

**SIGGRAPH 1990**

**17th International Conference  
On Computer Graphics and  
Interactive Techniques**

**Dallas Convention Center  
August 6th—10th**

# COURSE NOTES

## 2

### **COLOR AND COMPUTER GRAPHICS**

***Chair***

**Aaron Marcus  
Aaron Marcus and Associates**

***Lecturers***

**Aaron Marcus  
Aaron Marcus and Associates**

**Gerald Murch  
Tektronix, Inc.**

**Wanda J. Smith  
Hewlett-Packard Laboratories**

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SIGGRAPH90.Tut.Color

## **Color and Computer Graphics: Tutorial Notes**

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**Aaron Marcus (Chair)  
Aaron Marcus and Associates**

**Gerald M. Murch  
Tektronix, Inc.**

**Wanda J. Smith  
Hewlett-Packard Laboratories**

**Tutorial Number 2  
SIGGRAPH-90 Annual Conference  
Dallas, Texas  
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## Agenda

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| <b>Session</b> | <b>Time</b> | <b>Topic</b>                            | <b>Speaker</b>           |
|----------------|-------------|---|--------------------------|
| 1              | 8:30-8:45   | Introduction                            | Marcus                   |
| 2              | 8:45-10:00  | Terminology<br>Physiology<br>Perception | Murch                    |
|                | 10:00-10:15 | Break                                   |                          |
| 3              | 10:15-12:00 | Terminology<br>Physiology<br>Perception | Murch                    |
|                | 12:00-1:30  | Lunch                                   |                          |
| 4              | 1:30-3:00   | Cognition<br>Standards                  | Smith                    |
|                | 3:00-3:15   | Break                                   |                          |
| 5              | 3:15-4:45   | Communication                           | Marcus                   |
| 6              | 4:45-5:00   | Questions<br>Closing Remarks            | Marcus<br>Murch<br>Smith |

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## Abstract

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### Course Description

This course introduces terminology, principles, guidelines, and heuristics for using color in user interfaces and presentations for both screen and hardcopy display. The covers physiological, perceptual, cognitive, and communication issues, such as how human beings see color, what colors to select, how to select them, how to display and communicate color effectively, and how to design with color.

Participants will be exposed to a wide body of existing knowledge, practical advise that is immediately useful, and potential research topics. They will observe and analyze techniques for making displays more intelligible, functional, aesthetic, and marketable. The course will provide sufficient background and visual examples to enable participants to understand the complexity of color phenomena, to determine more effective use of color in their displays, and to know which information resources will be useful for further study. The course agenda includes the following topics:

|                                    |                                    |
|------------------------------------|------------------------------------|
| Basic terminology and concepts     | Color assignment and coding        |
| Physiological basis of color       | Relativity and redundancy          |
| Color perception schema            | Preferences, performance, learning |
| Color models and spaces            | Advanced user interface issues     |
| Color vision deficiency, illusions | Psychological, cultural issues     |
| User manipulation and selection    | Aesthetics, harmonious palettes    |
| Screen/hardcopy conversion issues  | Product identity, marketing issues |
| Cognitive issues for usability     | Case studies                       |

### Who Should Attend

Programmers and managers who need to understand the properties of color as they relate to humans. Professional developing user interfaces and presentation systems for a wide variety of applications, including process control, scientific visualization, and computer-aided design. Also, training specialists, technical editors, graphic designers, and human factors specialists.

### Recommended Background

Assumes some familiarity with color terminology, color appearance, and interaction issued in current computer graphics systems.

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## Instructor Biographies

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**Aaron Marcus, Principal  
Aaron Marcus  
and Associates**

Mr. Aaron Marcus is founder and principal of Aaron Marcus and Associates. His staff researches, designs, and evaluates the use of typography, symbolism, color, spatial layout, animation, and sequencing in computer graphics presentations, user interfaces, electronic publishing formats, documentation and knowledge visualizations for major US and International firms. Mr. Marcus has written many articles on graphic design for computer graphics for technical and professional journals, including the essay "Color: A Tool for Communication" in *The Computer Image* published by Addison-Wesley. He recently co-authored with Ron Baecker *Human Factors and Typography for More Readable Programs*, which includes color prototypes for C code. He served on a NASA advisory committee for color selection in the US Space Station. He has given screen design, information graphics, and electronic publishing tutorials at major computer graphics conferences and at companies in the USA, Canada, Europe, Israel, Singapore, and Japan. Mr. Marcus received a B. A. in physics from Princeton University and a B. F. A and M. F. A. in graphic design from Yale University Art School. He has taught computer graphics since 1970.

**Dr. Gerald M. Murch  
Chief Scientist  
Tektronix, Inc.**

Dr. Murch, a Chief Scientist at Tektronix, Inc. directs the activities of the systems Architecture and Interface Lab within Tek Labs. This lab focuses upon workstation architecture for visualization; color products, which included the development of TekColor™ standard; user interface design and corporate industrial design which form the focus for the creation of a Tektronix common product look and feel. Dr. Murch received his PhD in natural sciences (physics, physiology, and experimental psychology) from the University of Göttingen, West Germany. Prior to joining Tektronix, he held the position of Professor of Experimental Psychology at Portland State University (Oregon), where he directed the research activities of the Human Color Vision Lab. Dr. Murch has written three books on human perception as well as numerous papers on human factors. He has given tutorials on human factors of color and color display systems throughout the world. These include NCGA, SID, Eurographics and Ausgraph.

**Dr. Wanda J. Smith  
Manager Corporate  
Human Factors Engineering  
Hewlett Packard  
Laboratories**

Dr. Smith has 23 years experience as a Human Factors Engineer in the computer industry. Her experience includes research, product development, manufacturing, and marketing of computer I/O devices, automatic transportation, checkout and financial transaction systems, and scientific and medical instruments in the U. S. and Europe. Dr. Smith completed her graduate training at Stanford University where she conducted her thesis research on vision. She has published computer images including the recently published book, *Using Computer Color Effectively*. Dr. Smith has been a U. S. delegate to the International Standards Organization for seven years and is currently authoring a standard for ISO on Computer Image Color.