PERCEPTUAL DISCREPANCIES IN COLOR PRODUCTION TECHNOLOGY

COURSE # 1

CHAIR:

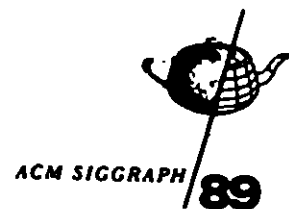### Sonya Haferkorn
Pratt Institute

SPEAKERS:

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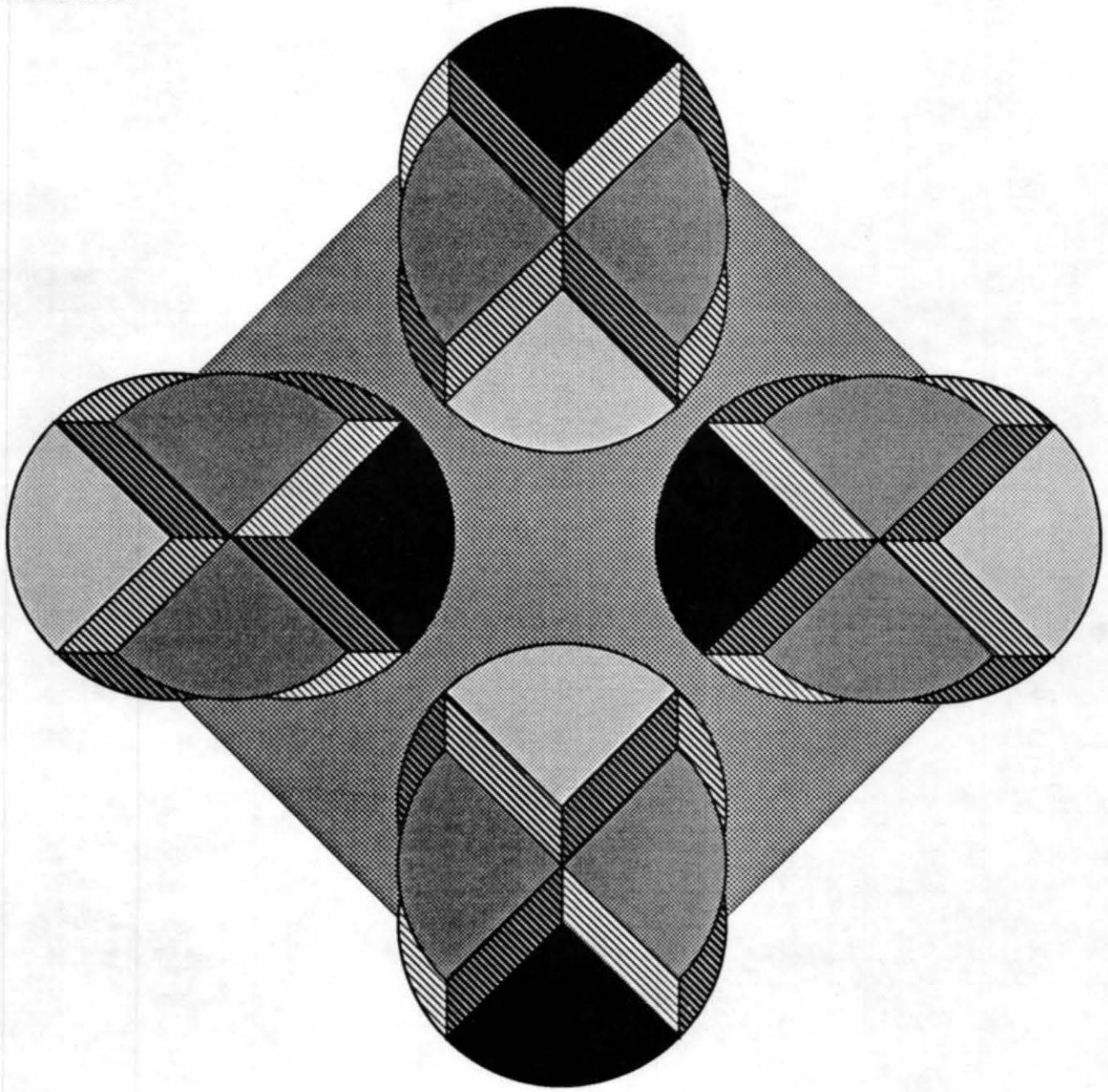New York Institute of Technology

Mary Gruber
Colortec Graphic Production, Inc.

Perceptual Discrepancies
in
Color Production Technology

Abstract

This course is designed to assist those who are responsible for some aspect of the creation or production of computer generated color imagery. With the high degree of specialization required by current computer graphic production technologies and environments, it is difficult for any individual to have a profound knowledge of all aspects of preparation, production and post production of computer generated imagery. This applies equally to artists, designers and scientists, who use color in order to create works which will be reproduced or viewed in environments or media other than those in which they were initially created. Accordingly, many specialists may develop nearly expert skills in a single area, without fully comprehending the effect of their work on previous and subsequent graphic production stages. *Perceptual Discrepancies in Color Production Technology* is designed to acquaint both artists and technicians with aspects of color which may impact their overall knowledge and performance, regardless of their specialization.

Color is often regarded as a field of specialization within computer graphics. Nevertheless, issues of color behavior, human perception and output technology affect the appearance of nearly all computer generated images, including those black and white applications which rely on textures to achieve varying densities of grey. The emergence of color reproduction technology at the microcomputer level brings enhanced opportunities to thousands of users, but also greater degrees of complexity, more decisions to make, and more knowledge necessary to achieve the desired final image. The aim of this course is to address state-of-the-art issues in computer color usage and reproduction, and to make available a range of information applicable to beginners in all realms of the computer graphic production process. The four papers examine color from various viewpoints, including human perceptions and sensibilities, basic hardware functionality, and the physical differences between additive and subtractive color systems and materials. Emphasis is placed on enabling users to understand color technology and behavior well enough to make color choices which will survive translation to other media, such as print, video and film.

Recent developments in color organization systems tend towards colorspaces in which human perception plays a major role. Though many systems provide access to over 16.7 million discrete colors, the average user selects only those colors in the most accessible and therefore shallow ranges. A determining factor in the color selection process is the interface through which novices learn to locate and combine color choices. Current user interface designs in general tend towards simplicity, in the respect that the technical aspects of color specification are buried, and colors are selected more through appearance only. The increasing prevalence of icons, larger color swatches and instantaneous alteration of colors within the composition during the selection process, all increase the speed and flexibility of color usage. Color attributes, such as fluorescence and brilliance, hitherto unaccounted for in traditional color solid models, are of increasing concern in computer simulation system design, since computer generated color is based on color as a source of light. These are also part of the present concerns in color organization, and are addressed in *A Perceptual Basis for the Development of Color Tools in Computer Graphics.*

Perceived color illusions, a relatively recent concern in the long history of color studies, also play a striking role in computer color usage. The realm of direct or additive color (colored light), which constitutes computer generated color, increases the effect of several perceived illusions, most notably those based on after-images. These may be deliberately employed by designers who acknowledge the unique ways in which color illusions are amplified in the computer graphic environment. Conversely, even scientific applications in which data is color coded are also vulnerable to color legibility problems, if basic color interactions are not understood. Undesired illusions which may accidentally result from insufficient awareness of additive color behavior, may be controlled through application of examples outlined in *The Manipulation of Computer Color Illusions.*

Many computer artists and users, although responsible for the creation and manipulation of imagery, have only vague knowledge of the hardware used to display computer generated pictures. A basic understanding of hardward design, including translation of digital image information into output on a video display monitor will enable computer artists and users to appreciate perceptual discrepancies in the representation of a single picture on any number of different display devices. The unique behavior of colors in the spectrum, also determined or affected by the display technology and media format, may be better manipulated, given a clearer understanding of the way in which color information is handled differently in each. *Computer Output Technology* attempts to outline, in terms comprehensible to non-technicians, such information as may affect the use of color in various hardward, video and film systems.

Finally, while it is often desirable to obtain printed output of computer graphics, computer generated color is increasingly used as an intermediate stage in the traditional production of print images. This necessitates an understanding of color output technology on the part of graphic designers and others who might not be interested in the computer as a self-contained picture-making environment. Discrepancies which arise in the translation from subtractive color (conventional comps prepared in paint, magic marker or other reflective media), to additive color (in the computer), and back to print again (for the final output), may be decreased through the use of perceptually ordered color sets, such as the Pantone system and other "designer" sets. Reliance on human perception of color accuracy and other issues in the output of computer generated imagery to print are discussed in *Managing Color Discrepancies Between Computer Graphics and Print in Microcomputers.*

It is our sincere wish that those attending the course, or acquiring the notes, will find here the information which will enable them to have more control over the use of computer generated color, regardless of the application.

Sonya Haferkorn
Chair

Speaker Biographical Information

Sonya Haferkorn, Chair
The Manipulation of Computer Color Illusions

Sonya Haferkorn is president of Metamorphisis Computer Concepts, a firm which specializes in the design and execution of computer imagery for broadcast and electronic media. One of the original employees at Omnibus Simulation, Haferkorn has been a professional computer designer/animator since 1982. She currently serves as executive design director at Four D Computer Graphics, New York, and color design advisor for the teleoperations research unit of Space Studies Institute in Princeton, New Jersey. In March 1988, her electronic translations of Josef Albers Interaction of Color premiered at the Guggenheim Museum, New York, as part of the Josef Albers Restrospective. An adjunct instructor at Pratt Institute, Haferkorn teaches for the master's program in computer graphics, 3-D modeling for industrial design, and electronic illustration on the Macintosh.

Mary S. Gruber, Lecturer
Managing Color Discrepancies
Between Computer Graphics and Print in Microcomputers

Mary Gruber is the Scitex Visionary Support Training Coordinator for Colortec Graphic Production, Inc., in Norwalk, Connecticut. She was previously manager of the Pratt Manhattan Computer Graphic Center, where she also taught courses in computer competency, electronic illustration and electronic publishing. Gruber has a B.S. from the University of Colorado, and a Certificate in Graphic Design from Spokane Falls Community College. She has been a freelance computer graphic designer in the tri-state area for the past three years for clients including Mastercard, Brilliant Image, Walmar International and Estée Lauder.

Jodi Slater, Lecturer
A Perceptual Basis for the Development of Color Tools
In Computer Graphics

Jodi Slater is a graphic systems designer with Manhattan Graphics and Letraset Inc., New York, specializing in the color interfaces for their desktop publishing and desktop presentation software (ReadySetGo and StandOut). She holds a M.S. in computer aided design from Carnegie Mellon University, and a B.A. in Computer Mathematics from the University of Pennsylvania. At Carnegie Mellon, Slater developed a perceptually oriented color selection system based on the Munsell Book of Color. These ideas were extended in the Electronic Palette, an application she created for solving Josef Albers Interaction of Color exercises on the Macintosh II. Slater has also worked as a consultant to the human interface group at Apple Computer in the use of color in interface development.

Stephen M. Uzzo, Lecturer
Computer Output Technology

Stephen Uzzo has spent over a decade of research in the video field. His many projects include interactive learning systems and distance learning system development, training and consulting in video and film technologies, broadcast video system design and technology assessment. Uzzo presently resides at the New York Institute of Technology Video Center in Old Westbury, New York, where he is director of engineering for the Joint Center for Communication, Learning and Technology. He is also vice preseident of Suffolk Research Group, Inc., of Dix Hills, New York; an independent advisory and design firm for the video industry. Uzzo is a member of the Society for Applied learning and Technology, and the Society of Motion Picture and Television Engineers.

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Color Production Technology

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