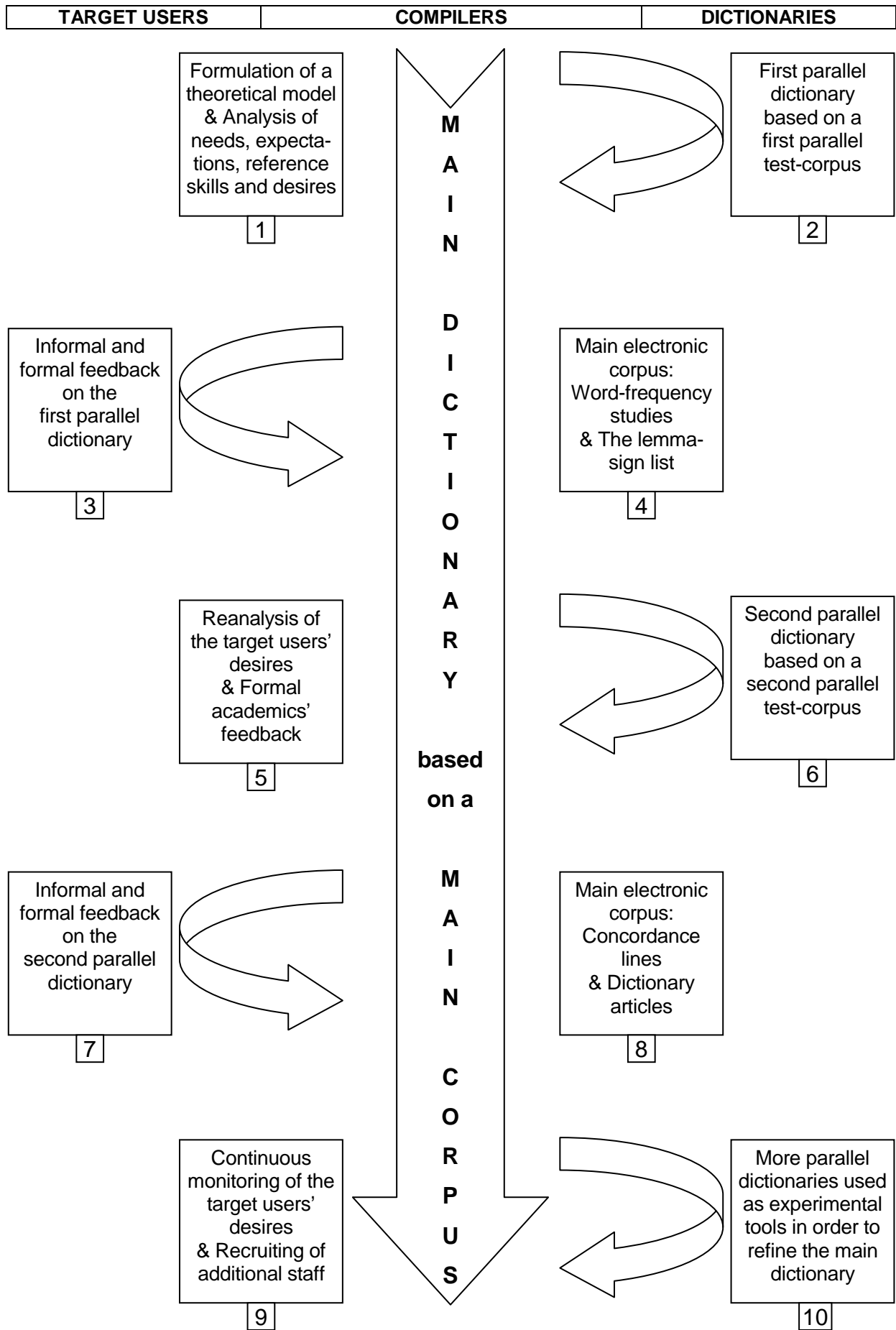


Fig. 34.1: The theoretical framework of Simultaneous Feedback

Fig. 34.2

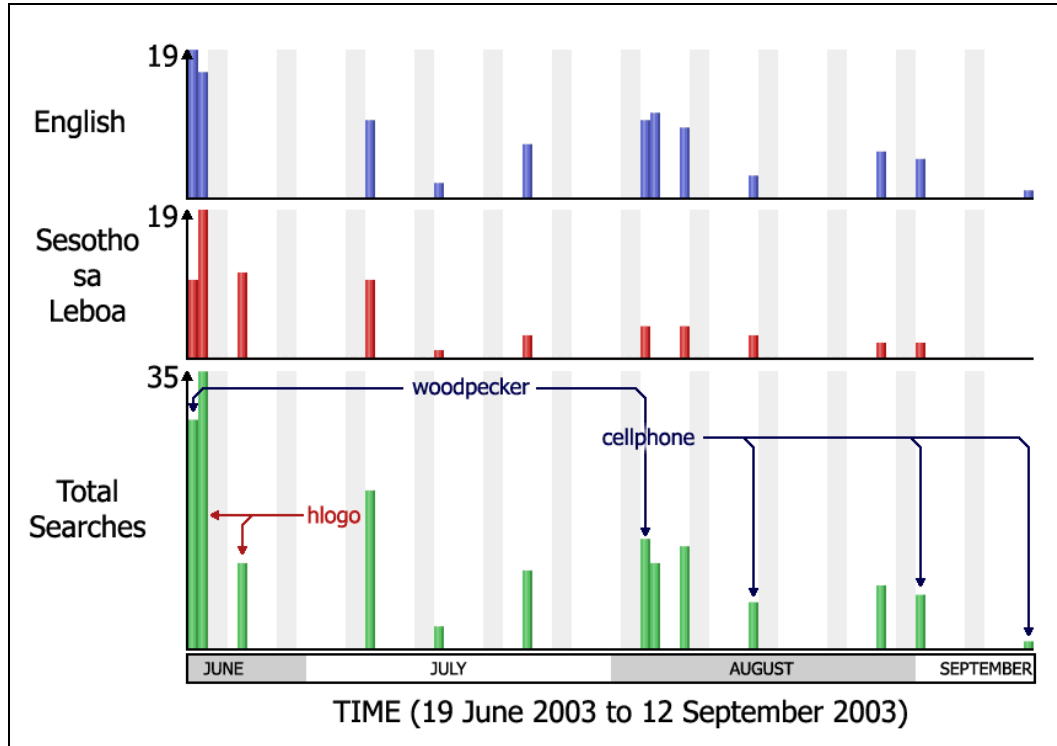


Fig. 34.2: Selected searches by one particular visitor of the Online Northern Sotho - English Dictionary

Fig. 34.3

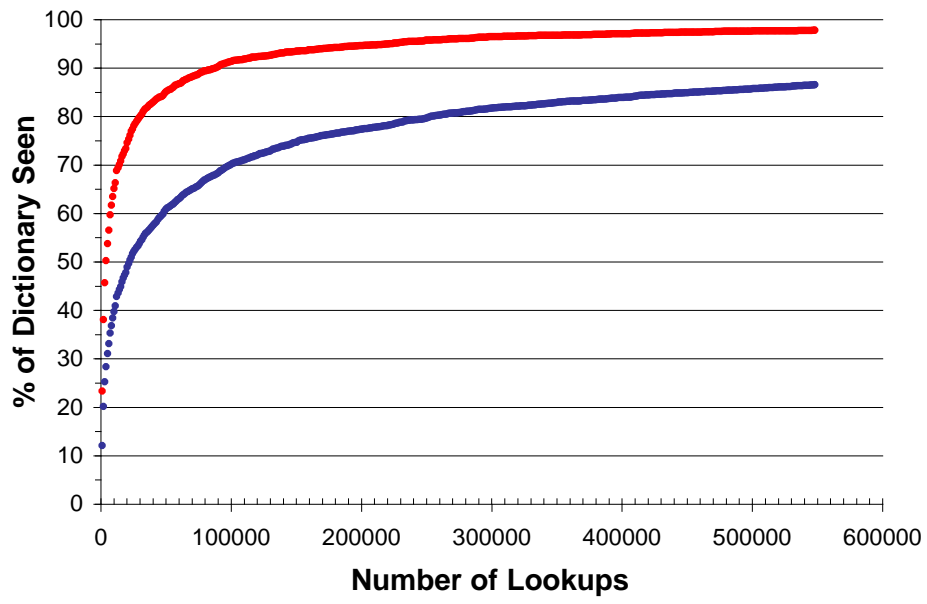


Fig. 34.3: Percentage of dictionary returned ('seen') in function of the total number of searches (bottom: directly, top: with cross-references)

Fig. 34.4

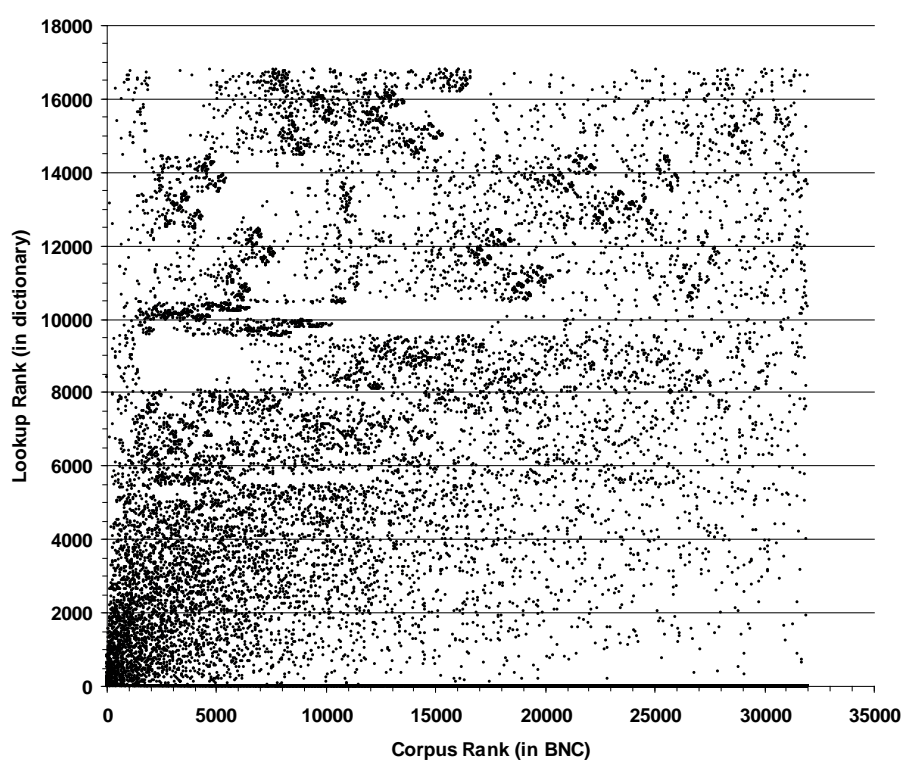


Fig. 34.4: Ranks of English 'dictionary lookups' versus their corresponding 'corpus frequency' ranks in the BNC (British National Corpus)