

CIELAB at 50: How We Got Here

John Seymour, June 16, 2026

This year marks the 50th anniversary of the CIELAB color space and the corresponding ΔE_{ab} color difference equation. It is worthwhile to take a moment to step back and objectively consider its origins. This presentation retells the numerous small decisions that went into the development of CIELAB with the full benefit of hindsight.

One of the first key decisions in this history was a conceptual model of how the human eye captures color, which came from the unsung hero Elliot Adams. His 1924 paper was a brilliant colligation of the two competing theories of color vision at the time, Hering's color opponents and Young-Helmholtz trichromacy.

The next milestone was the 1931 Standard Observer. It is natural to assume that this was developed to emulate the human response to color. But no. Instead, the committee decided to emulate a simplistic color measurement device – a device that never achieved market acceptance and slowly faded out of existence.

But arguably the first key decision that went into the stew that became CIELAB was the Munsell Color system, developed in the early 1900s. This was the first systematic arrangement of colors that was both built around the concept of hue, saturation and intensity, and which had a physical embodiment that one could buy. In 1940, there was a key decision to refine the spacings of colors to improve perceptually linearity, leading to the Munsell Renotation data.

Elliot Adams provided his second key decision that led to CIELAB in 1942, when he expanded his largely theoretical 1923 paper into a set of equations that agreed fairly well with the Munsell Renotation data.

But Elliot Adams was far from being the only contender for sets of equations that predicted color appearance. Industry's demand for a way to check tolerances on colors led to the development of many ways to calculate whether a color was produced in tolerance. Industry surveys of 1973 and 1975 found nearly two dozen different ways to determine color differences.

At least five organizations recognized that this Tower of Babel was a problem, notably the Society of Dyers and Colorists (SDC), the American Association of Textile Chemists and Colorists (AATCC), the Inter-Society Color Council (ISCC), and the International Commission on Illumination (CIE). The latter of these committees decided to form a

subcommittee in 1974. In 1976, they decided to adopt the general format of Adams' color space, making some modifications suggestions from other players.

All in all, these were the key decisions that seemed like good ideas at the time. Some decisions were good and others had some undesirable repercussions.