Memorandum to File   July 16, 1967

Conversation with James F. Crow.

He plans to visit Stanford on sabbatical between January 15 and May 1
next year. The subject of principal interest may be the application of
artificial intelligence to genetics, as an extension of the DENDRAL project.
A second topic may be the interrogation of the Census data file, but it is
not clear for exactly what purpose. Conceivably these two projects might be
combined.

Our first task was to try to define the simplest, yet still useful,
area of genetics for heuristic formulation. What emerged after a few minutes'
conversation was the automated genetic counselor. This machine would be
given a pedigree or group of pedigrees as input data, and would be triggered
to induce the most effective hypotheses of genetic transmission to account
for them. We might use Newton MOrton's Segran program as an analog of the
predicter of the DENDRAL system. Whereas at first the hypothesis generation
would be quite rote and would consist of postulating an arbitrary number of
genes, be they dominant or recessive, and with various interactions and
penetrants, it becomes obvious that this unfiltered generator would correspond
to unfiltered DENDRAL. We now have the question of automating that judgment,
such as is used by the human geneticist to infer from the data which lines of
hypothesis are the most plausible, and which lines do not even deserve exhaustive
consideration. In a further application of the automated counselor, the system
should have a good deal of a priori information with respect to the modes of
inheritance and empirical risk of a number of explicit conditions, and use
these as plausibility criteria, much as the GOODLIST of DENDRAL. Finally, the

mechanized system could be used for a more systematic collection of empirical

risk data from existing pedigrees, and for using more complex contingencies

in making predictions on an empirical risk basis.

Finally, there can be a part of the system analogous to the symbiotic

aspects of DENDRAL for collecting information from a patient at input and

for communicating to him at output. Possible advantages of an automatic system

would be the explicit separation of informative and psychotherapeutic functions

of the physician. With a counseling machine at his disposal it is also con-

ceivable that genetic counseling could be made available to a much wider reach

of physicians than is now the case. The system could have built-in interrogation

to try to extract the maximum possible useful family history. Such a system

should of course be well integrated with multiphasic screening and whatever else

is done on an automated basis, but in many respects it might be much the most

productive automation of the clinical process that could be easily undertaken

at the present time.

Consider the merits of incorporating this idea into a proposal for an

NIH grant.