

The semiotics of user interfaces – a socio-pragmatic perspective

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Abstract

Within the IS research field, there are many views on how to understand the use of IT systems. Within the community of organisational semiotics, Stamper's semiotic framework has been used as a tool to understand information systems at different abstraction levels. Another theory related to organisational semiotics, Information Systems Actability Theory (ISAT), argues that social action theories and speech act theory are needed for a thorough understanding of the use of IT systems in organisations. The use of IT systems is considered to be performance of action within a social context. The purpose of this paper is to elaborate on user interfaces of information systems as a means to understand socio-pragmatic and communicative aspects of IS use. The theoretical foundation is based on semiotic and socio-pragmatic theories, and findings from a case study are presented and discussed in order to clarify the argumentation.

Keywords: Semiotics, user interfaces, HCI, actability, social action

1. Introduction

Within organisational semiotics, Stamper's (1973) organisational onion illustrates a view on organisations, business processes and IT systems. It consists of three layers: The informal, the formal and the technical. The organisation as a whole is looked upon as an informal IS, where the values, beliefs and behaviour of individuals are important. The informal layer aggregates the formal layer, which is the way individual actions and business processes should be carried out according to rules in the organisation. The third layer, the technical system, is the part of the formal system that is automated (e.g. through and IT system that supports the processes). The degree of formalisation is the lowest in the informal layer, and highest in the technical layer.

Based on the layered view on organisations (as presented above), the semiotic framework (Stamper 1994) is an analytic tool that suggests that signs can be understood at six different abstraction levels. The lower three levels – physics, empirics and syntactics – are considered to belong to the system platform. The upper three levels – semantics, pragmatics and the social world – are seen as human information functions.

Organisational semiotics has been described as “a discipline that explores the use of signs and its social effects within a social setting” (Baranauskas et al 2002 p 5). Several authors have based their research on this perspective, and some recent papers have treated the subject of

how organisational semiotics can help develop user interface design concepts. Connolly and Phillips (2000) conclude that a synergy between the two perspectives of Human Factors (HF) and Organisational Semiotics (OS) potentially can bring benefits to designers of user-system interfaces. Their starting point is the usability theories of Shneiderman (1998). Their discussion is focused on the potential advantages that can be reached through a synthesis between Shneiderman's human factors perspective and the semiotic framework. One of their conclusions is that the meaning of signs is different depending on which semiotic level we are observing. They motivate this conclusion through a discussion on a case study, primarily based on the levels of the semiotic framework. According to Connolly and Phillips, the ideal would be to be able to define future user interfaces (UI) on the pragmatic (or social) level, and to automate the design at lower levels in the framework. They find this approach useful, and make two conclusions based on their argumentation: 1) Signs mean different things depending on which level in the semiotic framework we are currently studying and 2) There might be relations between the different levels in the framework. The example below illustrates how Connolly and Phillips apply the semiotic framework to analyse a part of a user interface. Table 1 contains an analysis of a 'Send' button in an e-mail system:

Table 1 - Analysis of UI element using the semiotic framework (adapted from Connolly and Phillips 2002)

Semiotic level	Meaning of 'Send' button
Physical	Group of pixels
Empiric	Visible shape
Syntactical	Icon capable of being distinguished from other icons and of being combined with other icons
Semantic	Carrier of meaning
Pragmatic	Instrument of user-system communication
Social	Tool to help the user accomplish an interpersonal action

The result of the analysis illustrates how the meaning of a sign differs depending on which semiotic perspective we apply to analyze it.

Baranauskas et al (2002) follow the example of Connolly and Phillips, claiming that the referential framework of UI analysis needs to be broadened when designing Internet applications. Furthermore, social and organisational aspects are said to be paid insufficient attention in contemporary literature. The semiotic framework is proposed as a tool to conduct user interface analysis of web sites. Their findings indicate that issues related to organisation and business need to be afforded by the UI, and that it should be taken into consideration in analysis, design and evaluation of web sites. In line with Connolly and Phillips, they consider the framework to be an analytic tool that helps analyse a UI at different levels and from different perspectives.

Andersen (2001) discussed the role of semiotics in user interface design, stating "semiotics is also helpful for positioning design of computer systems in a broader theoretical and philosophical context" (Andersen 2001 p 423). We see a point in using the semiotic framework to direct attention toward different aspects of the user interface, but we believe that we need complementary theories in order to understand how to explain phenomena at different levels in the framework. In the work of Baranauskas et al (2002) and Connolly and

Phillips (2000), user interfaces are analyzed on a social and pragmatic level. However, it is not transparent *why* certain questions are asked at different levels in the semiotic framework¹. We believe that the semiotic approach to user interfaces need to be problematized further – a definition of the sign concept needs to acknowledge communicative aspects, in order to be suitable for theorizing on socio-pragmatic aspects of user interfaces.

The purpose of this paper is to present a socio-pragmatic and semiotic concept of user interfaces. Based on a communicative perspective, we believe that this concept is 1) useful to understand socio-pragmatic aspects of IT use and 2) a tool to relate the use of IT systems to an understanding of work tasks and business processes.

This paper does not explicitly handle cognitive aspects of user interfaces – the relation between our user interface concept and cognitive psychology is partially discussed in Sjöström & Ågerfalk (2003), and it will be further discussed in coming publications.

This paper is based on previously performed case studies and a thorough theoretical reasoning. It is continuation of work reported in Sjöström & Goldkuhl (2002). Parts of a case study will be presented, in order to clarify and illustrate the presented concepts.

Chapter two is a theoretical chapter, presenting our (socio-pragmatic) view on the sign concept and on user interfaces. Chapter three contains an empirical discussion. Finally, we sum up our findings in the conclusions section.

2. A socio-pragmatic perspective on semiotics and user interfaces

Our basic view on signs is that we can apply two different perspectives on signs in relation to action: 1) signs as a pre-requisite for action and b) signs as a result of action. This approach makes it apparent that we consider signs in a communicative perspective². We therefore argue that it is meaningful to take several actors into account when studying a sign; The creator of the sign (the communicator) as well as the interpreter of the sign. Chapter 2.1 contains a fundamental discussion on how to define the sign concept. Chapter 2.2 discusses the implications this definition has on the design of user interfaces.

2.1 A socio-pragmatic perspective on semiotics

There are many approaches to semiotics as the study of signs. Innis (1985) contains an overview and a collection of classical articles. Peirce (1985) has made an important and often quoted definition of sign: “A sign, or representamen, is something which stands to somebody for something in some respect or capacity.” (ibid p 5). In this definition there are several important issues, which can be commented upon. There is one actor identified (“stands to *somebody*”), which we conceive as an interpreter of the sign. Moreover Peirce emphasises the representational aspect of the sign. This is done in the definition and also a bit later in his text: “The sign stands for something, its object” (ibid p 5). We do not deny the importance of this representational or referential aspect of the sign, but there are important aspects not mentioned. Just acknowledging one role – an interpreter – dismisses the communicative

¹ One example of this is the analysis of the social level and the pragmatic level in table 1, which seems to provide a rather narrow view on pragmatics and social action and also an unclear relation between the pragmatic level and the social level.

² If an action results in a shared message, it is an act of communication

character and function of signs. It thereby also disregards the action character of signs³. It might be possible to interpret the peircean position concerning the sign interpreter (“which stands to somebody”) as a generic concept applicable both for creator and receiver. In both these roles there is a meaning relation between the sign and the actor. This means that the sign stands to its creator as a sign as well as to its receivers. We admit that this is a possible view. However, this view dismisses the fundamental differences between the sign creator and the sign receiver. The sign for its locutor is not in the first place something to be interpreted. It is a result of a purposive act where a communicative intent is shaped and expressed. The act of the receiver is quite something else. It is an act of reconstructing what is already there. This view will be explicated further below.

A non-natural sign is always part of a socio-pragmatic context. A sign is the result of an actor producing that sign with intentions in a communicative act. The sign will be directed towards one or more recipients. These recipients will interpret the sign and obtain some knowledge as an effect of this communication process. This means that the sign must have relations to these two roles of a communication situation: The locutor creating the sign and the addressee creating an understanding through an interpretive act. The relation between the sign and the locutor can be seen as an expressive sign relation. The sign is an expression made by the locutor of what he wants to communicate to the addressee through his communicative act. The relation between the sign and the addressee is an influence sign relation. The sign will influence the addressee through his interpretive act.

Besides these two actor relations, the sign will of course have a signifying relation to its referent; i.e. the objects talked about. These three relations correspond to the three functions of language described by Bühler (1934) who is another classical semiotic scholar⁴. The three functions are: 1) Symptom (the expressive relation), 2) signal (the influence relation) and 3) symbol (the referential function). These functions are depicted in a communication model (figure 1)

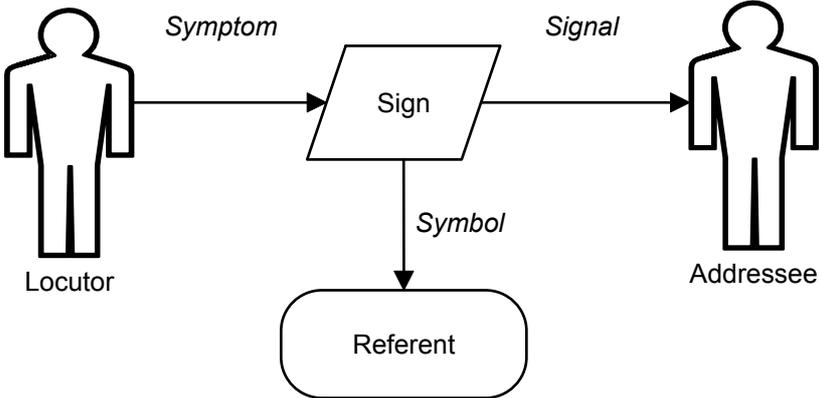


Figure 1 Sign in a communication context describing three basic functions of the sign

³ It disregards the communicative action aspect of signs. Interpretative action aspects can be said to be at least partially included; see discussion below.

⁴ Jakobson (1985), still another classical semiotician, has built on Bühler’s semiotic functions and added some more functions (phatic, poetic and metalingual). These other functions seem not to be as basic as the three functions from Bühler and we will not need them for our analysis here.

Our main message is that a sign should always be seen as a part of such a socio-pragmatic context. It always has a relation to its author as well to its interpreters. And the sign also says something about the world; that it has the capacity to “bring the world” to the communicators. The Russian semiotician Vološinov (1985 p 52-53) describes this socio-pragmatic view of the sign in the following way: “... word is a two-sided act. It is determined equally by whose word it is and for whom it is meant. As word it is precisely the product of the reciprocal relationship between the speaker and listener, addresser and addressee.” “A word is a bridge thrown between myself and another. If one end of this bridge depends on me, then the other depends on the addressee.”

Even if we like Vološinov’s metaphoric and poetic way of describing communication, we must comment upon some issues, which otherwise might obscure our message. The word (which rather should be said to be an utterance) is in itself not an act, but rather a result of an act⁵. Uttered words are not results of one two-sided act, as Vološinov seems to state it. There are instead two distinct but related acts “operating” towards the utterance; the expressive act of the locutor producing the utterance and the interpretive act of the addressee trying to capture its meaning. It is important to not take it for granted that the same meaning will arise between speaker and listener even if this usually is the intention and many times is what is accomplished.

If we should follow the original description of signs by Peirce, we get a limited view on sign pragmatics. Pragmatics, in this view, is restricted to the interpreter’s possible actions based on the sign. Morris (1964), following in the traces of Peirce, has elaborated on the pragmatic relation of signs to the interpreter. Morris distinguishes between different pragmatic meanings of sign (designative, prescriptive, appraisive), all in relation to the interpreter and what he possibly may do based on the sign. These pragmatic meanings are based on the notion of the act as it is described by another American pragmatist, G H Mead (1938). Mead distinguishes between three phases of an act, perceptual, manipulatory and consummatory⁶. Although we find these distinctions useful⁷, we claim that this is a limited view on sign pragmatics since there is no reference given to the creator of the sign.

One way to explicate our position further is to relate to the concepts of illocution and perlocution from speech act theory (Austin, 1962; Searle, 1969). Illocution is what is done within the speech act (i.e the communicative intention of the locutor). Perlocution is the possible effects on the interpreter. Pragmatics of signs should include both these action aspects⁸; what the locutor performs in relation to the addressee (the illocutionary aspect) and what the addressee performs based upon the presented sign (the perlocutionary aspect).

Another way to explicate our position is to relate it to the different actions exerted in communication. Clark (1996) describes communication as a joint action consisting of one act of a speaker presenting a sign and one act of an addressee identifying and recognizing the sign. We think that Clark’s terminology (“*joint action*”) is misleading. Communication is not one joint action performed by a speaker and addressee together; it is rather a *joint activity*

⁵ Confer Ricoeur (1991) about his discussion about text as a result of an action and a prerequisite for reading (interpreting).

⁶ The designative function relates to the perceptual phase (observable properties); the prescriptive function relates to the manipulatory phase and the appraisive function relates to the consummatory phase.

⁷ Confer for example Cronholm & Goldkuhl (2002) where these different categories have been used to clarify the different phases of a user interacting with a computer (in the Elementary InterAction Loop).

⁸ This has been stated earlier by Goldkuhl & Ågerfalk (2002) in a critical analysis of Stamper’s (1994) semiotic ladder.

consisting of two distinct, but related actions, performed by each actor (speaker and addressee respectively). Although we find his terminology confusing we think that his emphasis on these two interrelated acts is very important. This is also fully in line with Goldkuhl's (2001) differentiation of intervening and receiving actions. To produce a sign is an intervening action and interpret a sign is a receiving action. Through the sign these two kinds of action are interrelated.

A conclusion of the discussions above is that the meaning of the sign (representamen) must be understood not only in relation to the interpreter and the object it refers to (as proposed by Peirce). The peircian position does not include the pragmatic and social aspects that origin from the creator of the sign. When discussing pragmatic and social meanings of the sign, both the creator and the interpreter of the sign should be emphasized (c.f. Böhlers view on signs presented in Figure 1). Especially when analysing the socio-pragmatic meaning of a sign, it seems important to acknowledge the creator of the sign.

2.2 A socio-pragmatic perspective on user interfaces

The discussion in section 2.1 considers a sign as either a prerequisite for action or a result of action. This way, all parties involved in creation and interpretation of the sign are acknowledged, which illustrates the pragmatic and social aspects of semiotics and results in a richer picture of communication. This line of reasoning can be transferred to user interfaces (since they can be viewed as groups of signs). The traditional view on user interfaces is that they are parts in a user-system interaction. From a semiotic perspective, de Souza et al (2001) want to expand this view on user interfaces. They distinguish between three different types of communication:

1. User-system interaction
2. User-user interaction
3. Designer-to-user communication

In order to understand and define user interfaces from a semiotic perspective it is necessary to take all these communication situations into account.

In their paper (ibid) they emphasise the communication in a user-interface from its designers to its users. They describe the user interface of an IT-system in this respect in the following way: "They are one-shot messages from sent from designers to users about the range of messages users can exchange with the system in order to achieve certain effects" (ibid p 462). This can be compared to the concept of action repertoire (or action potential) within the IS actability theory (e.g. Goldkuhl & Ågerfalk, 2002; Sjöström & Goldkuhl, 2002). The action repertoire of an IS is the possible actions which the system afford to its users. This action potential is a result of the designers'⁹ work.

In their discussion, de Souza et al (ibid) focus on the communication between designer and user, while we argue that it is more important to focus the business communication going on: Users of the IT system actually communicate with each other, using the artifact as a medium for communication. This is actually pointed out by de Souza et al (ibid), but it is only discussed in relation to specific types of multi-user applications (e.g. groupware).

⁹ It is important to have a broad conception of IT designers in this kind of discussion, including those who are responsible for the design of the IT system.

We want to stress this kind of communication since we find this to be the core of an information system. A communicative perspective means that **information systems are regarded as systems for technology mediated business communication**. In figure 3 we have described user interfaces contextually, not only in relation to the actual user, but also in relation to other human communicators. We distinguish between three different types of actions: *Business communication*, *UI navigation* and *IT system design*, following the division above from de Souza et al (2001).

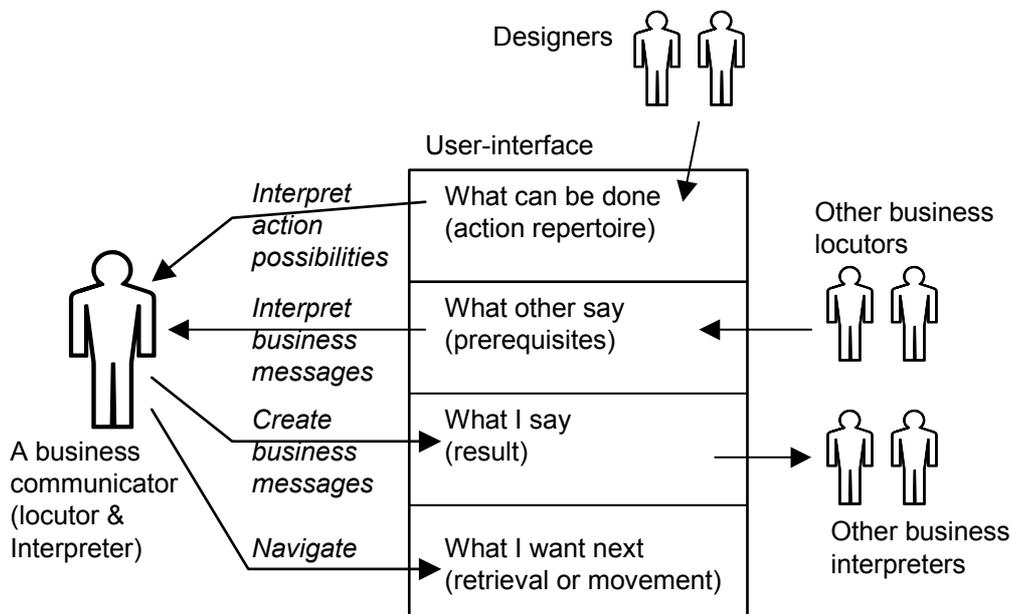


Figure 2 - A communicative perspective on user interfaces

We divide a user interface into four parts. One part is the action repertoire. This is to be seen as communication from the designer to the user. By interpreting the user interface the user may hopefully understand what kind of actions it is possible to perform. This part of the user interface is thus signs from designers telling the user what possible actions to perform.

In order to communicate something, through the system, to other persons, there might be necessary to read what others have said/done earlier. Within the IS actability theory, there is one important concept - action memory - which relates to this (e.g. Goldkuhl & Ågerfalk, 2002). An action memory consists of messages about earlier performed actions and other important action circumstances. Before communicating something to other persons, the actual user may read parts of the action memory of the system. These presented messages are thus prerequisites for the user's action. The messages are signs from other persons within the business and mediated by the IT system. To obtain such messages on the screen, the user probably performs some acts of retrieval. We consider this as a part of the UI navigation; which is described below.

After reading such messages, the user may act by expressing something. He may input something through the keyboard and then through the mouse click on some screen button. What is on the screen as a result of his input is a message from him. It is a result of his communicative action. After he has concluded his action (for example through a mouse click), this message will be taken care of by the system and possibly mediated to other users. What are on the screen, at least before the concluding clicking, are signs, as results of a communicative act, with the intention to be forwarded to other persons.

The fourth and last part in our principal description of user interfaces is the UI navigation part. We include here instructions to the system to retrieve messages, besides instruction to move to some other part of the system. What possible navigation actions to perform is part of the action repertoire. This means that there is a reference from the action repertoire part not only to business communication actions, but also to possible navigation actions. Note that this part of the description does not have the same communicative character as the previous three parts – the only interpreter of UI navigation is the locutor performing the navigation. However, we find it important not to leave out the user navigation in this model.

This socio-pragmatic perspective on user interfaces enhances communication aspects. An IT user is seen as both a locutor and an interpreter. Andersen (2001), in his semiotic analysis of human-computer interaction, describes humans as “compulsive interpreters and compulsive talkers”. An IT user is taking part in business communication with other business locutors and interpreters (figure 2).

All these four parts of user interface can be described according to our basic semiotic definition. Each part is 1) an expression of a human acting (symptom) and 2) is directed towards some interpreter (signal) and 3) refers to something (symbol). The user interface is an *interactive action medium*. It contains messages (signs) both directed to the user and from the user. This is of outmost importance to acknowledge. The user interface contains signs to be interpreted and signs, as results of user interventionist action, to be handled by the artefact and possibly forwarded to other humans. In order to explicate this further we have described the different types of communication using the user interface in table 2.

Table 2 - Types of communication of different parts of the user interface

Part of user interface	Type of communication and communicators
Action repertoire	A user interprets possible action types afforded by the system (communication from designer to user)
Business communication - for interpretation	A user interprets messages from other users. These messages are mediated through the IT-system. (Communication from user to user)
Business communication - a created formulation to be forwarded	A user creates messages to be mediated by the system to other users (Communication from user to user)
UI navigation	Interaction between user and IT system (No communication between human actors)

Based on the above, we argue that the UI designer needs to treat the matters of business communication and UI navigation separately – one issue is to make sure that business communication is supported a proper way (in relation to work tasks and business processes), another issue is to make sure that the navigation works properly.

This separation of navigation and business communication points out that we are trying to understand different phenomena. The socio-pragmatic meaning of a sign is clearly related to communication between actors in the organization. So far we have discussed this issue mainly as one actor (an IT user) being a locutor respectively a recipient. The business communication through an IT system is however usually more complicated since it comprises a many-to-many communication situation. The IT system is a mediator in such communication with the pre-defined ability to transform messages. Sjöström & Goldkuhl (2002) have presented a

model describing this complexity of IT-mediated communication (figure 3).

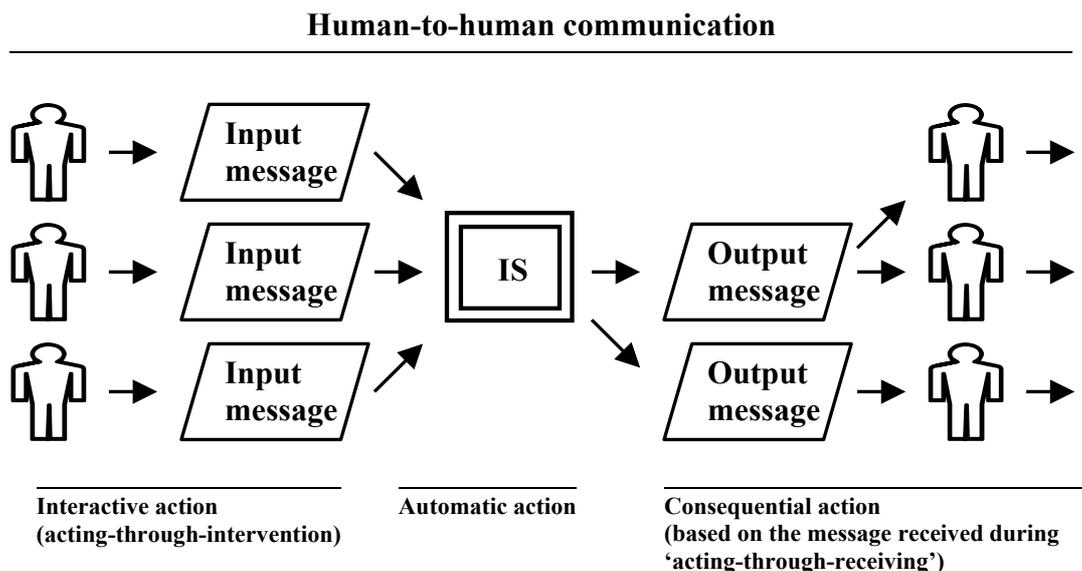


Figure 3 - Types of actions related to three IS usage situations (Sjöström & Goldkuhl 2002)

Figure 2 should be seen as a more abstract view of communication through the system, while figure 3 illustrates the complexity of (business) communication using IT systems. The figure is presented in order to relate the previous discussion (based on figure 3) to a discussion on socio-pragmatic aspects of user interfaces. A conclusion from Sjöström & Goldkuhl (ibid) is that an understanding of the communication taking place when utilizing the user interface (the actors involved, temporal and spatial aspects) is vital for an understanding of the socio-pragmatic aspects of the user interface.

In the introduction to this paper we presented a semiotic analysis of a sign (A 'send'-button in a user interface; cf table 1). Within ISAT, there is an important concept called an ae-message (action elementary message); cf Ågerfalk (1999, 2002). An ae-message is the result of an e-action (elementary action), and it consists of propositional content (semantic content describing some part of the world) and an illocution (the intentions of the creator of the message). The ae-message is considered to be the smallest unit of analysis when considering socio-pragmatic aspects of action. The idea is that we need to study a set of related symbols (forming an ae-message) in order to understand their socio-pragmatic meaning. This is also related to our discussion on the sign concept, where we pointed out that utterances (rather than words) are interesting to analyze. We will not deepen the discussion on ae-messages here, but our conclusion is that messages (consisting of signs) are our unit of focus, not single signs.

To sum this chapter up, we conclude two things. First, a communicative view on user interfaces is a step towards an understanding of socio-pragmatic aspects of the interface. Figure 2 presents a communication model on user interfaces, which can be used to guide a designer or evaluator to make the communicative aspects transparent when designing user interfaces for business communication. Second, we need to focus on a larger unit of analysis than a single sign when analyzing socio-pragmatic aspects of user interfaces. The ISAT-concept of ae-messages constitutes a unit of analysis that makes it possible to understand socio-pragmatic aspects of communication.

3 A socio-pragmatic view on a scheduling system

This section contains discussions on an empirical example, in order to illustrate the theoretical concepts presented in section 3.2. The IT system we analyse is a scheduling system for rooms and equipment (projectors and computers). Parts of this case study have been presented in other publications (c.f. Ågerfalk et al 2002; Sjöström & Goldkuhl 2002). The system is used at a number of Swedish universities. Note that the examples (the screen documents) have been translated from Swedish to English. One (for us) known difference is that some letters are underlined in the Swedish version, indicating keyboard shortcuts to some functions in the system. These are not part of our translated versions, due to aesthetic reasons.

This chapter consists of three parts: Two parts describing (central) screen documents in the system, the third part presents some important (socio-pragmatically related) finding from the case study.

The screen document for overview / searching

The ‘introduction’ screen (Figure 4, below) in this system is an overview of the bookings currently in the system. All the current bookings (future bookings including today) are displayed. Each booking is a result of a previous action from some actor in the organization. When a teacher is about to schedule, he/she must interpret the current ‘state of business’ by looking at this screen and by performing an interpretative act. Furthermore, the teacher has to navigate in the system (e.g. by searching in the schedule). These actions are navigational, in the sense that interactions take place, with the purpose of changing the current view of the system.

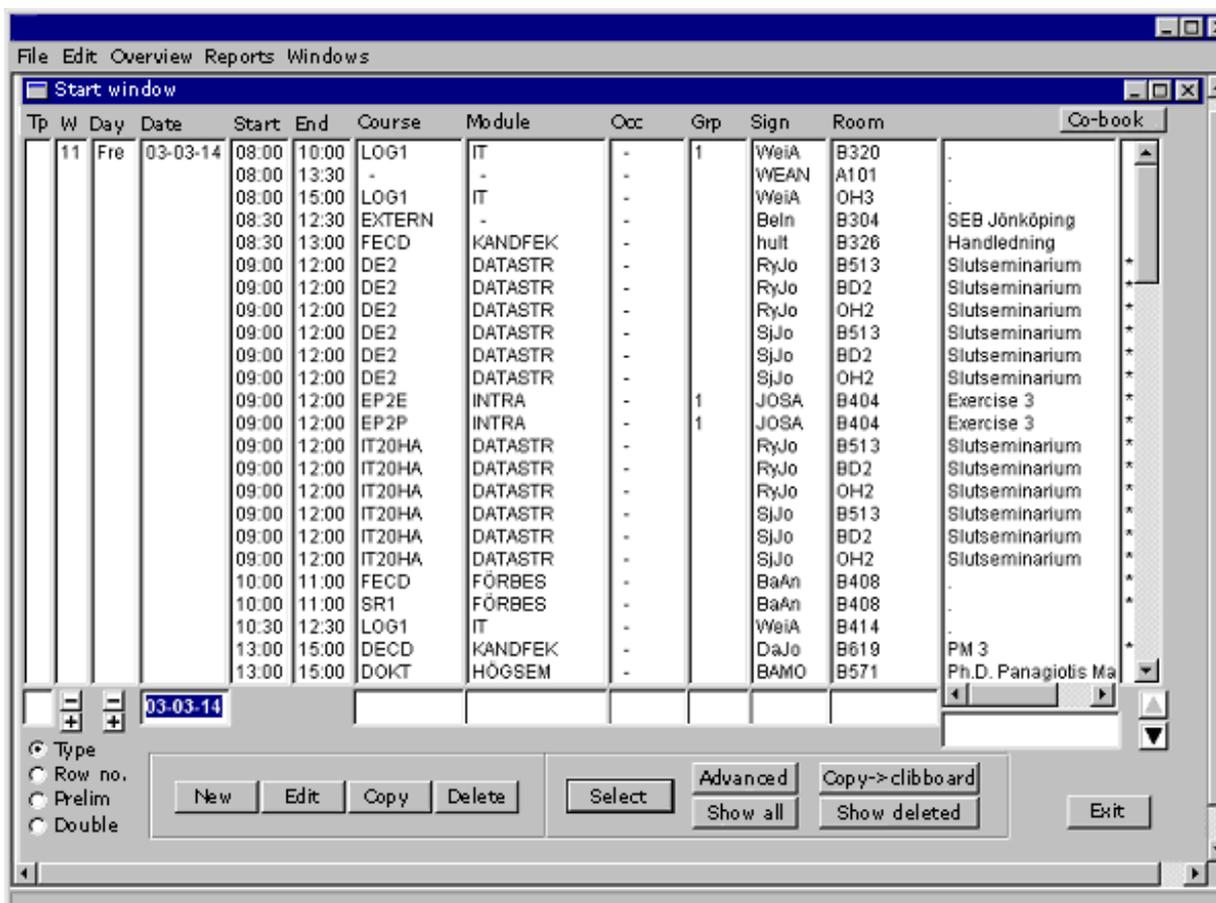


Figure 4 - The interactive screen document for overview and searching

Table 2 (below) shows the communication that takes place when this screen document is being used. The table is based on the categories in figure 3. Note that the fourth category (retrieval/movement) is not included. We believe that it is important to understand the UI navigation aspects in order to draw conclusions about the user interface, but in this case we are mainly interested in the communicative aspects; hence we do not focus on navigation at this time.

Table 2 - Communication taking place in the screen document for overview / searching

Action repertoire (designer-to-user)	The designer does not communicate any possibilities to perform communicative business actions. However, different opportunities to navigate in the system are communicated. The user can navigate to various screen documents or filter the current view of business messages using the text fields underneath each column.
Prerequisites (user-to-user)	The locutor has to interpret a set of previously sent business messages, arranged in a table. These are the result of previously performed bookings – an “action memory” that needs to be interpreted by the locutor before scheduling. In this system, it is transparent who is responsible for each business message (the person responsible for the booking is part of the table).
Result (user-to-user)	There is no possibility for the locutor to create business messages in this screen document.

The screen document for scheduling

When the teacher has got an overview of the current bookings, he/she can create a new booking. Figure 5 (below) shows the interactive screen document used to create new bookings. A set of interactions is needed in order to schedule the booking. This actual scheduling action is directed toward two groups of actors: Students and other teachers. The illocution is different for these two groups. The purpose of communicating the message to the students is that the teacher wants them to show up at the lecture. The purpose of communicating it to other teachers is that the teacher wants to prevent them from booking that same room at the same time.

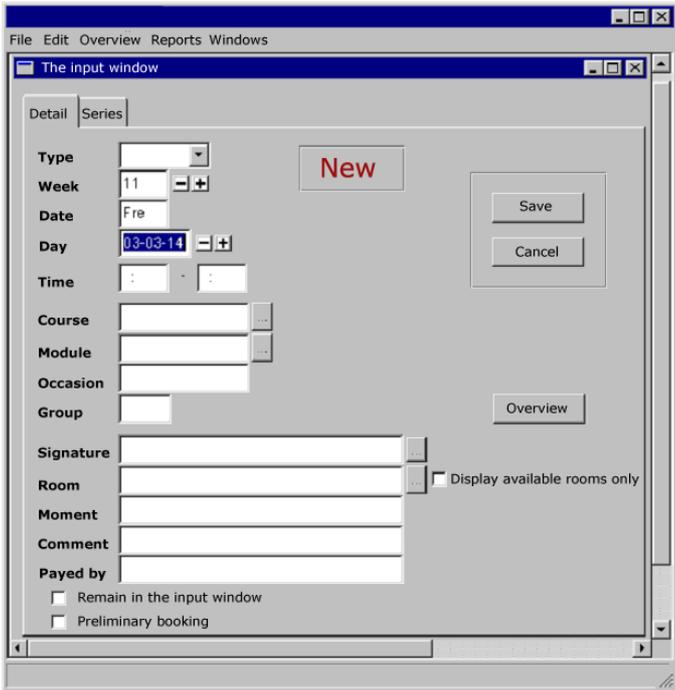


Figure 5 - The interactive screen document for scheduling

Table 3 (below) contains an analysis of the communication that takes place when this screen document is being used. Again, the category retrieval/movement has been left out. Note the description of the result, where time aspects and spatial aspects are part of the analysis.

Table 3 - Communication taking place in the screen document for scheduling

Action repertoire (designer-to-user)	The designer communicates the possibility to 1) formulate a booking and 2) to communicate this to other students and teachers. Further, the possibilities to navigate to complementary screen documents (with the purpose of choosing rooms, classes, extra equipment, et cetera) should be communicated to the locutor.
Prerequisites (user-to-user)	No business messages are displayed in this screen document.
Result (user-to-user)	<p>The locutor can use the input fields to formulate and communicate a booking to students and to fellow teachers.</p> <p>Spatial aspect: The intended interpreters can receive this message on the school network, the Internet or on video screens in the school. This is not revealed to the locutor in the user interface.</p> <p>Time aspect: The locutor cannot be certain when this message reaches the intended interpreters, since they have to ‘pull’ the message by choosing to view the schedule.</p>

Some results from the evaluation of the booking system

In the description of the screen documents above, we have proposed a way to describe the communication taking place in the user interface. However, we haven’t proposed *how* to analyse the communication. From an actability perspective, it is important to make the business communication visible – sometimes, it might be very important to understand who the creator of a message is, and that the messages we create reach the people they are intended to reach. This is partially fulfilled in the scheduling system, but there are weaknesses in (current configuration of) the system on the socio-pragmatic level. These weaknesses are related to communication aspects:

- 1) The teachers using the system are sometimes led to believe that their messages are delivered to the intended interpreters, although they are not. In one case, a scheduled session reached the teacher’s students, but it didn’t reach other teachers. The cause of this was that different faculties, who normally teach in their own buildings, use the system. In this case, a teacher at the engineering school scheduled a lecture at the business school. The system indicated that this action was performed correctly. However, the school’s bookings were stored in different databases, with the result that the teacher’s students could see the booking, but it was invisible for teachers at the business school.
- 2) Last minute changes to the schedule might not reach the students. If a teacher gets ill, and a lecture has to be cancelled, several extra measures have to be taken in order to communicate the cancellation to the students. One can of course not argue that an IT system should support every situation in the company, but in this case it was problematic, since it was troublesome to find other ways to reach all the students. Within actability, an analysis of communication includes studying *when* a message reaches the intended interpreters and *how* they receive the message (the place of reception; and whether the message is pushed to the interpreter or pulled by the interpreter). In this case an automatic mail to the affected students would have reduced the size of the problem, since students tend to check mail more often than they check

the schedule for changes.

- 3) Another reflection from our side is that several screen documents are designed to support only one type of user-user communication. The ‘overview’ window is a one-way communication from other users to a user. In this document, interpretations of previously communicated business messages take place. The ‘scheduling’ window only supports intervening actions: A locutor creating messages to be interpreted by others. In such a system, a lot of navigation between different parts of the user interface has to take place in order to create new business messages. This could also be related to cognitive theories about not overloading the user’s short-term memory (e.g. Nielsen 1993). A way of explaining this phenomenon with our interface concept is that previous business messages that support some user action should be easy accessible, preferably on the screen document that affords the intervening action. The user interface should involve both action prerequisites (messages from others) and possibilities express messages intended for others; confer figure 2 above.

The three examples presented above are examples of an analysis of communication; where actions have been studied. This analysis, where the creators as well as the interpreters of symbols are part of the context, makes it possible to understand socio-pragmatic issues better. If only separate signs – specific parts of figure 5 and 6 – were to be analysed, it would have been harder to draw conclusions about socio-pragmatic aspects of the user interface.

4. Conclusions

When socio-pragmatic aspects of user interfaces are to be analysed, we need to acknowledge the communicative aspects of signs. In organisational semiotics, Peirce’s triadic definition of a sign has a great influence – this definition does however not explicitly acknowledge the creator of the sign, only the interpreter. Other semioticians, like Bühler, Vološinov and Jakobson, define a sign in a communicative perspective, which leads to a better foundation for an understanding of socio-pragmatic aspects of the sign. Based on our definition of the sign concept, we have presented a communicative view on the user interface concept. We acknowledge interactions on three levels: user-system, designer-user and user-user. The user-user level is made explicit in our view, making it a tool to understand socio-pragmatic aspects of IT-system use. We have also proposed that a suitable unit of analysis for socio-pragmatic aspects of user interfaces is the so called ae-message, as defined in ISAT. Our argument is that in order to understand the socio-pragmatic aspects, we need to focus on something larger than a single sign. Our socio-pragmatic view on signs and user interfaces can be regarded as a complement to the ideas of Connolly and Phillips (2000) and Baranauskas et al (2002), who proposed that the semiotic framework can be used as a tool to understand different aspects of user interfaces. In this paper, we argue that our communicative view on interfaces facilitates an analysis at the socio-pragmatic level of the semiotic framework.

The socio-pragmatic semiotic analysis performed in this paper has also led us to a concept of *pragmatic duality* in human-computer interaction. The prevailing perspective in HCI is that that this kind of interaction is to be seen as a user interacting with an IT artefact. The socio-pragmatic perspective is critical towards this narrow view on HCI and suggests that the user should be conceived as taking part in business communication with other human actors and that the role of the IT artefact (and its user interface) is only a mediator in this human-to-human communication. However, the socio-pragmatic perspective should not be interpreted as a rejection of the view that a human is interacting with an artefact. That would be naïve. Instead we suggest a view on the human-computer interaction as mainly a dual interaction. If

we look at the business communication (which can be both interpretation and message creation), described earlier in the paper, we mean that the user is interacting with the artefact and other humans at the same time. The IT system is an artefact with the ability to interact in pre-defined ways with a user. The user must be able to understand how to manage the artefact, for example how to enter information into certain fields and click buttons on the screen etc. When performing such actions, the user is not only manoeuvring the artefact. At the same time, he is actually communicating with other business actors. One can say that he (through acts of reading and writing) at the same time is instrumentally managing the artefact and communicating with other humans¹⁰. In the same act he is doing several things simultaneously. An interpretative act (when reading information presented on the user interface) means both recognition of what other humans may have said and also finding out how to utilise the artefact. An act of intervention (when entering information onto the user interface) means both an informed act of managing the interface and a communicative act directed towards other humans. Our view on the pragmatic duality of user interfaces can also be a foundation to understand the relation between IT system use and business processes. Important future work will be to relate our work to other contextual approaches to UI design.

To summarize the discussions above, we refer to the purpose of this paper: *To present a socio-pragmatic and semiotic concept of user interfaces*. This conceptualization is useful to understand IT use as social action and how IT artefacts can be seen as communicative instruments in such social action. In future research, we also believe that it can be helpful to relate the use of IT systems to work tasks and business processes.

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¹⁰ Ågerfalk & Eriksson (2003) have described instrumental and communicative rationality in relation to usability. This is however done in a slightly different way than we do. We emphasise the pragmatic duality in human-computer-interaction.

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