How can Computers assist the Students in the learning of clinical Medicine?

Acknowledgement:
This article was originally written in german language. I’m sorry that I’m not very good in written english. I know that I often use words that are not the best ones and build sentences with them you never would. I had to do a translation in spite of sharing my thoughts with my english-speaking friends and colleagues - and this was the only way to do this: By my own. I hope you get the meaning of it and forgive me the insufficiency of my poor english. http://dict.leo.org was a very valuable help to find words I did not even knew about their existence.

Summary
When Howard S. Barrows discovered in 1969 that "medical students and residents, for the most part, did not seem to think at all", he introduced as a consequence the "Problem Based Learning". In 1984 he adopted together with Feltovich the "script" concept to medical education. These "illness-scripts", which are mainly generated through reflection on patient encounters, are supposed to be the underlying structures of the clinical reasoning processes.

In this article, I'll show how and under what circumstances computer assisted learning programs assist the construction of those "illness scripts" - and therefore could be a valuable aid in the preparation of the students for "real clinical life".

Background
I'm working since more than 7 years exclusively in the field of computer aided medical education - it's realization and it's implementation. The trigger for this occupation was the program "Laennec" from MD Raphael Bonvin. This program doesn't teach theory by means of multimedia - it's far more: using "simulated patients", the student was able to perform a simulated physical examination with a simulated stethoscope. Besides, he could get the patients medical history and other medical data regarding the simulated patient. I became aware that this could be the beginning of a new era of learning. This insight arose from the fact that the program enabled me to learn things that the university was unable to teach - a.e. the recognition and interpretation of lung sounds on the base of a clinical question formulation. At this time I just finished medical school. The desire to create similar programs became more and more important to me. I intended to substitute them at places where I liked to have these learning-aids when there weren't any.

In a more reflective manner I have to ask myself why it should be to any others interest but mine to have these case-based programs with simulated patients at ones hand. Aren't books, slide-shows, lectures, videos and real patient encounters enough to learn with? What justifies the extravagant expenses and effort that the production of such a kind of learning-aids generates?

1 Problem-based, Case-based and Situative Learning

1969 Howard S. Barrows tested medical students and residents of the McMaster university in Canada: "I discovered that medical students and residents, for the most part, did not seem to think at all. Some gathered data ritualistically and then tried to add it up afterwards, while others came up with a diagnosis based on some symptom or sign, never considering possible alternatives." (Barrows H.R., Twomblyn R.M.; 1980). He had to realize that the outcome of the medical education didn't match the expectations at all. As a consequence the curriculum was reorganized in a problem-orientated way. Besides, knowledge and skills were trained and learned in environments similar or identical to those where the students finally had to use/access it.

The clinical education was done using patient-cases in a problem-orientated manner. The goal was to induce problem-solving-skills. The means to achieve this were on one hand real patients, on the other hand paper-cases. Nevertheless there is nothing more motivating for a medical student than the work with real patients, there are some points to mention that vote for paper cases. Let's make a short discussion about the pros and cons" (Barrows H.R., Twomblyn R.M.; 1980).

Disadvantages of using real patients:

- The appropriate patient for student learning at a particular time may not always be available.
- Variables in the patient may include uncooperativeness, hostility, difficulties in communication, other disease complications.
- The patient may feel as though he is being used as a guinea pig in the student's education.
- Patients are available to students only in special settings, such as hospitals or clinics.
- Many important types of patient problems that are complex or urgent are not available for student learning because the urgency and seriousness of these problems require immediate and often complex care.
• The student himself often is distracted by his neophyte status in front of patients.
• The repeated use of patients by students often makes the patient become very "unreal", the opposite of the desired effect.

Disadvantages of using written case histories (paper cases)

• This format is unreal and abstracta. There is no challenge to the skills of interview nor examination.
• There is little challenge in making relevant observations about the patients in the gestalt of the patients appearance.
• The student is not challenged to develop an initial concept from initial cues; to generate early hypotheses; or to interview and examine, using an inquiring strategy, in order to rank or verify those hypotheses.

The usefulness of paper cases is also a very straitened one - and they do not provide too much motivation to the students. When Barrows realized this, he asked for "simulated" (="standardized") patients for medical education. These simulated patients were actors who were instructed to play one or more medical cases. These simulated patients were also useful for the examination of medical skills. The so called "OSCE" (Objectiv Structurated Clinical Exam) has been institutionalized in the U.S. and Canada since then - in Europe we're still working on this.

1.1 The Importance of Case Examples

Charlin, Tardif and Boshuizen describe in "Scripts and Medical Diagnostic Knowledge: Theory and Application for Clinical Reasoning Instruction and Research" how Barrow and Feltovich introduced in 1984 the expression "scripts" (or "illness scripts") to the medical education. This expression - which comes from the cognitive psychology - stands for a theory which describes how medical diagnostic knowledge is processed to result in clinical problem-solving skills. Thereby the knowledge is represented in "value clusters": patterns that allow very quick to check if an actual gained value fits with the corresponding value in the "script".

If it fits, it's beeing tested for the presence of other important criterions - if it don't fits, another script "pops up". This "activation" happens by the experienced physician often without taking consciousness - but the beginner has to do the activation by rational deductionb. There is also an obvious maturation between the beginner and the experienced which can be demonstrated best with the fact that students - after having had a patient-encounter - can't present their findings in a reasonable manner. An experienced clinician usually won't have any problems in presenting his findings in a reasonable manner at all.7 "Illness-scripts" are best created - and polished - by tutored patient-encounters. This is the place to make use of computer aided interactive case-based multimedia programs. Case-based programs created with and for the abilities of computers don't have to be static at all. So they can provide the student with the positive aspects of formerly "written" cases but without their handicaps.

Since the middle of the nineties, Computers are capable to show colorpictures and even to play movies and sounds in acceptable speed. These multimedia features - accomplished with programmated feedback-mechanisms - allow the construction of simulated patients in an audio-visual and interactive way. Recently publications show that the brain possesses facilities to learn by watching actionsb. This means, that the soccer-player becomes a better player when he watches regularly matches on TV - and students become better doctors when they observe good history taking and physical examinations performed by colleagues.

1.2 Importance of the Learning Environment

How efficiently learning takes place is not only dependent on the didactic skills of a teacher -or of a program - but also of the environment where the learning takes place. Godden und Baddeley7 designed in 1975 the following experiment: In a free recall experiment, divers from an university diving club learnt lists of words in two natural environments: on dry land and 6 meters underwater, and recalled 4 minutes later the words in either the environment of original learning,

or in the alternative environment.

<table>
<thead>
<tr>
<th>Learning-Environment</th>
<th>Recall - Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>dry</td>
<td>13.5</td>
</tr>
<tr>
<td>wet</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td>11.4</td>
</tr>
</tbody>
</table>

Lists learnt underwater were best recalled underwater, and vice versa. A subsequent experiment shows that the disruption of moving from one environment to the other was unlikely to be responsible for context-dependent memory. In further experiments, the differences between the learning and the recall environment were adapted more and more since it was only about different rooms in the same building. Even then the differences remained significantly.

It's not only the exterior environment that plays a role in the recall of information. Also the internal environment - also factors like hunger, tiredness, thirst play a significant roleb.

As closer the learning environment comes to the environment where the recall of information will take place, the better. The ideal case would be, if both environments would be the same. But this is often impossible. The question

a The sender of an information wants to reach his auditory. An informatic engineer who writes software for physicians should be aware of this - and therefore present the informations in a manner that is recepible for a physician. Piaget and Gardner explain that there is not one but many types of intelligence, depending on individual, community and environment. Programs written by engineers are often full of large texts and tiny pictures - no wonder, they are used to think abstract. But most Physicians are used to recognize patterns and to interprete haptic and audio-visual sensations

b This implicites that one should chew wile learning the same kind of chewing-gum that when doing the examination.
2 Discussion of the Different Learning Categories

Table 2: This table illustrates different learning categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Behaviorism</th>
<th>Cognitivism</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>Drill &amp; Practice</td>
<td>Tutoriated learning</td>
<td>Apprenticeship</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Case-based learning</td>
<td>Reciprocal Teaching</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explorative learning</td>
<td>Project-orientated learning</td>
</tr>
<tr>
<td>Knowledge is...</td>
<td>stored</td>
<td>processed</td>
<td>constructed (situativ)</td>
</tr>
<tr>
<td>Knowledge is used.</td>
<td></td>
<td>as a correct Input/Output-Relation</td>
<td>as Correct cognitive concepts, formal operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to handle a situation</td>
<td>to handle even complex situations</td>
</tr>
<tr>
<td>Learning objectives</td>
<td>correct answers</td>
<td>to know the methods to find solutions</td>
<td></td>
</tr>
<tr>
<td>Strategy</td>
<td>teach</td>
<td>watch carefully and assist (a tutor)</td>
<td>kooprate</td>
</tr>
<tr>
<td>The teacher is</td>
<td>Authority, Instructor</td>
<td>Tutor</td>
<td>Coach, Co-player</td>
</tr>
<tr>
<td>Feedback is</td>
<td>given from outside</td>
<td>given from outside</td>
<td>a self-construction – therefore at first sight not controlled - Pay attention to communication!</td>
</tr>
</tbody>
</table>

2.1.1 Classic Conditioning: Drill & Practice

With "Drill & Practice"-methods, student are trained to re-act fast and correct - best in a reflex-like manner. The basic paradigm is the "classic conditioning", formulated by Pavlov. There are some medical skills which have to be at a doctors disposal immediate when needed - a.e. the correct treatment of an emergency case. To achieve this, the same action has to be done and re-done many times - until the pattern of such an action goes "from the neocortex to the spinal cord". The computer can be a very estimated help in achieving this because of its inability to fatigue - in contrast to a human being.

But the limits of what can be mediated by these "Drill & Practice" methods are very narrow - they end at the mediation of symbolic content.

Examples how "Drill & Practice" is used in learning-programs:
- vocable-trainers (languages)
- emergency training (pilots, doctors, army)
- recognition of airplanes (army)

2.1.2 Tutorated Learning

Tutorated computer-based learning/teaching means that the system tempsts to simulate a "real" teacher who presents the learning subjectives in a didactic scheme. I know of two ways that have been used to achieve this: The popular way re-builds a learning environment wherein the tutor acts as a coach who facilitates the problem solving of the student. The more sophisticated method is called the "Socratic Dialog" where the student is questioned on and on - with the aim that he find out about the dissonances of his still immature constructions and then analyses and corrects them. The fact, that these concepts tempst to simulate "real" teachers provoke a very high ris to end as a "programmed learning" unit. Such "programmed learning" units are often not liked by students at all. A reason for this dislike could be, that a simulated tutor that has been reduced to a minor set of algorithms and paradigms acts without knowledge about the real situation and the rules of teacher-student interactions. In the development of such systems must be put some brain in the implementation of human-like interactions and intelligent guidance systems, then the chance is much higher to elaborate a system that is also liked by the students and not only by the teacher who rebuildet themselves electronically.

2.1.3 Case-based Explorative Learning

To prepare students for the "real clinical life" with its unpredictable situations, programs that use "explorative learning" concepts could match these specifications best . Thereby is assumed that the student has an intrinsic interest to learn because he wants to understand the world - and to prove oneself. This happens in a process where the student interacts permanent with the environment. An important part of the interaction is the making of mistakes. Mistakes have to be made in order to recognize them as mistakes and prevent them. At this level, mistakes are not made due to wrong connotations but because of wrong assumptions. The assumptions are subject to this refining process with the aim to elaborate them to a level where they could build a stable base for concepts.

In medical education it's obviously forbidden to learn knowledge and skills with the "trial and error" method because this would harm real patients. Nevertheless on many medical educative institution students learn on patients with the "trial and error" method.

*Remember Aldous Huxley's „Brave new world“ and Anthony Burgess „Clockwork Orange“

*This is the case for students. In other sectors - like banking - programmed learning is used often and with success.
Todate there are only a few learning programs that creates a simulated clinical situation wherein the student learns in a case-based explorative manner. A reason for this is the astonishing complexity of such programs. Besides simulated patients also simulated tutors have to be created - complex help systems have to be implemented with the aim that the student doesn't get lost in too many degrees of freedom. In addition, an accurat self-assessment must make sure that the self-constructed concepts remain somehow in a common field. In the example-section of this article you will find more about how this could be achieved.

2.1.4 Importance of the Psychosocial Dimension

Joe Henderson\textsuperscript{15} emphasizes, that programs that mediate solely "Knowledge" and "Skills" are not sufficient to prepare students for the "real world". "For the most part...practice is viewed as technically rational and mechanistic, addressable by the application of theory-based facts and rules. This restricted model of health care largely ignores the psychosocial dimensions of health and illness. It does not prepare students to deal effectively with the real swamp of professional practice, particularly in the majority of cases where the variability of human behaviour and human situations plays a role."

This conditions a supplementary postulation for programs that prepare for the "real clinical life": The simulated patients should act like real patients - sometimes unpredictable, sometimes very understandable, sometimes happy, sometimes angry and so on... and this depending also on the behavior of the student. Let's demonstrate this with a fictive example: The student has to inform a patient that this one is very sick and will die soon. The way he performs this task - if sympathetic, insympathetic or objective will provoke different patterns of behavior the simulated patient could react. If the student inform in a very sympathetic way, the patients maybe collapses - but if the student would inform in a very objective (cold) manner, the patient would probably become very angry about the doctor. Many different ways are possible - and not predictable. If the student has undergone and reflected many different patterns of human behavior - maybe equal if simulated or real - he will have the potential to act in the real clinical life.

3 Examples

3.1 Computer aided "History taking" illustrated with the program "Headache interaktive"

"History taking" means the dialogue between doctor and patient. The aims are to contact the patient, to get an idea about his actual complaint and the medical history and to identify familiar and psychosocial factors that play a role. It may astonishes the reader that in about 80% of all cases a correct diagnosis is already made with the history taking. Thereby must be considered that an important part of the informations are non-verbal. The experienced physician takes also the gait, the whole expression of the body, the smell and many other things into account.

There are even some specialties in medicine where the diagnosis is made to about 100% solely by history taking. The diagnosis of headache is such an example. With the program "Headache interactive"\textsuperscript{16} Marco Mumenthaler and me realized a prototype of a program that allows the computer-aided learning and practicing of the history-taking skills.

3.1.1 The Case-based Entrance

"You have never a second chance for a first impression". That's a commonplace - and it's true also in the case of learning programs. The first "screen" communicates what then will be expected. For our case-based program, the entrance are the portraits of the patients:

The presentation of the portraits takes place at random. This lead the student to all simulated patients - also if he starts each time the program in clicking the portrait in the right upper corner.

3.1.2 Movies carry other Information than Texts

When shooting the movies of the history-taking scenes, we filmed the patients over the shoulder of the experienced physician. This gives the student a feeling of taking part of the scene personally a feeling that helps the student to become empathic with the patient - and there is nothing more motivating for medical students than empathy wit patients.

""Headache interactive" was awarded with the "European Academic Software Award 2000" (EASA2000) in Rotterdam NL.
3.1.3 From linear Movie to the Interactive Meta-Movie

Movie is a time-based, linear media. Therefore people that has to do with it is afflicted in a more linear thinking. The “classic” form how a movie could be used to tell us about history-taking could be as follows:

First there would be a presentation of the patient and the physician, then the history-taking part and after all a conclusive commentary of the physician. For a beginner this form would be appropriate. But a student with some extent of understanding needs only parts of the information provided in the commentary sections - the rest will maybe bore him to an extent that he quit the program.

The computer enables us to take the commentary parts out of the time-line and make them accessible by option. This signify, that we can provide the user with movies in a non-linear manner.

Illustration 4: The screen design of "Headache interactive" at the part where the commentary can be accessed by option. The specialist (Mark Mumenthyer on the right side) optionally pauses the movie where the history-taking of a patient is shown and explains exactly the meta-information he has (why he asks that question and what the answer of the patient implicates)

In "Headache interactive" the form used to achieve this is following: a button underneath the movie shows what the actual scene is about. If the student clicks this button, the scene is paused and the specialist appears like a “deus ex machina” and gives a commentary to exact this scene. The advantage over a linear movie is obvious: beginners and the specialists can use such a program to improve their knowledge - without being bored. The beginner will optionally call most of the provided comments - where the specialist will pick out only a few.

3.1.4 Importance and How-to-do of Self-Assessment

The objective of the program "Headache interactive" is to work out a good vocabulary of important questions that the student can use to practice history-taking skills. The more relevant questions the student can use - the more exact will be the picture he get’s from the patient - the more precisely will be his diagnosis and the better will be his treatement.

The student must have instruments to measure his abilities. He has to know by self-assessment when he is capable of doing a complete history-taking - and he has to find out how far it is to this goal. In "Headache interactive is a self-assessment section provided where the student can perform a simulated history-taking by his own - and get finally constructive feedback.

This is realized as follows: the student poses full-text questions to the simulated patient. The full-text entries are then scanned for possible meanings and the student is then provided with a clickable list of pre-formulated questions. The click onto one of these questions play the scene of the movie where the patient answers that question. The student tries to ask as much relevant questions as are known to him. When he comes to the point where he don’t know any further questions, he can call a simulated tutor who then provides the student with assistance. It’s very important to implement such assistance in order to not frustrate the student: a frustrated student is would be a poor learner who will probably quit the program.17

3.2 How to Simulate a physical examination - demonstrated with the program "Neurology interaktive"18

When performing a physical examination, the physician collect information about the patient in a standardized manner. The obtained information then are quantified - an important fact that allows the description of the course of condition. On another level the importance of the physical examination lies in its function to establish the professional contact between physician and patient. The instruments used to perform the physical examination - like the stethoscope or the reflex hammer - became symbols for medicine at all. Imaging techniques like X-Rays, CT, MRI or Ultrasound did rule out many techniques of physical examinations. Our society becomes more and more a visual one - we believe in what we see - and this is the great plus of the imaging techniques. The knowledge about how to perform a “good” physical examination therefor vanishes - and there are yet physician who lament that

18"Neurology interactive" was awarded with the "European Academic Software Award 1998" (EASA1998) in Oxford GB.
they become more and more their patients manager and that their primary medical activity is urged to the background. Nevertheless the actual situation, we assume that a good physical examination would be for both involved parties of great benefit.

3.2.1 Computer Based Physical Examination

I wrote at the very beginning of this article about the fascination that affected me when I first encountered Raphaël Bonvin’s Program "Laennec CD-ROM". It became absolute clear to me, that the computer was capable to mediate a clinical scill: the auscultation. Bonvin used pictures of patients. When moving the mous over a ‘sensible’ region, the cursor changes into a stethoscope and the according sound is played. The student thereby has to collect the clinical information himself - and to make his mind out of these information. In addition, the provided information is of the same quality (sound) than in a real patient-encounter*. The premise was also given to make case-based media for the education in clinical medicine.

At this time, Marco Mumenthaler and me started to develop a computer based learmprogram in the field of clinical neurology. The hardest problem to solve was to provide the user with 11 different tools with which he then could do the physical examination on any part of the body of the simulated patients. Then the simulated patient should react adequately. This was an easy job to do when the reaction of the patient was sound (heart- or lung-sounds, answers to questions) - we just had to play a sound. But when the finding was a visible one (gait, motility of the eyes etc.), then the simulation was out of our reach. We decided to play movies wherein the reaction of the patient to the action of the physician is filmed.

* Bonvin’s "Laennec" was awarded 1994 with the "European Academic Software Award".

Illustration 6: In the simulated neurologic examination the whole patient must be reached by many different tools. The reaction of the patient to the application of these tools is either simulation or illustration.

It became obvious to us that the playback of these movies was making the making of a virtue out of necessity. Reasons that convinced us most were the representation of the relationship between doctor and patient - and that the quality of the digitized video was accurat enough to show even the expression of the patients faces. This last fact made the simulated patients very "vivid".

3.2.2 Help in the Construction of Illness-Scripts

The more degrees of liberty a learning program has, the less do shy students profit by learning with it. This handicap has to be compensated. This can be done by the implementation of a help-system. One of the most important prerequisites of a help-system for problem-based learning ist that they do not destroy the curiosity of the students. We found a possible solution to that problem by the creation of a simulated tutor who was optionally send for. This tutor provides the student not with comments about the patients illness and its underlying pathophysiology but with simple advices about what examination should be performed to obtain an important finding.

Illustration 7: If the student sticks he can send for a tutor. This tutor then advises him what and how the next important examination would be to perform.

Table 3: The tasks that the tutor adresses to the student when the patient is suffering of a lumbar hernia.

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe the gait</td>
</tr>
<tr>
<td>Test the patellar reflex</td>
</tr>
<tr>
<td>Test the ankle jerk</td>
</tr>
<tr>
<td>Examine the sense of touch on both legs</td>
</tr>
<tr>
<td>Look for Valleix’s (pressure)-points</td>
</tr>
<tr>
<td>Examine the motility of the spine</td>
</tr>
<tr>
<td>Do Laségue’s-test (straight-leg-raise) on both legs</td>
</tr>
<tr>
<td>Test the strength of the dorsal extension of the big toe</td>
</tr>
</tbody>
</table>

The sequence of the list with the aspects of the "Illness-Scripts" (see Table 3) is randomized. Besides any examination that the student performed on the simulated patient is removed from the list - this causes that the tutor wont advice the student to perform examinations that already have been performed.
3.2.3 Mapping the Students Problem Solving Strategy to Picture his Understanding

Sophisticated computer-based learning programs should be designed to work in many different settings. One of the most interesting learning settings are tutored groups. This works as follows: a group of students discuss before and after a patient encounter an according case with the program. Remember Barrows consideration from 1969; “... some gathered data ritually and then tried to add it up afterwards, while others came up with a diagnosis based on some symptom or sign, never considering possible alternatives.” It becomes obvious that an analysis of the students problem solving strategy would be the best basis for a discussion which then would improve the students problem-solving strategies as result of this feed-back processus. Therefore, the program “Neurology interactive” maps the students problem solving strategy for each simulated patient.

Table 4: This log-file has been recorded when I started to examine the patient with the lumbar hernia.

<table>
<thead>
<tr>
<th>strength of dorsal extension (big toe right)</th>
<th>achilles tendon reflex (ankle jerk) (Achilles’ tendon right)</th>
<th>achilles tendon reflex (ankle jerk) (Achilles’ tendon left)</th>
<th>Lasegue’s sign (straight-leg-raise) (lateral part of right lower leg)</th>
<th>Lasegue’s sign (straight-leg-raise) (lower leg left)</th>
<th>gait (beside the patient)</th>
</tr>
</thead>
</table>

The log-file consists of the type of the examination and the region where it was performed. This allows to discuss the problem solving strategy.

Besides this list, others are generated by the program “Neurology interactive”. These lists are conceived to play a role in a specific learning-setting. Let’s take at example the setting where a student learns alone at home. The list that will give him most relevant information is that one where each examination he has performed is discussed by the system as shown in table 5.

Table 5: Each learning-setting has other requirements. The list generated for the student who learn alone gives us the correct findings and some pathophysiological informations.

<table>
<thead>
<tr>
<th>Examination</th>
<th>Findings</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>strength of dorsal extension (big toe right)</td>
<td>decreased on the right side</td>
<td>The long extensor muscle of the big toe is mainly innervated through the L5-root</td>
</tr>
<tr>
<td>Lasegue’s sign (straight-leg-raise) (lower leg left)</td>
<td>60 Degree</td>
<td>The elevation of the straightened leg pulls upon the roots of the sciatic nerve. These are mainly L5 and S1.</td>
</tr>
</tbody>
</table>

4 Conclusions

The best way - but not in all cases feasible - to learn clinical knowledge and skills is done by bedside-teaching with experienced tutors.

To prevent patients from harm and to make a constructive curriculum possible, computer-aided case-based programs are of great benefit.

There is a strong need to implement such programs in the curriculum - and to communicate this with the faculty. This is the only way that the programs are being used the correct way - and the investments are maybe retrieve into a better education which would result in a better reputation of the faculty.

There should be access to learning programs in different settings. After all there should be enough rooms for 4 to 8 persons with learning-computers and projectors - this for discussion groups and problem based learning.

Tanks for your interest. If you have any questions - or you want to provide me with a reviewed english version of this article - please don't hesitate to contact me at mailto:c.daetwyler@gmx.net

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