

From Paint to Pixels

Analog and Digital Color Processes

Historically, art educators have focused on teaching how to create colors by mixing colored pigments (Fig. 1), in which red, yellow, and blue are the primary colors. However, media arts education provides a new approach because artists and designers are working with colors digitally created by mixing red, green, and blue light sources in the RGB environment, such as the screens of desktop computers (Fig. 3a), laptops, tablets (Fig. 2), and even on cellphones.

Paint is a medium that stores colored pigments. When light hits the paint, it reflects the colors of the pigment. But on computer screens, for example, colors are emitted by a microscopic grid of red, green, and blue (RGB) light sources called pixels (Fig. 2b and Fig. 3b). To show colored objects on the screen, RGB light sources shine at various intensity levels to produce other colors. This principle is demonstrated in this guide with hands-on tutorials on how to mix red, green, and blue lights. It is also the basis for understanding color perception and how color is created for media arts applications.

Computer technology introduced new ways of working with color, which can be created using a digital color mixer, the input of a color notation (RGB, CMYK, HSB, Hexadecimal...), and computer algorithms. However, the most common way for selecting colors on digital displays is from a color picker—a Graphical User Interface (GUI) (Fig. 2b)—which is a visual system that organizes and displays colors for “intuitive” color selection. However, the notion of picking colors “intuitively” must be carefully questioned in the context of art education. Learners will benefit from a knowledge-based approach to color selection instead of relying solely on intuition and trial and error.

This guide provides a framework for teaching young learners some of the most foundational color concepts of the digital age so their interaction with color on the computer screen is empowered by knowledge. 2D and 3D digital color models, such as the RGB/CMY digital color wheel, the RGB cube, and the HSB color cylinder, provide the background for understanding the digital color spectrum, color picking, and digital color mixing,



Fig. 1: Mixing colors. By mixing colored pigments, such as red, yellow, and blue, artists create other colors to express ideas.

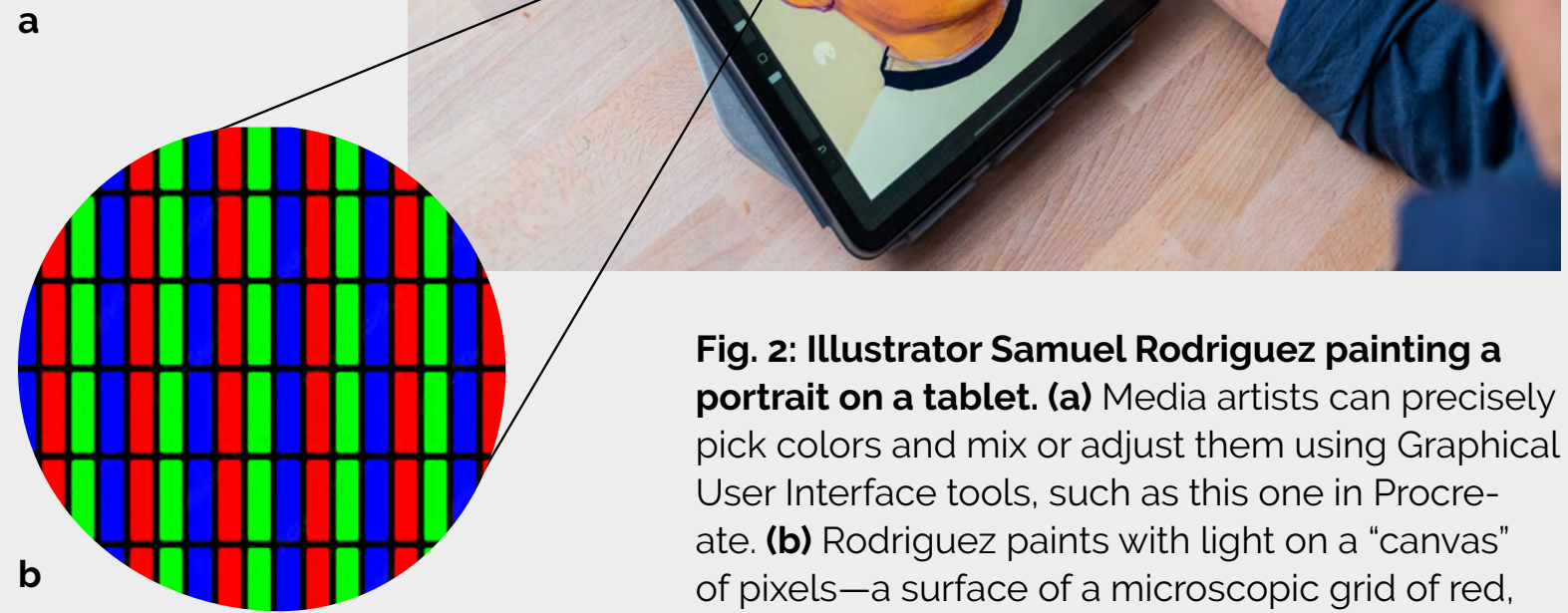
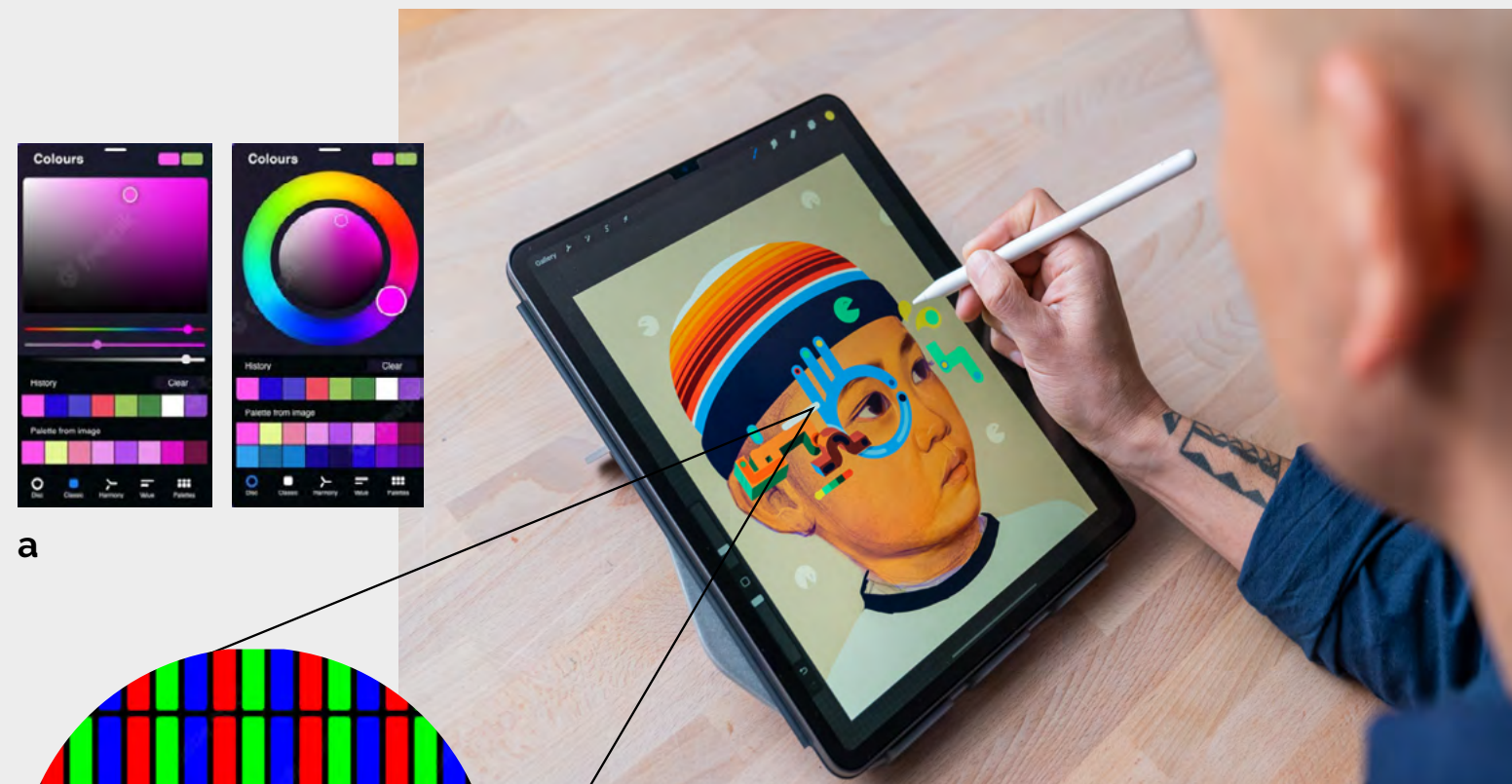


Fig. 2: Illustrator Samuel Rodriguez painting a portrait on a tablet. (a) Media artists can precisely pick colors and mix or adjust them using Graphical User Interface tools, such as this one in Procreate. (b) Rodriguez paints with light on a “canvas” of pixels—a surface of a microscopic grid of red, green, and blue lights. He uses colors and shapes to convey emotions and to celebrate diversity.

Photo © Samuel Rodriguez. Courtesy of the artist. Color Picker and Mixer © 2022 Procreate. Used with permission. Infographic: Petronio Bendito.

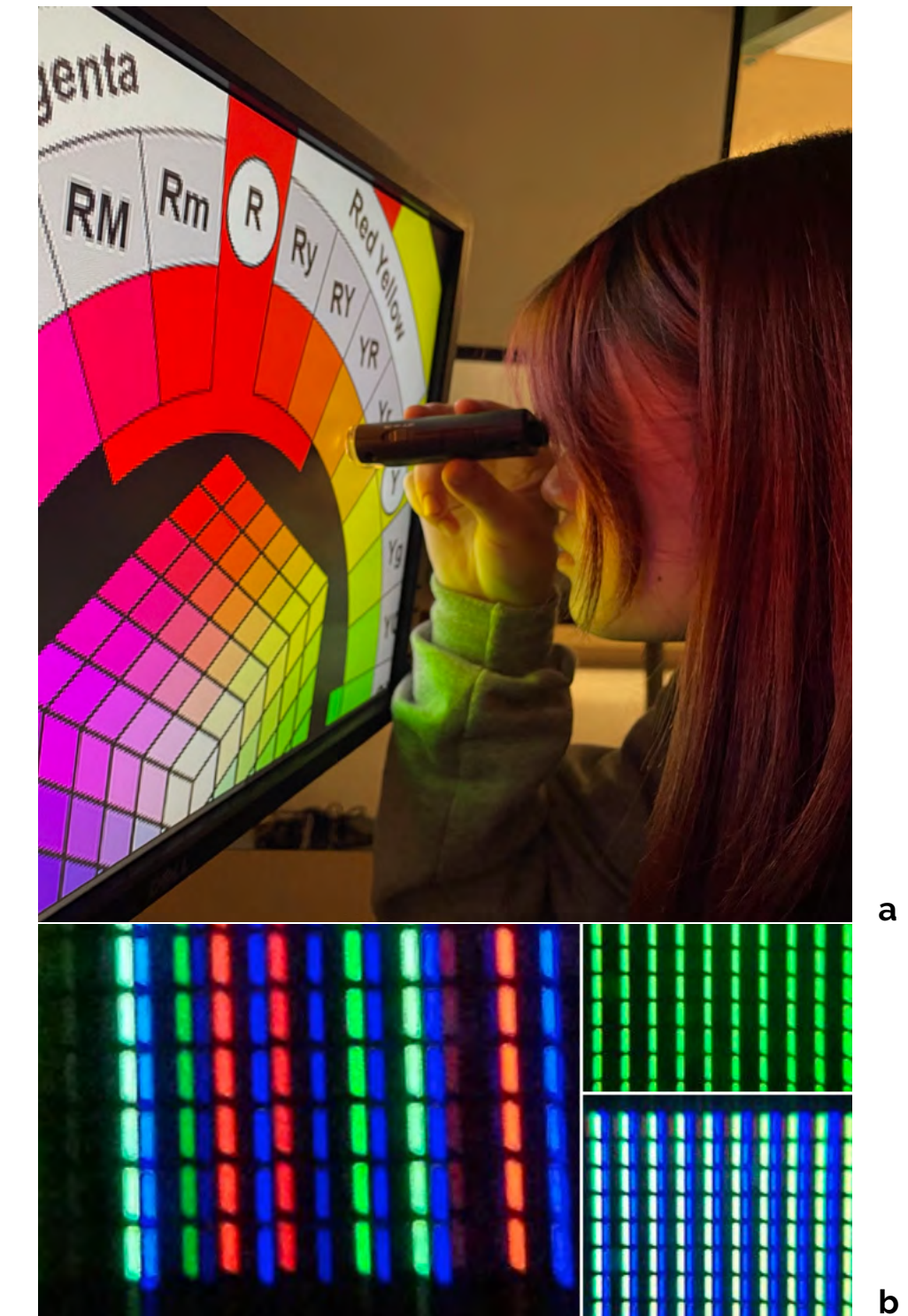


Fig. 3: Digital Color Inspection. (a) A student examines the RGB/CMY digital color wheel on the computer screen with a handheld analog microscope. (b) All she sees is a pattern of pixels composed of red, green, and blue lights that change intensities from color to color. No other colors are visible. It's amazing!

Hands-on Idea: In the classroom, a downloaded version of the RGB/CMY digital color wheel available online provides a range of digital color swatches for systematically examining how colors are created on the screen at the pixel level. Note: Use an analog handheld microscope for accurate color viewing results.