The computerized use of medical knowledge encompasses almost all of the subject matter of this conference. And so it may seem strange that we have set up this particular session. What we intended was an opportunity to focus upon some application oriented fringe and the problems that attach thereto. The program for this symposium indeed does not sharply isolate use of knowledge from its other roles. Knowledge usually outstrips understanding. Further, knowledge may be disorganized or not useful. For the present session we use a narrower context.

Medical knowledge is the organized and usable information that derives from the experience of medical care, epidemiology, or from laboratory science. The artful and rational blending of information converts data to knowledge. The constructs that emerge are inductive inferences and their deductive consequences, according to the acceptable rules of logic and according to the validations that clinical and laboratory trials bring. Ordinarily, knowledge of this sort is inculcated through education, and fortified by practice. Until recently, in all instances, it was exercised through use of the human brain. What the computer brought to this scene is the privilege of freezing certain exercises in a generalized form (algorithms) and allowing their repetitive use by the mechanism of program execution. It is to this "exercise" that we refer in the phrase computerized use.

In computer science we speak more commonly of activations. Computerized use, therefore, rests on several legs. At one extreme is the entire problem of representation; this domain is investigational, abstract, and difficult. A session of this conference is devoted to studies in this area. A second area concerns the man-machine interface and deals with the forms and flexibilities necessary in hardware. It overlaps into the problems of developing "friendly" software, toward "natural" language systems, or "one second" response time systems. In between are problems of choosing an appropriate segment of medical knowledge and combining some representation, its associated data and the particular form of human interaction with its purpose, e.g., to aid the physicians in making records, to aid the physician in diagnosing infectious disease, to remind the physician of drug interactions, or to augment the reference information of a nurse. In a word, to "use" the knowledge rather than investigate it.

Computerized use, then, is the development part of an R and D formulation. In the formal description of patents, it is the reduction of an idea to practice and the implementation of the practice to service - effective form. We would expect to find, therefore, specific prototypes or complete units to:

1 Collect, store, and file data
2 Retrieve, interpret, classify data
3 Apply accepted general rules to a situation as a member of a general case
4 Identify a complex particular situation
5 Provide enlightenment, by reminding someone of what he already may know, or should
6 Answer questions (form of 3,4,5), give advice
7 Do things automatically with effecter machines
8 Replace man.

Like the early aeroplane or automobile, examples of computer use sometimes are ungainly or clumsy. They make errors --- the user is easily turned from "gee, whiz!" to ridicule or disgust. The long road that computer electrocardiography has pursued is an appropriate paradigm. But we are not today in 1960 - computer use in medicine does not require prior apology.

In this session we have assembled papers that seem to be characterized by the will to be usable immediately to doctor, patient, or student. Because medical knowledge itself is not a continuous fabric but a patch work of regions of better comprehension separated by gaps of
reference, use programs focus, according to Sutton's law in areas "where the money is."

The first paper on cerebrospinal fluid by R.L. Griffith, Sullivan and Miller could well fit into a session on modelling. It is, however, a subject of critical clinical importance on occasion, but one which frequently becomes neglected in the education of a physician by the press of other subject matter. I suppose the question is: "What is the utility of a dynamic mnemonic in cerebrospinal fluid mechanism to the doctor?"

Until the advent of relatively recent neurosurgical and neuropharmacological methods, the practice of neurology could largely be paraphrased as the game of "where is the lesion?". The game was played by combining astute clinical observations with the exercise of a phenomenal amount of associative memory, concerning, for example, tract location and function. Truly, if Sherlock Holmes were to be recast as a physician of the late 19th century, he would have had to have been a neurologist. Dr. James Reggia will discuss in his paper the use of neurological rules in an artificial intelligence format moving toward a usable diagnostic system in neurology. The paper exemplifies the use of knowledge invoked as rules from the neurological sciences and from computer science.

Another area of knowledge which seems well codified at any one time is treatment, i.e., what to do after a decision is made, as though the intelligence were exercised at branch points or nodes and the transitions were automatic. If for node we read "patient status" and for transition we read "treatment/procedure" the physician activity resembles a finite state machine. This is my interpretation of what I think Dr. Ben-Bassat, Dr. Carlson, Dr. Puri, and Dr. Weil seem to imply in their paper on Hierarchical Representation of Treatment Protocols. Although one may say this form of computer use of knowledge sounds like the "activated cookbook"... one can also hear the distant clanking of the robot physician. The usefulness is not to be denied.

So we can proceed to these discussions without further frothing from the chair.