WORK, LANGUAGE AND PERSPECTIVE:
An Empirical Investigation of the Interpretation of
a Computer-Based Information System

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Abstract

On the basis of empirical material, this paper will demonstrate how different perspectives on work can be pointed out and described, and how concept spheres can change when different work languages are brought together.

In a process of systems development, various professions take part. Some professions have the purpose of describing and organizing the work, other professions have the purpose of performing the work. There is an important linguistic difference in perspective between those two purposes.

The language of instructors and coordinators is general and normative, the language of workers is specific and descriptive. When a computer system is introduced, terms and concepts from different work languages are introduced and it is difficult to predict what the linguistic changes will be. It inevitably leads to the alteration of old concept spheres and the emergence of new ones, but the result is not always what was expected by the designers.

A well intended linguistic design is sometimes accepted and sometimes rejected by the users. This fact might be explained as a result of merging or contradicting perspectives.

Keywords: perspective, semantic roles, semantic fields, work language, processes, activities.
1 Introduction

The concept of perspective is a wide and diffuse one and there is no unambiguous definition to be given. But still it is a commonly used concept and a concept recognized as very important in the process of systems development. Nygaard and Sørgaard who makes a theoretical investigation of the concept, its interpretation, definition and relations to systems development state:

A well developed ability to identify and learn a wide range of perspectives is important to people working in systems development. Their training should be organized with this as a main objective. (Nygaard & Sørgaard 1987)

This statement stems from a wish to resolve misunderstandings and detect hidden conflicts in the process of systems development. I will not try to give a recipe for a number of perspectives to be learned, because I think it is rather naive to believe that we can learn or be taught perspectives. We all adopt our own perspectives according to our interests in specific work situations, not as an act of will but as an unreflected necessity in praxis. I do believe though, that there is a point in being able to identify differences in perspective or at least being aware of these differences. So what I will do is, with some general assumptions about language usage as a point of departure, to indicate which linguistic details to look for, when trying to identify differences in perspectives.

1.1 General Assumptions

In a large company, there is division of labour. This means that groups of people in the same company—in the same organization—carry out different functions. These groups develop different sub-languages on the basis of their professional backgrounds and the nature and organization of their functions. In a systems development process, various professional categories participate—system developers, programmers, technicians, managers, organization experts, coordinators, training managers, union representatives, instructors, and sometimes even the users in question. Representatives of these categories carry with them languages developed for the handling of their traditional functions. And the development of the computer based system—the computer system itself and the interpretation and use of it—will be influenced by these languages. When the computer system is introduced, a confrontation of a number of different professional languages and work languages take place. This does not mean that I see the languages of the organization as a conglomerate of mutually incompatible and incomprehensible languages for special purpose, which inevitably cause misunderstandings and conflicts, because of their specific vocabulary. That I see as a minor problem, because new words can always be explained and learned if needed. What might bee a bigger problem is that we always adopt a specific perspective on reality, when we use words and put them together into sentences to describe or comment
on events or to take part in action. Conflicts caused by different perspectives are not always so easily detected.

In many cases, perhaps in most cases, we do not notice the misunderstandings or conflicts before it is too late. We tend to look upon our common national everyday language as the default value for our linguistic interaction: a means of communication which is always at hand and which we do not reflect upon until we find ourselves in a situation where communication breaks down and causes a physical inconvenience (cf. Winograd & Flores 1986). We assume that we speak a language that everybody can understand, but the point is that we always face linguistic choices of some kind when describing reality—choices which have to do with what we want to or must “do”, which actions we are directed towards. Depending on which roles (or acting potentials) we perform in the organization of the work, we adopt different perspectives of the work.

I believe that the different sub-languages of an organization—here expressed as differences in perspective—always are in constant contact with each other, influenced by each other, and thereby they create new language forms and new meanings. What makes a system development process different from previous changes in the organization is that the different language forms become more tangible here. Partly because the technological change in question is a radical one, but most of all because the computer is a symbolic tool, through which different perspectives are verbalized and made public. Parts of different sub-languages mix, new conceptual spheres emerge and it is not always clear whose perspective is the dominant one.

1.2 Material and Method

In order to avoid the traditional linguistic approach which interprets linguistic expressions as paraphrases of terms from the common national language, which incidentally very often happens to be the linguists own sub-language with its implicit perspective, I will use an empirical method of contrasting authentic speech situations. This means that I have to present rather long examples which can be a bit boring, but at the same time the method gives the reader a possibility to use her own judgements.

In the beginning of the eighties I made an empirical study of the work language on the office floor in a book keeping department at the Postal Giro in Stockholm before the introduction of computers (Holmqvist & Källgren 1986, Holmqvist 1986, Holmqvist & Andersen 1987). 1986 I made a new study while computers were introduced at the same place (Holmqvist 1988, Andersen 1989). With examples taken from those studies I will illustrate how, in a given situation, different staff categories with different associations to the working process handle the same phenomenon linguistically when talking about the system, and how this creates different perspectives. I also illustrate how the intention behind the systems, as it is reflected in its design, is interpreted by the users.

Since the aim of the paper is not to discuss a linguistic theory and since lin-
guistic theories originally has not been developed to describe the world of systems
development I do not present a complete theoretical framework. In a rather ecletic
way I use bits and pieces from my educational inheritance to apply them in
this specific context. It is a mixture of ordinary school grammar and more sophis-
ticated theoretical reasoning. Therefore I find it more instructive to present the
methodological and theoretical framework along with the empirical observations.
There are two concepts though that should be known before the reading starts
and that is the concepts of Work Language and Professional Language. These
concepts are throughout the article used in the following sense:

A work language is a language used in a work situation, with the purpose of
supporting, changing or commenting the immediate working process, the orga-

ization of work, the shared knowledge, values and the social relations constitu-
ing the work situation. A work situation is a situation whose activities and roles are
seen by the participants as belonging to the work they are responsible for and
paid to perform. A professional language is a wider concept that includes all
languages that are motivated by the work situation, for example also language
used about the working process on a planning or educational level (Holmqvist &
Andersen 1987).

1.3 The Article

The article falls into two main sections and a final discussion. Section 2 shows how
perspectives differ with organizational roles. Three speakers with different roles
in the organizational hierarchy are contrasted in different ways and an attempt
to characterize three different perspectives is made. The characterization take its
point of departure in differentiations between speakers who (a) talk in work or
talk about work, (b) are only spectators to the working process or also partake in
it, (c) are solely organizing the working process or are solely performing manual
tasks.

Section 3 shows how perspectives meet in the computer based system. I
compare the linguistic part of the display design and the users’ interpretation of
it as it is shown in their work language. The focus is on descriptions of working
material and descriptions of working tasks. In the Conclusion the consequences
of the discoveries for systems development are discussed.

2 Perspectives Differ with Organizational Roles

In a traditional hierarchical organization, it is possible to distinguish between two
fundamental roles in relation to the work: one role that performs the work, and
another that describes and organizes the work. Linguistically, this means that one
either talks in the work or about the work. In a hierarchical organization, there
is often a clear distinction between these two. The roles are of course not fixed
and their manifestations vary according to the role constellations constituting the
situation. But the following is based on the hypothesis that there is a fundamental
and visible differentiation of manifestations and that there is a methodological point in describing people’s linguistic manifestations as a product of their different associations to the working process.

2.1 Describers and Performers

In the following example, (a) has been taken from a recorded interview with a coordinator, (b) from a recorded interview with an instructor who teaches the use of the system at office level, and (c) from a recording of the authentic work language at office level. In (a), the interview takes place in the office of the interviewed, in (b) at a table in the book-keeping department, and in (c) at a work station.

(a) The coordinator:

En tanke med den optiska lasningen är ju att allt man kan lasa optiskt ja, direkt, till exempel vbra inbetalningskort C, på dom finns ju fullständig optisk kodrad, alltså så behöver dom aldrig gå vidare till B 25.

One of the purposes of the Optical Character Recognition is of course that one can read everything optically—directly, that is—for example our pay-in slips “C”; because they have complete rows of optic codes, so they never have to pass the B 25.

(b) The instructor:

Nu sitter dom ju och kodar en massa C-kort som har det optiska fältet här, det går ju å lasa för maskin och dom laser alltså kortet vi behöver inte rora den, när vi lager det i facket så laser ju maskinen det sen lyfter vi opp den dar blåa lådan sen är dom klara.

The instructor:

They code a lot of C-slips that have this optic area—the machines are able to read it, and so they rend the slip and we don’t have to touch it—when we put it into the frame, the machine reads it and then we lift the blue box, and then they are finished.

(c) The work situation:

(...)

Instructor: gor då så här tycker jag, ta en liten lapp å så satter du på C-kortet och talar om att det är ett C-kort, sen när ni får tillbaks det då lager ni allthithopa i lådan har

Girl: du det har får ligga till i morgon bitti då, sen ger jag henne det för jag hade ett i dag som jag lamna till henne ett kort som saknades va som hon hade minskat ur, det ska vi ta med, sen lager ja tillbaka det här C-kortet när hon...

I: ja

Girl: for det vill val hon se också om du lämnar in det i buren, hon vill ju se C-kortet också
Instructor: Well, I think you should do like this: you take a small piece of paper, and then you attach it to the C-slip to tell that it is a C-slip. Later, when you have got it back, then you put everything in this box.

Girl: Well, I'll have to leave this till tomorrow morning, then I'll give it to her, because I had one today that I left for her—a slip that was missing something that she had cut out—we'll take that too, and then I'll put back this C-slip when she ...

I: Well

Girl: Because she is bound to see that one too if you leave it for her, she wants to see the C-slip too.

In the first two examples, the interviews take place outside the work situation and the persons are talking about work. The difference is that the person in (a) does not normally take part in the working process in question, whereas the person in (b) does. In (c), the persons interfere with and comment on the process in which they both take part.

When we look at reality, we always concern ourselves with parts. We are interested in one slice of the cake, and we reject the rest. In simple terms, what we are interested in is usually something we want to learn about, or think that the person we are talking to wants to learn about, and what we reject are things we do not need to know, or which we already know. This has direct consequences for how we select things to talk about.

In this case the overall selection has been done by me; I have picked out bits from long conversations. Furthermore, in the first two cases, the participants’ actual selection is determined by the questions asked by the interviewers, the subject being “advantages of the new system”; and in the last case, it is determined by the working process—the persons talk, in a simple manner, about problems as they appear in the course of the work.

To Be General or Specific

In both (a) and (b), the attitudes to the working process are of a general nature. Both persons are able to describe the general premisses of the process without including specific persons or objects or time and space. This is demonstrated by their choice of indefinite pronouns, for instance:

- man kan lasa
- one can read
- sitter dom och kodar
- they code
- allt man kan lasa
- everything, one can read
- en massa C-kort
- a lot of C-slips
and in the use of nominalizations:

den optiska lasningen
the Optical Character Recognition

and temporal/causal relations combined with timeless present tense:

på dom finns ju...altså så
because they have ... so they

nar vi lagger... så
when we put ... then

Moving on to (c), we will see that this example is not on the same footing as the others, although it deals with the same working process. The description of the working process is not of a general nature; instead, the language is used for interfering with work and commenting on it. This means that the statements are related to time and space. They talk about specific work objects, that can be pointed out in the room, and specific persons. This is shown in the use of the definite article:

sen lagger jag tillbaka det har C-kortet
then I'll put back this C-slip

and personal pronouns:

så satter du på
then you attach

sen lager jag tillbaka
then I'll put back

hon vill ju se
she wants to see

The actions they talk about take place within a certain period of time:

får ligga till i morgon bitti
leave this till tomorrow morning

jag hade ett i dag
I had one today

and in a certain sequence of time:

ta en liten lapp och sb ...
take a small piece of paper, and then ...

with time specific perfect tense:

sen när ni har fått tillbaks det db...
later when you have got it back, then...

When they talk about work they adopt a perspective of generality whereas talking in work implies a perspective of specification.
To Be Normative or Descriptive

The staff is working at work station B 25. In examples (a) and (b), we find statements about the flow of data and the handling of material that are directly contradicted in (c). With regard to the C-slips (paying-in forms that are fully pre-coded), it is said that:

they never have to pass the B 25

and that

we don’t have to touch them any more,

but in (c) there are indications that the C-slips are in fact included in the work at the work station:

ta en liten lapp å så satter du på C-kortet och talar om att det är ett C-kort,
you take a small piece of paper, and then you attach it to the C-slip to tell that it is a C-slip;

sen lagger jag tillbaka det har C-kortet
then I’ll put back this C-slip

hon vill ju se C-kortet också
she wants to see the C-slip too

This does not mean that (a) and (b) are lying, it simply means that they have both decided not to talk about the concrete reality; instead, they talk about the system as principle and possibility which can be seen in their use of words for purposes and possibilities:

En tanke med den optiska lasningen,
One of the purposes of the Optical Character Recognition;

vi behöver inte röra den,
we don’t have to touch it;

det går ju att läsa för maskin.
the machines are able to read it.

While the coordinator and the instructor are normative, talking about how the working process ‘ought to’ be, the staff is descriptive, talking about break downs in the routine and how the working process ‘is’. The working process ‘is’ such that the C-slips are often not recognized by the machine, and have to be manually registered, but it ‘ought not’ to be in this way.
Summary

Due to their organizational and educational background the coordinator and the
instructor are often forced to talk about work, while the staff almost all the time
is talking in work. Perspectives differ when you are talking about work and when
you are talking in work. When talking about work you are standing outside the
situation you are talking about. This means that you cannot rely on time and
space. Therefore your description tends to be of a general nature. When you are
talking in work, on the other hand, you are bound to time and space and cannot
avoid talking about the specific event you are partaking in. Some linguistic clues
to look for are:

<table>
<thead>
<tr>
<th>general</th>
<th>specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>indefinite pronouns</td>
<td>definite pronouns</td>
</tr>
<tr>
<td>timeless present tense</td>
<td>time specific perfect tense</td>
</tr>
<tr>
<td>verbal nouns</td>
<td>adjuncts for time and location</td>
</tr>
</tbody>
</table>

When talking about work it is easy to become normative since the work situation
is not present to verify your description. When talking in work on the other
hand, deviations from the norm often become the main conversational subject.
Grasping a normative perspective is very difficult without thorough knowledge
about the working situation. In this case, it is reflected in nouns for purposes
and verbs for possibilities and therefore detectable.

2.2 Participants and Spectators

Though the coordinator and the instructor both adopt an “about” perspective
there are differences. These differences are due to their roles as spectator versus
participant. The coordinator’s job is to establish routines for production and
co-operation on an overall level. Therefore he has to adopt what is usually called
a bird’s perspective. The instructor’s job is to teach the routines in direct
connection to the work situation. She does not perform the work but still she is
present in time and space, giving a helping hand and good advices. Therefore
she tends to adopt an ant’s perspective.

Talking About Activities or Processes

The linguistic item that reflects their difference in perspective most clearly, is
probably the semantic roles appearing in the examples. A semantic role is a
relationship between a verb and another constituent of a sentence describing an
event. It is characteristic of the common semantics of verbs that they have certain
roles attached to them. For instance, a verb like “läsa” (to read) implies that
there is a reader, an agent, and that he or she reads something, an object. He/she
may use a magnifying glass, an instrument, to help him/her read “Hanna read
the book through a magnifying glass”. It also implies that the reading is done
in time and space “at the kitchen table yesterday”. Sometimes there is also a
cause built in “Hanna who has bad eyes read...”.
The semantic roles is supposed to be part of the linguistic deep structure. The linguistic deep structure is the abstract system behind our concrete usage of language, which in turn is called the surface structure according to the theory of transformational grammar (Chomsky 1965). The semantic roles can manifest themselves as different grammatical roles (sentence members) in the linguistic surface structure. The following is a classical example taken from the American linguist Charles Fillmore who introduced the theory of a semantic deep structure (Fillmore 1968). The first sentence represents the basic meaning with a ‘normal’ coherence between the semantic deep structure and the grammatical surface structure.

<table>
<thead>
<tr>
<th>Seymour broke the window with a stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>agent object instrument deep structure</td>
</tr>
<tr>
<td>subject object adjunct surface structure</td>
</tr>
</tbody>
</table>

It is now possible to vary the grammatical manifestations of the semantic roles on the basis of what one wants to emphasize. If it is not interesting who performs an action, but only what aids are at hand, the agent is removed and the instrument is made the grammatical subject.

* A stone broke the window

If one is only interested in the result of the action, the object is made the grammatical subject.

* The window broke

and if one is interested in the event as the cause of a new event the verbum plus the object can be turned into a nominalization and made the grammatical subject.

* The braking of the window caused him trouble.

Now let us compare this with how the coordinator and the instructor expresses themselves above. In the all following sentences we can encatalyse this constructed sentence:

“Workers can read slips by the means of an OCR.”

Agent object instrument

The coordinator expresses himself like this:

allt man kan lasa optiskt
everything one can read optically

neither the agent nor the instrument nor the object is made the grammatical subject. Instead a subject dummy has been introduced in the form of the indefinite pronoun “man” (one). And in the next one
the event has been turned into a nominalization, i.e. a thing that can be given a grammatical role in a new sentence.

The instructor, however, behaves a bit differently:

- *det går ju att lasa för maskin*  
  *the machine is able to read it*

- *dom laser alltså kortet*  
  *so they read the slip*

- *så laser maskinen det*  
  *the machine reads it*

and makes the instrument the grammatical subject in all three sentences.

When I compare the coordinator to the instructor I would say that the former’s perspective is the perspective of a flow, in which the focus is on the paper and informations (everything that one can read), and actions on them is looked upon as an object (the optical recognition), while the latter see focus on machine activities that make paper and information float.

However, the instructor does not only focus on machine activities. The procedure which the coordinator describes as:

- *den optiska lasningen*  
  *the optical recognition*

the instructor describes in three stages:

- *vi lagger det i facket*  
  *we put it into the frame*

- *maskinen laser*  
  *the machine reads it,*

- *vi lyfter opp den blå lådan*  
  *we lift the blue box*

While the coordinator rejects people as well as activities, the instructor includes the physical activities before and after the technical processing with persons as agents.

Whereas the coordinator goes on to talk about the work station, through which the ‘flow’ does not pass:

- *alltså behöver dom aldrig gå vidare till B 25*  
  *so they never have to pass the B 25.*

making the slips the subject of his sentences, the instructor stops at the workers making them subjects and the slips objects:

- *vi behöver aldrig röra dom*  
  *we never have to touch them.*
Summary

A coordinator’s job is to establish routines for production and co-operation on an overall level. His work object is processes by which information is transmitted. To him, the information plays the main part in the game. The instructor’s job is to teach the routines, and her work objects are workers performing concrete activities. To her the workers or their stand-ins performing the activities are playing the main part.

The linguistic clues to look for in a flow perspective are:

0 verbal nouns filling a grammatical role as objects or subjects,
0 semantical objects as grammatical subject, and
0 semantical instruments as grammatical locative adjuncts.

And for the activity perspective:

0 semantical agents as grammatical subjects,
0 semantical objects as grammatical objects, and
0 semantical instruments as grammatical subjects.

2.3 Controller or Controlled

When the coordinator above chooses to focus on the slips and B 25 instead of people and their actions, this is because he organizes the phenomena of reality in a different way than the instructor does, and when both describe reality, they do so with different concepts. On the basis of previous experiences and main interests, we draw different conclusions from what we see. A phenomenon can be perceived differently, because our attention is directed towards different parts of it, and when we conceptually organize the phenomenon it may end up in different conceptual spheres. We are faced with different concepts of the same phenomenon, or parts of it, so to speak (Anderson & Furberg 1972).

The duty of an employee at office level is to perform the routines. Her work objects are paper and electronic digits. In case of a breakdown, it is the duty of the coordinator to change the routines, but until this happens, it is the responsibility of the employee to solve the problems outside the routine. There is a simpler way of expressing this: To the former, it is a question of preventing errors; to the latter, it is a question of correcting them.

The following example illustrates this very well. It is taken from the interview with the coordinator and from a girl who is “thinking out loud” while working at her work station. The subject of the linguistic activity is error messages and the interrelationship between paper and machine. As before in the interview, the selection is done very consciously. The interviewer has delimited certain fields of interest beforehand, and these are brought up and dealt with one by one. In the work situation, the fields of interest and conversation follow the working
process and the selection is determined by it. Among other things, this means that whereas the error messages and paper/machine relationship is dealt with as a whole in the interview, it only crops up occasionally in the work situation, and only when it is made topical by a sound signal (‘beep’) from the terminal. But both deal with the same part of reality.

(d) The coordinator (R): vi har ju haft problem i sjalva specificeringen av sjalva användarkraven just för att hitta kombinationen utav när man jobbar mot kortet och när man jobbar mot skarmen. Ursprungligen som sagt så fanns då en inbyggd teknik i botten och då var det så att sagra sjalvklart att vissa funktioner lostes utifrån den forutsattningen att det fanns inget kort att titta på. Sen när vi införde att man jobbade mot kortena och la det som en forutsattning i botten så var det en rad funktioner som gick på hur dialogen med skarmen skulle se ut som behövde andras och då jobba vi ibland med ljudsignaler för att bryta ett moment där man har jobbat emot kortet och få igång ett moment där man jobba mot skarmen.

The intervjuer (L): ljudsignaler anvandes för att markera ett skifte.

R: som det funkar rent praktiskt i och med att man har korten så jobbar man ju så att sagra i kompletteringsogonblicket normalt sett mot kortet och det ar ju då när man, när programmets logik sager att man gjorde fel, eller när man är färdig för omställningsogonblicket, som man så att sagra måste bryta det här att man sitter och tittar på kortet och registrerar.

L: och tittar på skarmen

R: mm, då använder vi ljudsignaler, dialogerna är uppbyggda på ett sånt satt att till nästa dokument eller nästa bunt, så att sagra, måste man ha kommandon som är såna att programmet kan detektera om tlexempel personen har suttit och jobbat mot skarmen och inte upptackt att det kommer en misstamning och bara går vidare

R: you see, we have had trouble specifying the needs of the users in order to find the right combination between working with the slip and working with the monitor display. As mentioned, the system originally had a built-in technique, and it was obvious that certain functions were carried out with the assumption that there would be no slips to look at. Later on, when the working with the slips was introduced, and this was made a condition in the system, a number of functions concerning the dialogue with the monitor display had to be altered, and then we sometimes worked with sound signals in order to interrupt the working with the slips and introduce the working with the monitor display.

L: sound signals are used for indicating a change.

R: the way it junctions in praxis, in connection with the slips, you normally work with the slips in the moment of completion, and then, when you, when the logic of the program tells you that you’ve made an error, or
when you have finished the readjustment, then we must interrupt this sitting and looking at the slip and registering.

L: and instead look at the monitor.

R: yes, that’s when we use sound signals, or else we use ...the dialogues are constructed so that the next document, or the next bundle, so to speak. ...you must have the commands, which are constructed so that the program is able to detect if, for example, the person has been working with the monitor display and hasn’t noticed a certain error, and simply continues.

(e) The girl thinking out loud at the monitor:

...ar dagnummret, sista siffran på dagnummret å, men är det maskinnummret och sen är det lopnummret och sista siffran här är kontrollsiffran för det hela, och därför måste jag slå ... och sen fem, sen ar det summan ’piip’... jag fär inte bladtra som jag vill det var fel ’piip’ det har va också fel, [P: hur ser du det?] for att det är ”tyvärr kontrollsifra är felaktig”, då måste jag ta bort den här varningsignalen, så in jag bort den dar.

... så försöker igen, nu gick de, för den va valdigt otydlig... ... ’piip’, nu e ”varning denna bunt balancerar inte”, då e det nål fel på bunten. hur kan den veta det, jo det står tretti ore, då e det nål fel, .. for att jag slog in den här, de e slutsumman på hela bunten men de va nål fel, ah jag slog ser du? det ar minus, vanta... det ar åtti, är du färdig med bunten nu? Na for den missa, den stammer inte,

så nu har den inte kunnt lasa sista (...) två—’piip’ fel, — ’piip’ jag får alltid med två siffror ’piip’ ’piip’ fel, det dar kommer jag alltid det där pipandet [P: Vad gjorde du?] ’piip’ ’piip’ — [B: Du tryckte på fel knapp,] ja, det är felaktigt kontonummer, då ar det 896783 ’piip’, det e felaktigt, därför har vi ett annat kontonummer vi ska använda... .

... the day number, the last digit of the day number, and then it’s the machine number, and then it’s the serial number, and the last digit here is the control digit, and therefore I have to type ...and then five, then it’s the total (’beep’) ...I can’t flip through the slips when I want to — that was wrong (’beep’) this was also wrong; [P; how can you tell?] because it says “sorry, wrong control digit”, then I have to remove this warning signal, and then I remove that one,

...then I’ll try again, now it works, because it was very blurred. (...’beep’), now “warning, this bundle does not balance”, then there’s something wrong with the bundle. how does it know, well, it says 30 öre, so something’s is wrong, ... because I typed this, that’s the total of the whole bundle, but something was wrong, you see? it’s minus, wait ... it’s eighty, have you finished the bundle now? No, because it’s wrong, it doesn’t balance,

so now it hasn’t been able to read the last (...) two—(’beep’) wrong, — (’beep’) I always end up with two figures (’beep’ ‘beep’) wrong, I always
get this beeping [P: What did you do?] (‘beep’ ‘beep’) — {B: You pushed the wrong button,] yes, that’s the wrong account number, then it’s 896783 (‘beep’), that’s wrong, that’s why there’s another account number we have to use ... 

To both the girl and the coordinator, an error is always an error, whether she herself, the client, or the OCR caused it:

The coordinator talks about all possible errors as handled as one thing by the system:

   nar programmets logik säger att man gjorde fel,  
   when the logic of the program tells you that you’ve made something wrong  

The girl is talking about errors in the balance:

   ‘piip’, nu e “varning denna bunl balancerar inte”, då e det nåt fel  
   ‘beep’, now “warning, this bundle does not balance”, then there’s something wrong with the bundle  

and errors in her physical handling of the key board, where the display says “Sorry you have pushed two keys at the same time”

   ‘piip’ jag fär alltid med tvi sifferr ‘piip’ ‘piip’ fel, det dar fär jag alltid det dar pipandet  
   ‘beep’ I always end up with two figures ‘beep’ ‘beep’ wrong, I always get this beeping  

as beeing the same message from the system.

But their ways of interpreting an error message are still different. The coordinator organizes it as one of several possibilities of preventing errors in the end:

   då anvander vi ljudsignaler eller också anvander vi, dialogerna ar uppbryggda p i ett sånt satt att nasta dokument eller nasta bund så att saga måste man ha kommandon som ar såna att forebygga fel i slutandan om tillexempel personen har suttit och jobbat mot skarmen och inte upptackt att det kommer en misstamning och bara går vidare.  
   that’s when we use sound signals, or else we use ...the dialogues are constructed so that the next document, or the next bundle, so to speak ...you must have the commands, which are constructed so that they prevent errors in the end if, for example, the person has been working with the monitor display and hasn’t noticed a certain error, and simply continues;
Furthermore he interprets the sound signal as attention control in a conceptual sphere that could be described like this:

- **Signal:** look at the monitor
- **No signal:** look at the slips

This is illustrated in his use of the preposition ‘against’ and the verb ‘look’in the following examples:

- och då jobba vi ibland med ljudsignaler for att bryta ett moment där man har jobbat emot kortet och få igång ett moment där man jobba mot skarmen.

  *and then we sometimes worked with sound signals in order to interrupt the working against the slip and introduce the working against the monitor display.*

- vi måste bryta det har att man sitter och tittar på kortet och registrerar.

  *we must interrupt this sitting and looking at the slip and register.*

He is not saying “working with the slip” which implies a physical action, for the same reason as he do choose the word “look”.

Whereas the coordinator sees potential errors, the girl sees it as errors that are already there and must be removed here and now in order that she may continue to work. She interprets the signal as action control:

- **Signal:** re-adjust your previous action
- **No signal:** keep going

which is illustrated with her verbs for physical action

- då måste jag ta bort den har varningssignalen,
  *then I have to remove this warning signal,*

- så tar jag bort den dar,
  *and then I remove that one,*

She is given an error message and she cannot continue with her job unless she adopts a certain course of action.

- Så försöker jag igen, nu gick det.
  *then I’ll try again, now it works.*

While the coordinator tends to look at the electronic digits as the real work objects in the process of registration, and the paper as just a necessary evil that causes error:
vi **måste** bryta det har att man sitter och tittar på kortet och registrerar.

*we must interrupt this sitting and looking at the slip and registering.*

the girl views paper as the real work objects and the computer system as a necessary evil that control her activities:

jag **får inte** bladdra (i kortbunten) som jag vill.

*I am not allowed to flip through the slips the way I want to.*

She is not allowed to flip through the paper pile the way she wants to and like she used to before the computer was introduced, because if she does, she is not able to see some information that she now has to register but earlier could disregard. Here the beeping calls her attention to the paper pile and her handling of it, not to the monitor as was the coordinators intention!

**Summary**

The coordinator’s perspective is a flow perspective because his task is to prevent errors in the final product. From this perspective the error messages are means to prevent incorrectness, not to cause trouble for the staff. Since his perspective disregards their concrete actions, he makes them spectators of the dataflow, like guards staying awake and keeping an eye on the process. For the girl who actually all the time is wide awake and perform concrete actions to make the flow float, the signal does not tell her to ‘change her point of attention’ — it tells her to perform a necessary action (remove the beeping) which enables her to continue her work. Furthermore it makes her aware of her doing something wrong with the slips.

**3 Different Perspectives Meet in the Computer-based System**

In the above section, I have contrasted different fragments of the language usage in the organization in order to illustrate the difference in perspective when persons with different functions describe the same phenomenon. Here I will contrast systems design with the work language around it.

In the design of a computer system, the different groups are forced to accept each other’s linguistic conditions, but the result of the compromise is not necessarily what was expected by the designers.

The system’s terms for the working material are taken from the old work language in the book-keeping department at the Postal Giro, but some new terms are also introduced. These new terms becomes members of the same semantic sphere of working material as the old ones whose content therefor are changing. The words for the activities on the other hand, are taken from other sub-languages. In spite of the fact that the content of these innovatives are almost the same as that of the old language terms, the words have been replaced by other innovations in the new computer based work language.
To describe this I use the concept of semantic fields. A semantic field is a collection of words with some content features in common and other features that distinguish them. The concept is traditionally used within linguistics to make comparisons between different national languages’ ways of classifying phenomena in the world. As an illustration I give the following example of the different extension of similar words in Danish, Swedish and English in Figure 1:

<table>
<thead>
<tr>
<th>Danish</th>
<th>Swedish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>skov</td>
<td>skog</td>
<td>forest</td>
</tr>
<tr>
<td>træ</td>
<td>trä</td>
<td>wood</td>
</tr>
<tr>
<td></td>
<td>träd</td>
<td>tree</td>
</tr>
</tbody>
</table>

Figure 1: A model of a semantic field

Instead of comparing different national languages I just compare different sub-languages within a company.

### 3.1 Old Words in a New System

First, I am going to compare words for working material in the old work language, the new work language and in the system.

In the construction of the system at the Postal Giro, linguistic terms for the working material from the old work language have been applied as far as possible, but new words are also introduced. This leads to changes in the semantic fields.

As shown below, the term “job” has been introduced into the system; it is taken from the work language of computer science, where a “job” is simply a term for a certain amount of data, which the machine processes as a whole. The extension of it in the computer system is “all slips read by the OCR together with the manually registered ones”. When this is transferred to the paper slips, in the new work language, a shift in meaning takes place. The slips read by the OCR are excluded and the word “job” adopts the meaning of the old word “bunt” (pile), (i.e. an amount of working material which is relatively easy to handle, but also arbitrary), while “bunt” is pushed into location of the old word “bo” (i.e. the current transactions of one client; a certain number of slips together with a payment order signed by the client). This chain reaction sets the meaning of the word “bo” in motion, it becomes more limited and more precise and now refers to the payment order only. This is illustrated in Figure 2.

The old work language is based on a perception of the work as handling papers and documents, and an imitation of this reality has been attempted in the computer system. At the same time, the staff have demanded that they keep the ordinary slips in order “to keep at least a part of reality”. The result is that
Figure 2: A semantic field for work objects

in the book-keeping department there are now three slightly different meanings of the above words (except “job” which just carry two). One for the paper slips of the old system, one for the paper slips of the computer based system, and one for the electronic slips of the computer system. The old system will successively disappear and the idea behind an electronic system is to gradually render paper superfluous, but the fact remains that meanwhile the terms are the same for ordinary slips and electronic signals. My observations, however, indicate that it has been easy for the staff to adopt this linguistic change. I have not noticed any misunderstandings or conflicts on behalf of it. For me as an observer it was extremely difficult to know if they were talking about paper based or electronic working objects, but for them as performers in time and space the situation resolved any ambiguities.

3.2 New Words in a New System

Above we have seen how words from the old work language has been borrowed and readjusted to the new system. In spite of a rather complicated change in the semantic structure, the new language usage is easily accepted by the users. Now we will look upon a case where new words have been introduced.

One of the consequences of the electronic system is that several functions that used to be clearly separated in time and space can now be combined and carried out by one person at one work station without being separated in time. In the department, the old system has two functions, “kodning” (coding) and “rättning” (correction), which are carried out in separate units and with the staff changing places every half hour; and one function carried out in a separate department, which—in the work language—is called “rättningen” (the correction). The system also presents a description of the work organization as a combination of this functions, just in a new wording. As shown in Figure 3 the monitor display contains the overall term “verksamhet” (activity), divided into four functions on the next level, “produktion” (production) being one of them, which have two subordinate functions on the same level: “komplettering” (completion) and
“avstämning” (balance). “annan behörighet” (other competence) is another one on the same level as production.

![Figure 3: A system hierarchy of activities](image)

These functions are those parts of the new system that resemble the functions of the old system most closely. What is interesting about this, is that the functions which used to be clearly separated—spatially, technically, and with regard to roles—and which the staff used to view as separate functions, when combined in the new system is viewed by the staff as one single function, in their new work language called “registrering” (registering); the employees neglect the outdated system description of the work organisation and construct a new semantic field for tasks which again is based on time and space. The choice is between working at the terminal “registering” or at the OCR, now called “köra” (running) or “stå” (standing). Figure 4, which is a rough generalization based on the most frequently used “functions” in connection with the work languages of the old and the new systems, illustrates this.

![Figure 4: A semantic field for work activities](image)

Naturally, there are technical and historical reasons for introducing this division of different functions into the system, but to the staff, the differences are hardly evident. As far as time and space are concerned, they are in the same work situation, and the terminology is by no means self-explanatory. If the purpose
of this terminology has been to create a specific interpretation of the working process, the attempt has not been very successful as is further illustrated in the following conversation between the girl and an instructor:

(f) The girl: som om vi sager, här står det “komplettering” nu, haruppe, men sen när jag blir färdig med bunten, så är det “produktion”, varför?
I: Därför då börjar du med ny produktion, sen när du slår in då när du har slagit första och sista så står det komplettering
The girl: ja,
I: det står precis hela tiden här vad du gör
The girl: ja, men jag visste inte att det stod produktion, när jag var färdig med den har.
I: Na men det gör det.

The girl: Like, if we say, now it says “completion” up here, but then, when I finish the pile, then it says “production”, how come?
I: Because then you begin a new production, then, when you type, when you have typed the first one and the last one, then it says completion
The girl: Yes
I: It always says here exactly what you're doing
The girl: Yes, but I didn't know that it said production when I had finished this one
I: Well, it does

It always says here exactly what you're doing, the instructor says. Does The girl not know “what she is doing”, or does she merely have another perception of it?

The examples above shows that the new terms are taken from somewhere else than the work language of the book-keeping staff. The words “produktion”, “komplettering”, and “avstamning” do not exist in their old work language; they are taken from other work languages or professional languages. “Avstämning” is indeed a book-keeping term, but it belongs in a theoretical situation. It is an educational term. Indeed, it was the main function of “rättning” in the old system, but there was no word for this. “Produktion” is a term from economics. The word “komplettering” can almost be characterized as a common language-term. But as I mentioned in the introduction this is not a main point. The general meaning of the words are not that difficult to understand. Rather the point is that the words that are chosen reflect a specific view of the work. The word “komplettering” is particulary interesting. It reflects the fact that the staff only performs parts of the work. They only add something that has been lost in the Optical Reading Recognition process. It goes perfectly well together with the coordinaters flow perspective. It is not too far out to expect that the staff should adopt the word too. In fact the greatest part of their daily work, and their main task, is to perform this function. But as seen in the following conversation between the researcher (R) and the girl (H), the girl, in spite of the fact that she is obviously very well aware of the meaning of this specific word, is still not willing to adopt it in her work language:
R: De har orden haruppe, avstamning och komplettering, ar det ord ni använade forut eller ar det nya ord?
H: na de e nya ord,
R: använder ni dem sjalv?,
H: komplettering for att nar vi kodade, då hade vi alla korten till och med C-korten i handen,
R: sager ni komplettering?
H: ja for att här fir du bara vissa saker om det blir felaktigt C-kort och sen när det ar fel p i id-fältet och den kanske inte har kunnat lasa ett eller två siffror utav trettifyra, så trycker jag bara in de har siffrorna han inte har kunnat lasa och då får jag komplettera,
R: ni sager komplettera?
H: mm men vi kommer att säga- vi kallar det har for att registrera i alla fall,
R: Anvande man det ordet forut också? sa man registrera forut? eller sa man koda?
H nej komplett- koda,
R: så registrera det ar också nytt?
H: ja det ar nytt också, det va skillnad for att när dom satt vid checkarna darborta [det är andringscentralen som har datasystem sedan tidigare] då var det registrering det var lite finare
R: These words up here, “balance” and “completion”, did you use them before or are they new words?
H: no, they’re new words;
R: do you use them yourselves?
H: completion, because when we were coding, we were holding all the slips, even the C-slips;
R: do you say completion?
H: yes, because here we only get certain things — if the C-slip is wrong, and then, when there’s an error in the ID-section, and maybe it hasn’t been able to read one or two digits out of thirty-four; then I simply type these digits he hasn’t been able to read, and then I have to complete;
R: you say complete, do you?
H: Well, but we use to say — anyway, we call this registering;
R: did you also use that word before? did you say registering before? or did you say coding?
H: no, complet- coding;
R: registering is also new then?
H: yes, that is also new — it was separated, because when they were sitting at “the checks” over there [i.e. a special section in the department, where they have had computer systems for a while], then it was registering, it was a little more posh
“Registrera” that the staff prefers is an overall term for different types of data collection. And yet, the term here is related to data entry collection in computers. The reason for the adoption of the word is probably (as the above example indicates) that the word is familiar in the department. It has been borrowed from a special section that was not occupied with coding and punching and therefore needed a specific word for their data collection to mark the difference. Now when computers are introduced it can be used at the whole department as something different from those old techniques.

**Summary**

Two different perspectives meet in the system. The one describing work as manipulation of physical objects. This is reflected in the keeping of old words for working material. The other one describing work as information processing. Which is seen in the introduction of the new abstract words for work organization. The staff chooses to accept the first perspective, as is seen in their adoption of the new content for old words, and to reject the second as is seen in their refusal to adopt the new words and instead introduce one of their own.

**4 Conclusion**

In what way are these observations important? Let’s start from the beginning. The coordinator and the instructor, describes the work situation from outside it. Talking about work allows you to be general and normative. The staff talks about work from inside the situation. Talking in work forces you to be specific and descriptive. The normative way of looking upon the system says that it functions the way it is described, in principle. From this perspective any divergence from the norm is regarded as an accident, in which the staff function as garbage collectors. To the staff, on the other hand, the “collecting of garbage” is an important and reflective part of the working process. Talking about work allows you to neglect parts of reality that could be crucial for the detection of weak points in the system. When talking in work on the other hand you can’t avoid the weak points because they are a main cause for action in your daily work.

The coordinator as a spectator describe the system as a data flow, where information is the subject and the machines are spaces for the information to pass. The instructor as a participant sees the system as a cooperation between man and machine where both are subjects in activities. When talking about a computer based system, and not just a computer system, the last perspective is fundamental, because it takes into account the physical organization at the office floor.

The coordinator’s intentions are to construct a system where the final output is correct. Therefore he wants to prevent the staff from making errors and make sure that they detect errors caused by customers or the machine. He describes the solution to this as a question of prescribing new working routines. The staff
has to pay more attention to the screen display. He talks about the sound signal as a subsidiary to this change. The staff on the other hand looks at the signal as a disturbance in their working routine, and as a control mechanism, since no matter how much attention they pay, there are no choice of actions. Since it is irritating to get error messages all the time the staff will probably learn, by trial and error, to pay more attention in order to avoid them. Now, it is more than reasonable that an accounting system is secure. But given that there must be control factors in a system, it is important that all participants are able to discuss what they should be and how they should be realized, and the first premises for that is that one is able to call things by their “right” names.

The example with the sound signal leads over to the systems design and the question of transparency. Though the sound signal is an example of the opposite, the The Postal Giro system is in general rather transparent. In routine situations the focus is on the work task with few disturbances. It has been rather easy for the employees to learn how to carry out the old tasks with the new tool. I guess that it is due to the fact that the design, as far as working material is concerned, to a great extent build upon concepts well known from the old work language. The fact that the users don’t make any explicit difference between paper-based work objects and electronic work objects indicates that this part of the design has made the system transparent from a tool perspective (Ehn 1988). The concepts for working material are borrowed from the old work language, and the perspective on work as handling of physical objects is maintained.

But the employees had a lot of trouble to understand how work was organized and described through the system. The concepts for work organization are not taken from the old work language. The philosophy behind it is probably, that what should be in focus for the users is the handling of working materials, while focus for the organizers are processes in the system and therefor the words are chosen for them. But it is also important to make the processes and the organization visible to the users in order to make them understand how the system works. From observations not presented in this article I infer that this understanding was crucial for handling break down situations in work. There is also a close resemblance between the content of the functions in the computer system and the old paper based system so the intention is good enough. But since the words used by the system, in the description of the work organization, did not become a part of the new work language, I draw the conclusion that they did not make sense to the staff.

The tendency in the work language to build on concepts for activities bound to time and space indicates that this might have been a good idea when designing the system too.

References


