Medical Informatics Europe '97
C. Pappas et al. (Eds.)
IOS Press, 1997

Computer Programs and Clinical Contexts: Two computer based exercises for cognitive rehabilitation

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Two examples taken from computer programs for cognitive rehabilitation of patients with schizophrenia show how different groups of clinicians attribute different meanings to the same exercise. This illustrates that the meaning of an artefact or a technology is socially constructed and thereby intimately bound to the context of use. This perspective has implications on issues such as the design process, the assessment of technology and the issue of standardization.

1. Introduction

The increasing integration of information technology in the health care system forces clinicians and computer designers to pay even closer attention to questions regarding how technology should be developed and assessed. This is underscored by Koenig who states that "[o]nce a new therapy is available it becomes extremely difficult, if not impossible, to forego its use," [7, p. 486]. She continues: "Once a new a machine is in use, even in a very limited way, it is very difficult to change course and stop using the machine; its use becomes entrenched," [7, p. 487].

Within the field of cognitive rehabilitation the computer is widely used, most often in the treatment of patients with brain damage, but recently also in rehabilitation of patients with schizophrenia [1, 6]. The central assumption is that overall cognitive functionality can be improved by performing simple exercises and tasks. Accordingly, the literature shows an almost exclusive focus on the issue of efficacy in computer supported cognitive rehabilitation. Much less has been said about the conception of the clinical work (the use situation) represented in the design of the computer programs and thereby on how the computer may affect this situation.

We shall show how identical theoretical understandings of cognitive rehabilitation are represented in two computer based exercises designed for the rehabilitation of patients with schizophrenia. Some minor differences in the interface indicate a major mismatch between the conceptions of the use situation. These differences may be critical to the actual use of the programs. The examples point to the overall conclusion that a "technology is only what it is in some use-context," [5, p. 128]. This understanding of technology has implications for issues of development, assessment and standardization of computer systems. In other words, we need an adequate understanding of the situation that will be affected by the new technology, and we need to consider which aspects of this situation the computer will afford and which aspects it will constrain.

2. Two exercises for cognitive rehabilitation

We have co-operated with two groups of clinicians in designing two computer programs for cognitive rehabilitation of patients with schizophrenia. Design group 1 consisted of psychologists while design group 2 consisted of psychiatrists and a psychologist. In both cases it was the clinicians who decided on the specific content and interface design of the programs. Our job was to facilitate the design process (e.g. making prototypes) and to do the programming. There are several significant similarities between the two programs:

- both of them consist of a few small exercises;
- several exercises are used in both programs;
- the exercises in both programs are based on a specific neuropsychological understanding of cognition and schizophrenia.

The following is an example of a very simple exercise that can be found in both programs. In program 1 (designed by group 1) the exercise looks like this:

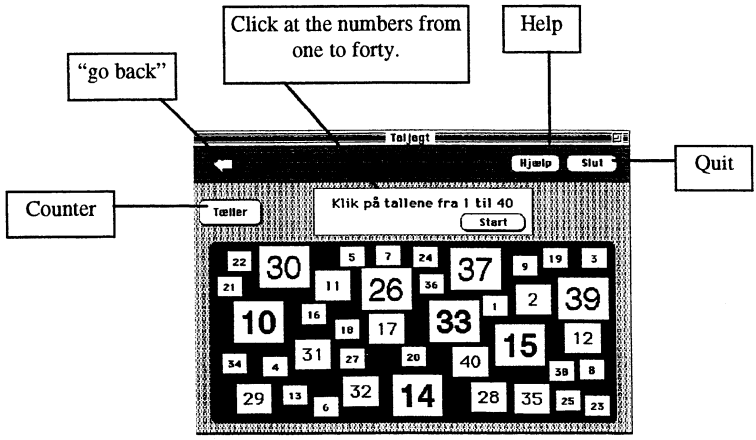

fig.1. The patient's task is to click at the numbers from one to forty. The numbers in the white boxes are changed every time the exercise is started.

In program 2 (designed by group 2) the exercise looks like this:

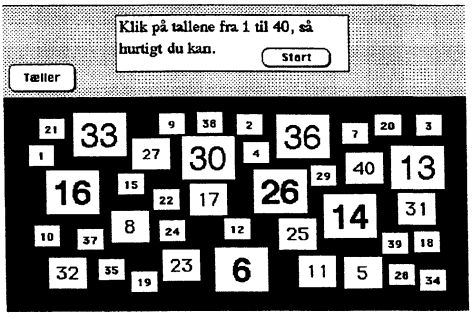

fig.2. The exercise is similar to the one above. The only difference is the (missing) menubar, and a minor rephrasing of the text presenting the task.

As one can see the two exercises are very similar as they share (almost) the same physical properties. In other words, in order to finish the exercise, the patient must do the same job (i.e. click on the numbers) regardless of the program in use. Thus, from a theoretical point of view, the two exercises represent the same assessment of what characterizes a good and a bad exercise. However, a closer look at the interfaces reveals a difference in the flexibility of the programs.

In program 1 there is a menubar above the exercises. It contains three possibilities:

- you can always go back to where you were before. It is then possible to choose another exercise or another level of the same exercise or the same exercise can be started once again;
- if needed the program offers context sensitive help;
- the program can always be stopped. Furthermore, when the program is started, the user can choose between five different kinds of exercises, and it is possible to choose different variations or levels of the exercise.

This is not the case in program 2. This program is designed in a way that does not support any kinds of decisions made by the users:

- it is not possible to do anything except finishing the exercise;
- when an exercise is finished the program will automatically move on to the next exercise;
- it is not possible to change the order in which the exercises appear;
- it is not possible to stop or to quit the program before all the exercises are done.

3. Two conceptions of the use situation

Although, the exercises, on a theoretical level, appear to be more or less "the same", the organization of the exercises is very much different. This difference reflects a deeper difference in the way the two groups of clinicians conceive the use situation.

A few remarks stated by the clinicians engaged in the two design processes illustrate this point:

Design group 1 underscored the following aspects in the process of designing program 1:
- it is important that the patient enjoys the training;
- it is important to uphold motivation. Therefore, a large amount of material is needed so that the training can be both individually customized and contain the ability for improvisation;
- communication between clinician and patient is important. The computer can serve as a medium which enhance the communication.

Design group 2 underscored the following aspects in the process of designing program 2:
- the use of the computer must be standardized in order to measure any effect of the training;
- the relation between the cognitive deficit and the program is essential;
- communication between the clinician and the patient is bias and should be avoided.

These statements, the clinicians' notes, and observation of the use indicate a central difference in the comprehension of the use situation, which is illustrated in fig. 3. In the way the use of program 1 is conceived the relation between patient and clinician is central.

Of course, the patient-computer relation is also central, but the training is to some degree viewed as collaborative and not only as a patient task: the clinician and the patient choose the exercises in co-operation, they talk about the exercises and about other things (e.g. how the patient feels, how he relates to other patients, etc). In some cases the clinician even performs the exercise. When it comes to program 2 things are very much different. Here, the relation between patient and computer is dominant. The clinician is not meant to play any active role in the training. He observes it, and tries to minimize the communication with the patient. To avoid bias the introduction of the program to the patient is, as far as possible, standardized.

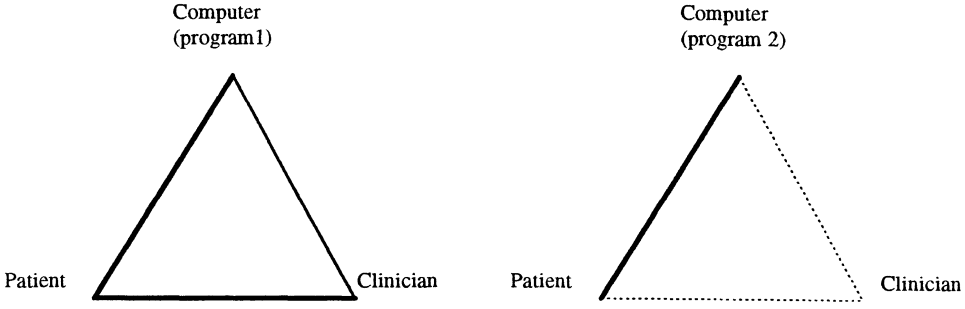

Fig 3. The two conceptions of the use situation. Program 1 affords flexibility and communication while program 2 constrains these aspects.

In spite of the fact that the only ostensible difference between the two interfaces is the menubar, the two exercises refer to two different use situations. Thus, minor differences in the interfaces may have major implications for the clinical situation.

An artefact or a technology affords certain aspects of use, while others are constrained [8]. This of course does not imply that the artefact always is used as intended by the designers (a cup for instance affords both drinking and throwing but not sitting and driving). Applying these concepts to the examples, it can be seen that program 1 affords a rather flexible way of working. Also, the program affords communication between clinician and patient, for instance in negotiating which exercise to use. On the other hand, the precise measurement of efficacy is constrained. When it comes to program 2 things look much different. This program affords the measurement of efficacy but constrains 'negotiation' between clinician and patient. This means that a clinician choosing between the programs, to some degree, is choosing between use situations and thereby between different therapeutic situations (e.g. whether or not communication should be afforded, etc.). However the question of what is constrained and what is afforded has consequences beyond the actual use situation. Technologies transform experience [5]. That is, technology is not just something we use, it also influences the way we see the world. This implies that the use of computers in cognitive rehabilitation, as well as other areas, may change the way we conceive and perform treatment in general.

In sum, the minor mismatches between the properties of the interface are not just a surface phenomenon. They entail the construction of two technologies each of them focusing on different aspects of the use situation and thereby affecting the clinical work in different ways.

4. Conclusion and implications

It has been shown how two groups of clinicians attribute different meanings to an artefact. This leads to the overall conclusion that a technology should be understood as part of a context or cultural background. This is not to say that studies of efficacy are not relevant but only that they are not telling the whole story. If we focus exclusively on these studies we might run the risk of overlooking other aspects of great importance (e.g. issues of communication, social relations etc.). On a more general level we believe that the intimate connection between technology and context has several important implications:

- Knowledge based on experience from the clinical situation in question should be represented in the design process. In the projects described, clinicians ensured the presence of this knowledge, but in many cases patients also could and should be engaged. The involvement of all relevant social groups calls for design methods that support co-operation and communication [3, 4].
- The computer program should not be assessed only according to its technical properties or theoretical (in our case neuropsychological) foundation. Assessment should be based on an adequate understanding of the situation that is affected by the new technology. In other words, we need to consider which clinical aspects will be afforded and constrained (communication, social relations, other kinds of therapy, etc.). This understanding could benefit from ethnographic methods, other kinds of qualitative methods, and from several techniques developed in relation to co-operative design [3, 4].
- Although standardization in many cases may be desirable [2], it also proves problematic: especially when it comes to standardization of interfaces. As we have shown small differences in the interface may, in fact, represent big differences in the interpretation of the technology in use, and thereby afford and constrain very different aspects of the clinical situation.

5. References

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