Editorial on Recent Advances

A plea for models

What does a model mean to you? A shapely young lady showing off swimwear? An eight-year-old boy with a broken airplane, just crashed?

The visual system is a highly organized and marvelously coordinated system. The extent to which we are able to develop a model to fit its observed functional behavior reflects and delineates the extent of our appreciation and understanding of the structural and functional components and their dynamic interrelationships.

Because a model is an explicit summary and demonstration of the collection of assumptions regarding the functioning of a system, it also provides a demonstration or revelation of the areas where understanding is lacking or scanty, and where there is apparent incompatibility of assumptions. A biological system implies functional consistency of underlying mechanisms and hence, a model provides a crucial testing of the mutual consistency of hypotheses and exposes the weaknesses in our understanding.

Observation data alone cannot lead us to an understanding of the interrelationships of the mechanical and physiologic components of the visual system. A model can promote awareness of very specific and pertinent questions which need to be asked as well as providing insight into the appropriate phrasing of questions. "Asking the right questions is, in science, a large step toward obtaining right answers."1

"The development of a model is a crucial feature in the scientific approach to any system and in particular to . . . complex biological control systems."2

The development and use of models involves continual interaction and mutual feedback between experimental results and theory, between observation and simulation. It allows us to alter conditions in order to demonstrate the implications of various disturbances on the complex functioning of the whole system. With the increasing development, we appreciate these implications at a more refined level of biological organization.

As clinicians use and add to the static eye position model presented in this issue by Robinson, it will expand and integrate the data of dynamic3 and clinical surgical models4 into a coherent whole which will help diagnosis and treatment of motility disorders.

The advent of the computer to science and of the engineer to medicine provides a level of model building which is thus
no longer an ivory tower exercise, but practical work in guiding research and clinical thought.

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REFERENCES