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How to Get the Medical Doctor in Contact With the Computer by Simple Means of Paper and Pencil

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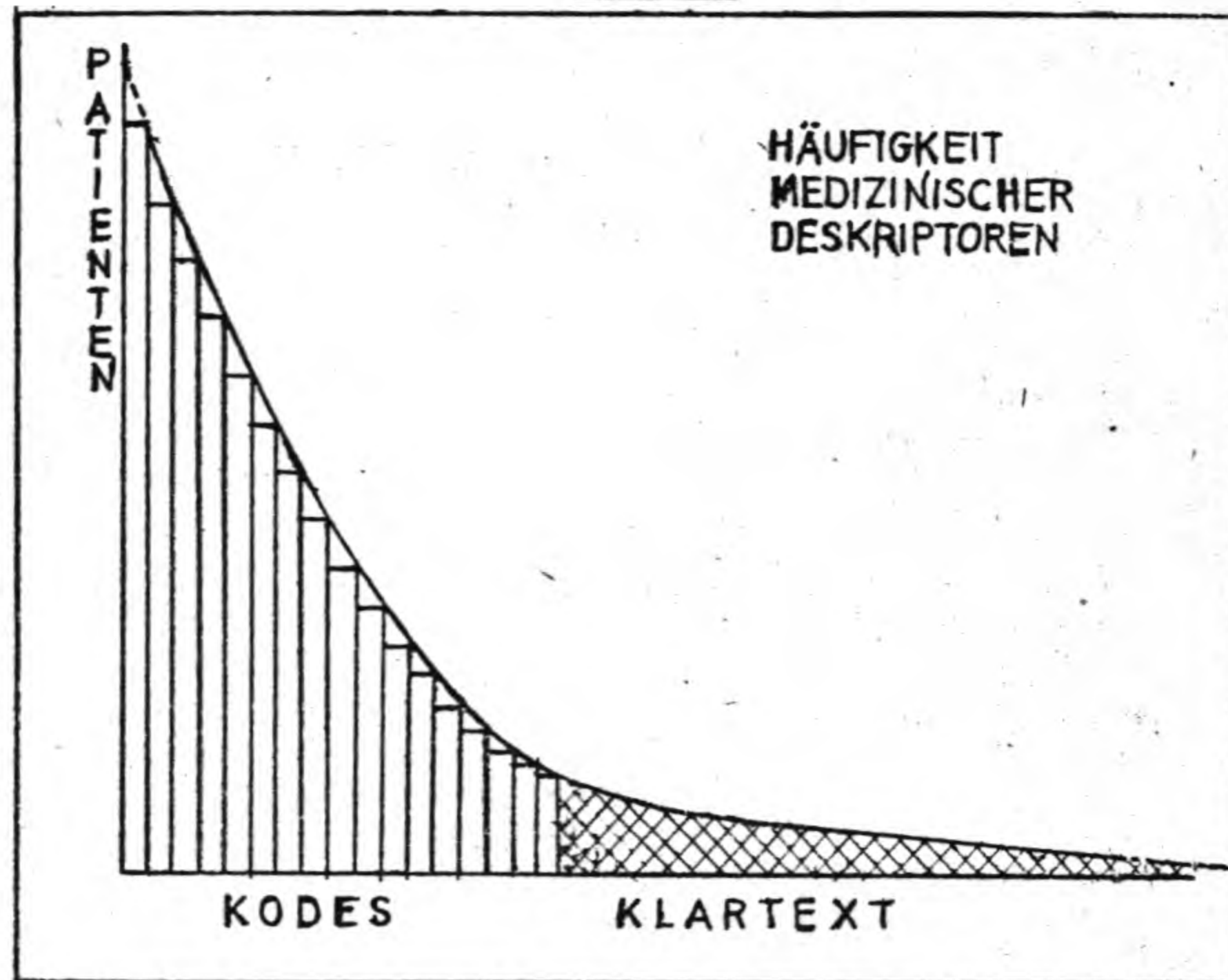
How to get the medical doctor in contact with the computer by simple means of paper and pencil. When we started at the German Clinic for Diagnostic in April 1970 we had to meet with 40 doctors, all coming from different medical schools, all having different medical languages and no one willing to give additional work to their daily routine just for the computer.

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On the other hand they all appreciated the computer's ability to retrieve the data they had found in their daily routine for scientific purposes. They asked me for long-term documentation in order to get after some

Figure 1.



admissions of the patient a kind of patient profile. There were major problems with which I was confronted in bringing the doctor and computer together.

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Problems

The first problem, a special one for our clinic, was that our doctors were especially aware, were especially fond and jealous of their newly gained freedom and they would not permit anybody to give them rules. But you know that to use the computer without any rules is practically impossible.

The second problem was a general medical one. I think it is not a question of technology to get a doctor in contact with a computer, it is more or less a psychological problem. A system must be devised which allows the computer to handle the routine affairs of the doctor yet is flexible enough so that the doctor does not feel forced or limited in his work.

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I will give you some details about the methods we are using in Wiesbaden, in the German Diagnostic Clinic. I am sure that we have solved the problem of getting the doctors in contact with the computer. I am sure now since, within several weeks more and more colleagues are convinced that the method is working, and are asking me to put their own data into the computer. Since the first hesitant colleagues of mine were convinced of the usefulness of the method, a run has started, so that now I am not asking them but they are asking me to use the method.

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In Wiesbaden

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The first technological problem we had was the broad variety of medicine in our clinic with all the specialists who were believed to be necessary for diagnosis in the internal field of medicine: we have eye specialists and neurologists, pathologists and cytologists etc. First I had to divide the broad variety of medicine into little parts so that I could manage to get one part after the other into the computer.

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How can little portions be gotten out of the whole without forcing the doctors? I told the doctors to give me the information about what they were doing in their own words. That was the first approach I used: I asked the doctors themselves if they would like to put the data into the computer. I asked them to give me advice on how to do it. I knew very well that they normally divided their data into parts like "previous history", "present findings", "prognostics" etc. I told them to give me an analysis of their own specialty. For instance the radiologists gave me instruction about the special investigations they were performing at the X-ray department; chest X-ray, pyelogram etc. All these portions of data I identified by a 3 part item and thus divided the field of internal medicine into an assembly of about 350 different parts.

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The second problem was now to get the data itself in these portions structured. We know the text analysis but a text analysis should not be used for this large an amount of medical data. I tried to convince the doctors that the computer would be able to help them to solve problems and to take work from them if they themselves, not me, helped to structure their data. I would like to call your attention now for a few minutes to another problem which deals with the kind of data which we have to put into the computer before I continue with our method of structuring these data.

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Coding

You all know the standard nomenclatures of the key coded diagnosis and that it is apparently impossible to convince the doctors that they should use in addition to their work any coding. But on the other hand if you sort all medical descriptors, I am not talking about diagnoses symptoms, tests and so on but am simply using the word medical descriptor to mean all words which have any sense in medicine, by frequency you will get something like this curve. (Figure 1) The most frequent descriptors we have on the left and the less frequent ones are on the right. It is quite clear that this vector with all descriptors ever used in medicine will reach here to Paris. There is a huge amount of words used to describe all medical findings. But if you look at this curve you can also see that it is possible to describe 80 to 90% of all patients with only a few words. I have to tell you these banalities for I think they are necessary to understanding how we manage our program. We explained this to the doctors and they saw very quickly that if we were able to help in this part by coding (i. e. the left part of few descriptors sufficient to describe 80-90% of all findings) and if they were allowed to give free text information in the additional part for rare, atypical and individual findings, the coding would not limit their discussion of the patient but save them time. For the coding itself I prepared just a sheet of paper, e. g. the doctors were asked for tuberculosis in the family, father and/or mother, brother, sister. That is a multiple choice question with various answers allowed. I underlined one sign in every word and asked the doctors to answer the multiple choice using these signs. If they would tell me about tuberculosis of the father to put an F, tuberculosis of the mother an M etc.

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Additional Free Text Information

But now how to solve the problem of additional free text information. I told them to put a star behind the code and behind the star to include whatever free text information they would like. So I had a structure for I gave that form a 3 byte name and I gave the single lines numbers. By typewriting the 3 byte name first and then the contents of every line I got a well structured data set into the computer. In addition to the structure of single lines we allowed each line to be separated into several fields, so that the doctor had the possibility of giving more than one answer to the question asked. For instance if he were describing a bronchoscopy he would use the first field for the first finding, the second for the next finding, the third for the third finding etc. Thus he had the possibility of describing a variable number of findings using the first, second, third ~~upto~~ the sixteenth field. In each field of a line again he has the possibility of coded information for the 80-90% and of free text information for the additional, atypical and individual not-precoded findings.

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Correct Coding Forms

The next problem was to get the right coding forms. I was aware that I would not be able to prepare for all our forty doctors all the forms they would use. So I asked them to give me a list of all descriptors which they felt they would use often. And when they did so I just had to arrange these descriptors in a manner adapted for the decoding program. Then I put those forms into a copying device and asked the colleagues to test them in practice.

As a reward for their valuable help in structuring and coding the data by those forms I saved the doctors time by representing to them their coded data in a narrative form by use of the computer. The problem of presentation of the decoded and translated data forced us to develop a special programming language which allows to print out the doctor's coded "shorthand" data in a generally understandable way. Again the doctor himself is asked to give us advice on how to translate his data for him and his colleagues into a narrative format.

Now the whole procedure looks like this: The doctor has his coding sheet, designed by himself. Each doctor has his individual sheets, so he very quickly adapts to his forms and knows in which line he has to put which findings by the use of certain codes. Normally in the course of three weeks he knows the right codes by heart. In 80-90% of the cases the codes will do it. For individual or atypical findings he is allowed to write it down on the sheet in additional manner using a star. The secretary types the data, the code and the free text writings into a typewriter which is connected with a small data transmission computer. That writes them on magnetic tape. This is put on the big digital computer. By use of the special decoding program the normal narrative text information is printed out. This narrative information is in a format that we can send to all other doctors as well, and that each other doctor who does not

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Conclusion

I am glad to say that thus by interfacing the computer with the secretary who is able to read the doctors usually not computer readable "shorthand" we achieved some relief of daily work for the doctor. In addition we had an advantage of the method in the EDP by the remarkable data reduction. The same advantage which saved the doctors' time saved us computer space. The psychological trick was:

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1. to follow the doctor's habit to structure his history into several parts
2. to allow him a kind of shorthand without any restrictions concerning additional information in uncoded free text format
3. to reward him with a translated narrative printout, and last but not least, by the simple means of paper and pencil without direct contact with the machine. That simple trick helped us to overcome the difficulties of getting the doctors in contact with the computer and allows us the documentation of the medical history without additional work.

Figure 1



Fig. A

