

# AIR *Brush* DIGEST



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The retoucher is not only kept in the background, he's often kept invisible—because he's fixing other people's mistakes. The retoucher's *work* is often also invisible. This article on technique, however, shows some dramatic "before" and "after" shots, executed by one of New York's top-flight retouchers.

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A contemporary Renaissance Man—author, teacher, scientist and artist—has helped create a new Renaissance in medical illustration. Illustrators from every school of thought will be interested in his unique techniques and approach. Get ready to view some startling illustrations.

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A porcelain ceramist reveals his use of the airbrush in creating works of art, and gives some insights into how to work glazes and stains. None of it is easy—all of it is hard work.

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## The Art of a

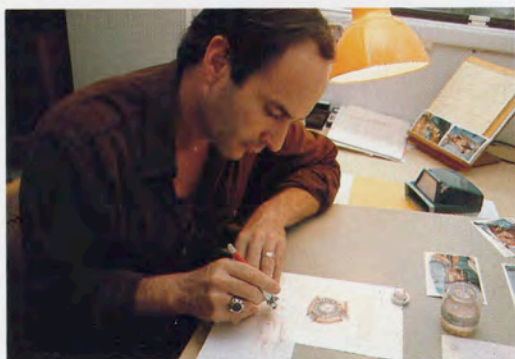
# Renaissance Man

**F**redric Harwin is a medical illustrator who uses many tools to create his art. Like the masters of the Italian Renaissance, he is open to experimentation. That is why he turned not only to the airbrush, but to a wide range of materials that he has learned to combine with the airbrush—thus he exploits the airbrush and the other media he uses to their fullest.

For instance, when Harwin saw a demonstration at a medical illustration convention of how subtle effects could be achieved with an airbrush on the underside of a piece of Mylar, he decided to play with the idea. He used regular Mylar—painting alternately on the top, bottom, and then on the top and bottom in combination. He tried Mylar that was frosted on one side and frosted on both sides. He also used pastels and colored pencils, as well as airbrushing techniques, on this medium.

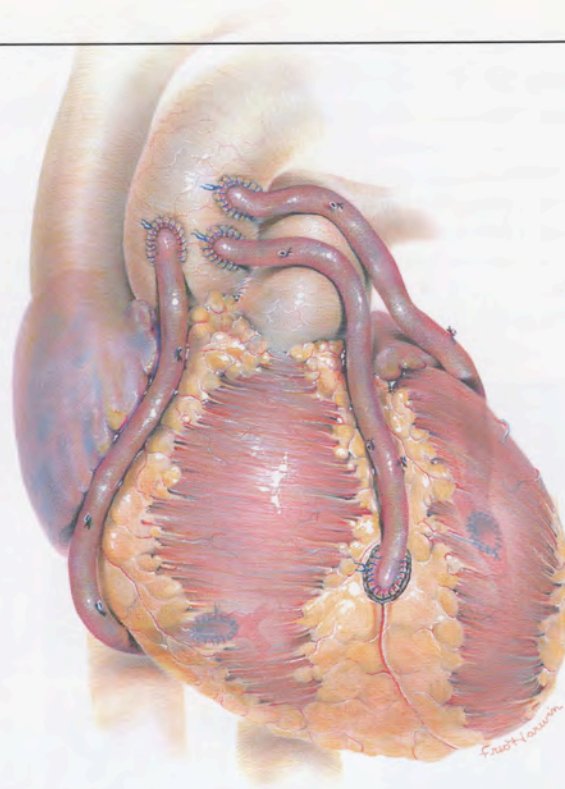
“I developed and sharpened this particular two-sided technique with two experimental drawings,” Harwin says. “One was of my daughter, the other a view of an adult heart.”

“I found that placing colored pencil over airbrush was not too desirable in most cases, but the airbrush over colored pencil worked fine. It depended on exactly what effect I wanted. Pastel over colored pencil gave me one effect, pastel over airbrush another, and airbrush over pastels still another. I worked back and forth, creating the



*“People say to me, ‘How can you go in and look at those guts?’ I tell them, ‘I’m not looking at guts; I’m looking at the most beautiful relation of textures and colors.’”*

*The saying “blood and guts” is a shorthand for injury, accident, trauma. In the operating room there is no trauma, no violence—and bleeding is controlled. It is under these conditions that Harwin views and marvels at the beauty of the inner workings of the body.*



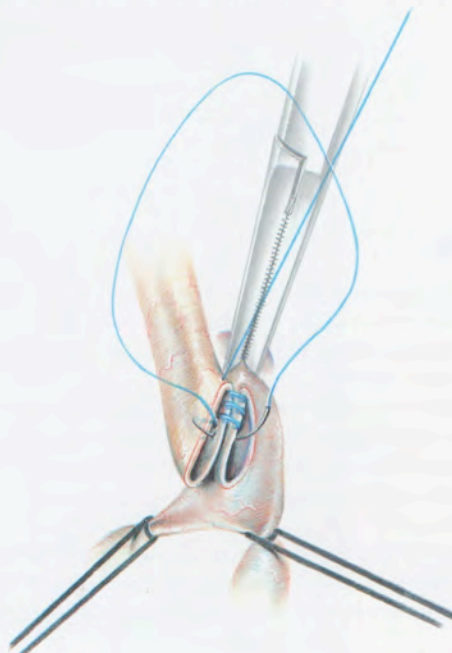
*Illustration showing a completed coronary artery triple bypass with grafted veins taken from the patient’s leg. Harwin created 64 illustrations to demonstrate the complete procedure from start to finish.*

desired color sensitivity, with some illustrations ultimately incorporating four separate depths.”

The technique became so successful in communicating subtle color differences that he used the double-side frosted Mylar technique throughout the *Manual of Cardiac Surgery* (see below for details of this remarkable medical text).

“I worked the back side of the Mylar with general tones, then applied the airbrush to the near side in conjunction with colored pencil and pastel,” Harwin explains.

In some cases Harwin does detail work on the backside





of the Mylar, for instance when he renders small blood vessels. Then highlights and transparent effects are added on top. To render in black and white on Mylar Harwin uses carbon pencils, carbon dust, graphite, graphite dust and wash to achieve his effects.

The transparent effects are some of the most startling examples of Harwin's art. Although medical illustration can be described as Scientific Realism—realism that must not *mislead* the eye for effect or drama—nevertheless, Harwin will readily admit that his work *is* designed to lead and direct the eye.

Using what could be called illustrations of “transparent organs,” the student or surgeon looking at one of Harwin's illustrations can see an organ as it will appear in the operating room, with all its subtle coloration. But in specific areas of these organs Harwin allows the eye to “see” through them to where a patch, a suture or a graft has been applied.

“It's so helpful to see in an illustration what one cannot see with the naked eye, to see what is there, and what the surgeon really needs to identify. That's why I used the transparency technique,” Harwin explains. And yet, as rendered by Harwin, “This technique enabled me to convey the field with minimal loss of reality or dimension.”

Taking this idea of leading the eye one step further, Harwin—“not content with the watchful passivity of a photographer”—shows only the most salient parts of a surgical procedure by dropping out backgrounds and unnecessary details.

A photograph of an open heart cavity can be a confusing sight. So Harwin's illustrations, although in no way schematic or diagrammatic, include only what he wants to demonstrate. This approach to Scientific Realism allows Harwin to show the “big picture” as clearly as detail.

When rendering a view of a heart cavity after it had been opened for heart surgery, for example, he leaves out all the surrounding tissue, fat and other extraneous

elements—things that take the eye away from important elements of the illustration.

To do this requires more than just eliminating the non-essentials. “It takes a lot of graphic tricks—the use of contrast, value relationships, complementary colors, and direction devices—I often show surgical instruments pointing in a certain way,” Harwin notes.

He works on an almost one-to-one scale in his illustration, using a Paasche AB airbrush. Harwin's almost one-to-one scale—never more than 10 percent larger than reproduction size—is fairly uncommon in airbrush rendering. Most airbrush artists like to have their work reduced—to “tighten” it up.

But with Harwin's renderings he has found he can enlarge his work and still get good results. “We enlarged the final rendering of the completed vein anastomosis (completed vein grafts) to a four-foot by six-foot color print, and I was amazed at the resolution.”

This is not surprising to anyone who knows Fredric Harwin. His illustrations are more than something he creates to earn a living. They are things he discusses with care and thought.

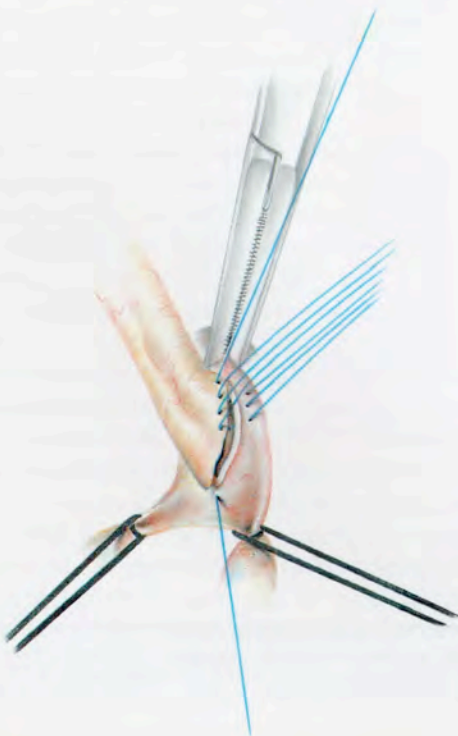
“Someone asked me to give a talk. They asked, ‘How long do you want to talk?’ I said, ‘How long do you have?’” Harwin said with a smile recently.

He is constantly involved with his art, constantly thinking about it. Like the great artists of the Italian Renaissance, art for Fredric Harwin is not something separate from life—it is life. And it is this attitude that makes his work fine art.

## History

It was the Italian Renaissance that gave birth to medical illustration and nurtured it to maturity. Scientific medical illustration grew rapidly because of that era's intense

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*The above illustrations demonstrate the last three steps in creating what is known as a shunt. This type of shunt is used almost exclusively in operations on infants.*



# Renaissance Man

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interests in science and the human form—interests that were to spread over Europe through the medium of printing.

During these formative years, medical illustration was not considered a specialized art. A commission to illustrate a medical text was approached as any other assignment for a fine artist of the Renaissance—for it was fine artists who were almost exclusively the medical illustrators of the age. To these artists a commission to illustrate a medical textbook was as much of a challenge as any other commission.

As medical illustration developed, it concentrated ever more on particulars. Gradually the *attitude of fine art* was left behind as unneeded baggage. Medical illustration in the years to follow would take on the *attitudes of the craftsman* who created art for utilitarian purposes.

When the tenets of medical illustration were single-handedly codified by Max Brodel, the “Father of Modern Medical Illustration,” when he founded the first school for medical illustration as a branch of Johns Hopkins University, the idea of the medical illustrator as craftsman became firmly established.

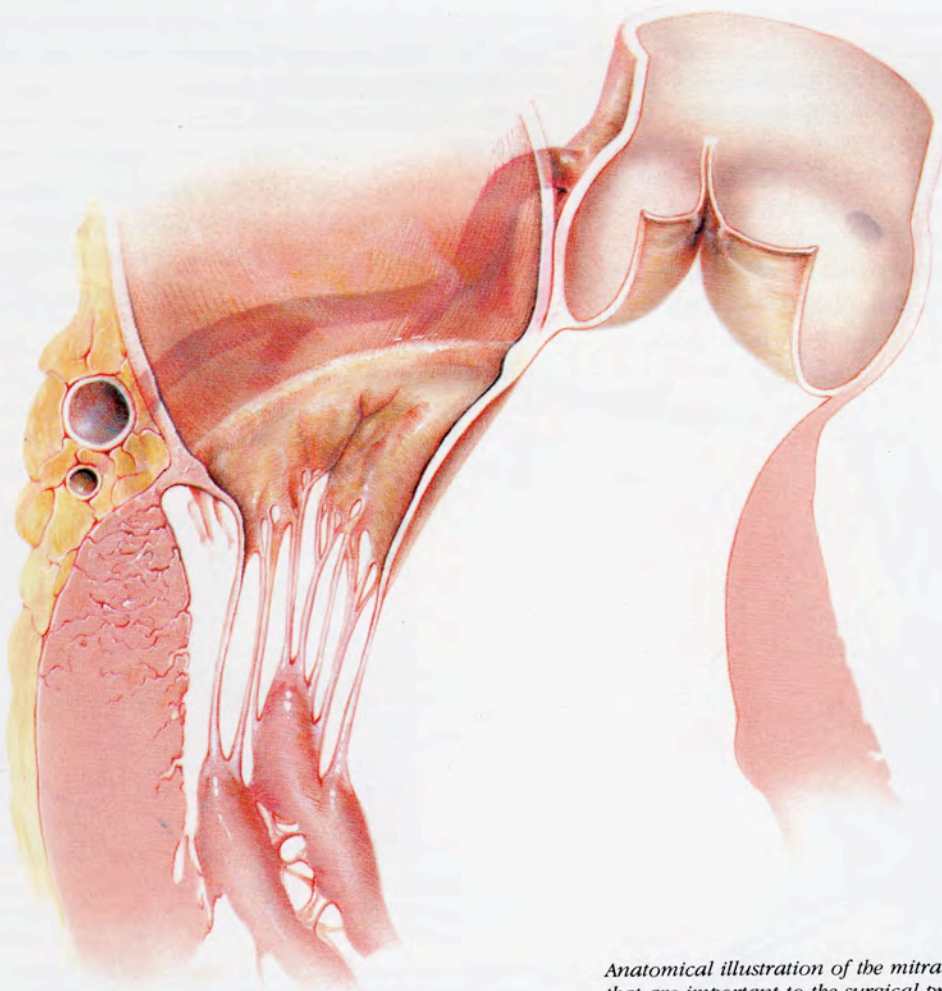
Brodel was a towering figure in the history of medical illustration. Although he was not trained in medicine, he discovered two medical procedures from his own observations that are still used today. One is the best place to make an incision during kidney stone operations, called Brodel’s Line; the other is a suture used in repairing a prolapsed kidney, called Brodel’s Suture.

Brodel’s words are the motto of medical illustrators to this day.

“A clear and vivid mental picture must always precede the actual picture on paper. The planning of the picture, therefore, is the all-important thing, not the execution,” Brodel wrote.

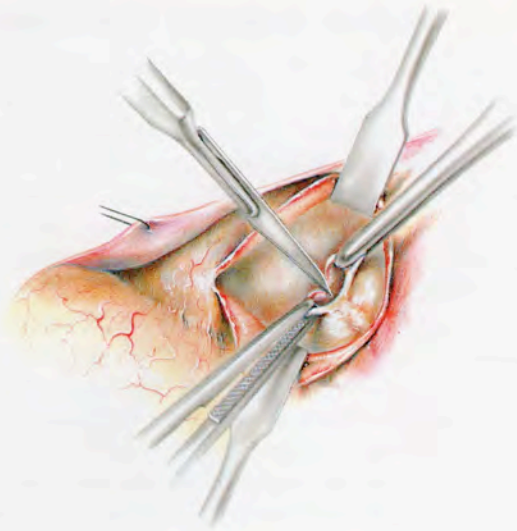
For years this approach brought medical illustration a long way—providing it with a beacon, a light to follow. But eventually the skills of the modern medical illustrator would have to become more than those of a planner. At some point execution would become just as important—and the attitude of the fine artist would be called upon once again.

Medical journals can be savage in their criticisms of medical books. In book reviews of medical texts it isn’t unusual to read reviews attacking “poor quality illustrations and photographs,” poor print production “impairing the quality of the illustrations,” and criticisms of illustrations as “overloaded with captions”—illustrations that are



Anatomical illustration of the mitral valve and adjacent structures that are important to the surgical procedure of mitral valve replacement. Harwin leaves out structures unnecessary to the procedure.





*This illustration portrays a surgical procedure that enlarges a congenitally small pulmonary artery valve to increase the blood flow.*

so unclear that a great deal of verbiage is needed to explain them.

When the prestigious *New England Journal of Medicine* prints a glowing book review, the medical community takes special note of it. Such a review is an event in itself.

### From "New England Journal of Medicine":

"Like canned vegetables, surgical atlases often lack a certain tang and aroma. Not so this manual. It delights in presenting things that are not normally noticed. Its credo is that 'the best surgeons do not make fast moves ... they make efficient moves.' Accordingly, 'even the way a needle is placed in the needle holder, the way the needle holder is held in the hand, and the motions of the hand, wrist, arm ...' are detailed. Such attention to these essential components of technical excellence is rare...."

"The book is blessed with a medical illustrator who is not content with the watchful passivity of a photographer.... Superb color plates ..."

"Full of nuance and scruple, this world-class atlas establishes new norms. It settles contentious questions ... without fuss. It will enrich and enchant all who read it."

The book this review speaks of is the *Manual of Cardiac Surgery*. Such reviews are very rare in the *New England Journal of Medicine*, but the review does not exaggerate. This cardiac surgery manual *does* set new norms.

In fact, the publication of this text seems to signal the coming of a new Renaissance in medical illustration.

Why does a renaissance occur? A renaissance happens when a number of precipitous events occur. Originally medical illustration couldn't have come into being without printing, new social attitudes concerning dissection, and the rediscovery of classical Greek scientific thought at the end of the Middle Ages—all of which developed simultaneously and then fed each other's growth.

With the coming of the *Manual of Cardiac Surgery*, by Dr. Albert Starr, Dr. Bradley J. Harlan and Fredric M. Har-

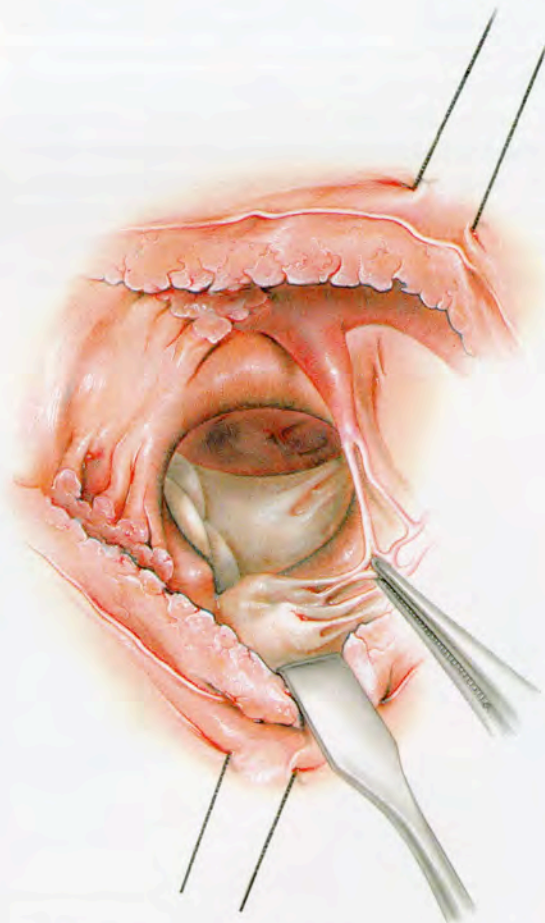
win, many similar "happy accidents" came together. A medical textbook company made a commitment to excellence, a skilled and dedicated medical illustrator joined forces with a superb team of surgeons, and cardiac surgical techniques had arrived at a high state of development.

This last development—the high state of cardiac surgery—actually was the crucial event. Without such a development no textbook publisher could afford to publish a sophisticated color medical atlas. A textbook publisher has to know that what he publishes won't be obsolete in a year.

In the last three decades cardiac surgery has had "rapid passage through infancy and adolescence to near maturity," wrote Dr. Denton A. Cooley and Dr. John C. Norman, eminent cardiac surgeons with the Texas Medical Center, Houston, in 1975. Two years later Springer-Verlag, an innovative and daring publishing house specializing in quality texts, took the initiative and approached Dr. Starr, Dr. Harlan and Harwin, all associated at the time with the Oregon Health Sciences University, Portland, Oregon, to work on a major cardiac surgery text.

The book's aim was to describe all current major cardiac surgical operations in a new way. "Carefully conceived and superbly executed full-color illustrations," the preface states, were to be "the *primary* vehicle for conveying this information." (Emphasis added.)

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*This is the view of a pulmonary artery related defect that affects infants—and will be fatal to half the children in whom it appears before age three, unless surgically remedied. It can now be patched and corrected with Teflon or Dacron materials.*



# Renaissance Man

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## The Illustrator As Co-Author

The illustrator of the *Manual of Cardiac Surgery* was not to be *just an illustrator* in the background drawing sketches. He was conceived as a co-author—an unprecedented consideration.

“When I use color I want it as authentic as possible. Where applicable, I want to show medical procedures can be taught totally visually,” Harwin said not long ago. Color illustration is fairly new to medical teaching texts. Previous to the publication of the *Manual of Cardiac Surgery*, the prevalent texts on heart surgery had *no* color illustrations in them.

“I work from actual specimens and high resolution photos. That’s because I want to work from the most accurate materials possible. I also spend a lot of time in the operating room. That gives me direct observation. Sometimes I’ll return a second time simply to observe color.”

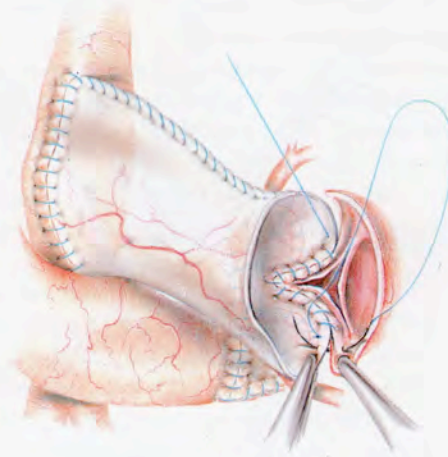
Three and a half years after it was started, and after great labor, the *Manual of Cardiac Surgery* was published. It comes from the surgeon’s point of view.

When the atlas finally got into the hands of surgeons and medical students it was immediately seen for what it was—a breakthrough for medical texts. The text, it must be stated, is brilliantly written. And the overall concept and execution were the work of three very dedicated men.

But the illustrations are the unifying force of this work. In a word, it is the first time the “visual tales” of teaching surgery—the kind of instructions surgeons give their students by showing with their hands what they do—have vividly come through in a medical text.

## Portrait of a Renaissance Man

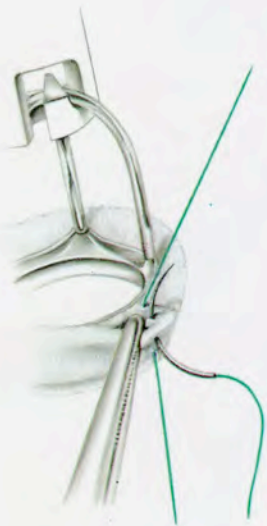
Fredric Harwin earned a Bachelor of Fine Arts degree in interior architecture, drawing and painting in 1964 and



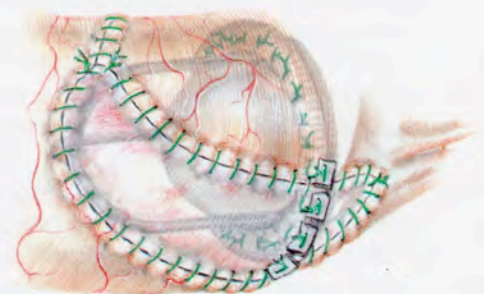
*This illustration depicts the construction of a conduit made from a cadaver’s brain covering (dura). Dura is naturally transparent—so Harwin is depicting strict realism here. This operation is designed to correct a severe anatomical heart defect. This defect, if not corrected, will be fatal to 80%-90% of the infants in whom it appears before age 1 year.*

then went on to take his Master of Science degree in medical and biological illustration in 1967. He then served as Director of Medical Illustration at Wayne County General Hospital, a teaching affiliate of the University of Michigan. In 1969 he joined the faculty of Oregon Health Sciences University. For the past two years he has been Director of Ocular Prosthetics at the Portland, Oregon, Good Samaritan Hospital’s Dever’s Memorial Eye Clinic. He has also taught at Portland State University and at the Oregon Museum of Science and Industry and is Adjunct Professor with the Medical Program, University of California, San Francisco Medical Center.

He is an author, a teacher, an artist and a scientist—but above all he is a man of vision. As a teacher and as a “visual communicator” he saw clearly that a number of things weren’t being done very well in the field of medical illustration. And he set out to change them.



*Illustrations depicting the placing of an artificial mechanical valve in the heart to replace a diseased valve. The first illustration demonstrates the type of suture that must be used—depicting how a surgeon might demonstrate it to a medical student outside the*



*operation room. The second illustration depicts the sutures as they appear in place. The third illustration shows how a Dacron graft closes and gaps the enlarged passage the surgeon has made to fit the artificial valve.*



## Harwin's New Approach to Color

Harwin saw that very little color was being used in medical illustration, and that when it was being used it was not communicating information; it was being used for color schemes. Traditionally, medical illustration showed arteries as red, veins as blue, lymphatics as green, nerves as yellow and muscles as red-brown.

"This is fine if you're teaching anatomy," Harwin noted recently, "but if you want to teach techniques in surgery, color should differentiate" the various aspects of the body as seen in the operating room. The surgeon needs to know, for instance, how that anatomy looks under retraction, "not just how it looks from a view of a picture in an anatomy book that's been turned on its side."

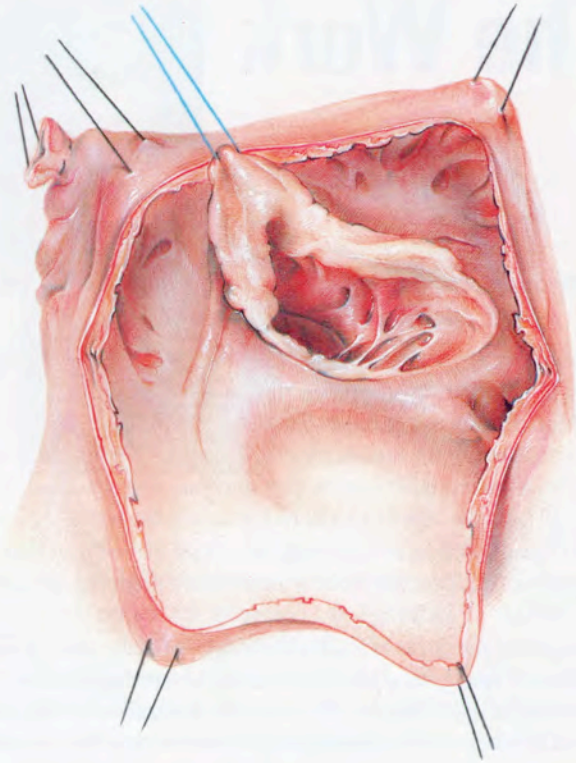
Harwin was one of the first to understand that in a surgical text, color should be used as a diagnostic tool.

He also understood that the illustrations of surgical procedures needed to stand on their own as much as possible. He felt strongly that illustrations should not need captions—or only brief ones. To be truly successful, they need to be independent of the text, with a "voice" of their own.

Harwin also realized that his illustrations would, in some cases, have to go beyond the text to show the step-by-step continuity of procedure being described. It was a case where a clear series of pictures would be worth many thousands of words.

Then he, and the two brilliant cardiac surgeons with whom he worked, developed another unique visual teaching concept—by showing what not to do. In cardiac surgery, where tiny instruments work on tiny areas, the tiniest of mistakes can be fatal.

The publisher of the *Manual of Cardiac Surgery* liked the concept of showing what not to do so much that they encouraged the surgeons, Dr. Harlan and Dr. Starr, and Harwin to develop a whole "how-to" chapter in the beginning of the book on hand movements and on the proper way to hold surgical instruments, needles, and needle holders.



*This illustration shows the most common congenital cardiac defect, called a ventricular septal defect (VSD). It appears at birth in one out of every 500 infants. In many cases it is not necessary to operate on this defect. But in cases where an operation is called for, a Dacron patch can remedy the problem.*

These realizations about the diagnostic use of color, the need for illustrations to stand on their own, and the need to show what not to do were truly new insights in medical illustration. But new artistic visions are lost unless they are executed with more than average skills. New visions need masters to bring them to fruition. In creating the art of the *Manual of Cardiac Surgery*, Harwin has demonstrated that he belongs in the category of master. ■



*Harwin shows off the Broadway transfer lithography press that is part of his and his wife's new company, Harwin's Studio. Currently his wife is producing original lithographs on this press, which can accommodate stones up to 38" x 40." Harwin plans to publish his own prints on this press in the near future.*

*A portrait of Harwin's daughter Lisa—a portrait in which he used the same techniques discussed above.*

