A Webinar with Charles Poynton

ACES 1.0 and Beyond

Next scheduled webinar,
2 sessions of 2 hours each:

Wed./Thu. Sep. 2/3, 2015
11:00 – 13:00 EST

For nearly 20 years, cinema production and post-production was based upon the conceptual model of film acquisition: Even if digitally acquired, imagery was typically processed using the Cineon/CPD coding that incorporated the technical parameters of film; in particular, the S-shaped tone response and the colour crosstalk of film are built-into the image encoding. The CPD scheme made CGI and VFX difficult.

Digital cinema cameras are now commonplace; however, image data encoding is diverse and nonstandard. Some cameras generate data roughly comparable to a film scan (e.g., ARRI log C); others generate data comparable to HD (BT.709/BT.1886), or are based upon HD video (Hypergamma). "Log" formats of various kinds (e.g., Sony log, Red log). DI houses and CGI/VFX facilities have to deal with image data in new forms.

The Academy of Motion Picture Arts and Sciences (AMPAS) has has released ACES 1.0, which defines a pipeline that acquires and processes "scene-linear" data – that is, image data closely coupled to scene exposure. Colour transforms imposed during the DI process create the desired "look" and systematically compensate for the viewing conditions of cinema. The ACES scheme is being deployed commercially.

In this webinar, Charles Poynton will discuss the technical and visual requirements for acquisition and processing using the ACES scene-linear model. He will introduce the basic technical parameters of various camera encodings and describe their dynamic range and noise properties. He will describe the *input device transform* (IDT) by which image data from different cameras is transformed to a common colourspace (ACES). He will outline how "picture rendering" must be imposed in the DI pipeline, for example, by the ACES *reference rendering transform* (RRT). He will describe ACES log coding (ACESlog, ACESproxy), the ACES colourspaces (AP0, AP1), and describe the four key colour transforms in ACES: IDT, LMT, RRT, and ODT. He will explain how the scene-linear model is applied to the DI pipeline, and how it aids CGI/VFX integration. He will describe various output device transforms to yield imagery suitable for D-cinema, HD, and other displays. We will go "Beyond" version 1.0 by discussing how the the RRT and ODTs might be extended in the future.

See overleaf for a detailed outline.

Who Should Participate: This Webinar will be suitable for people in positions such as these:

- Post-production and visual effects supervisors, post/VFX/DI engineers, and technically minded cinematographers and colourists
- HD/UHD engineers and Digital Imaging Technicians (DITs)
- Compositors, lighters, shaders, and pipeline engineers
- Digital cinema, digital video, and CGI/VFX software developers

Participants should be familiar with digital video, HD, and digital cinema. Knowledge of mathematics isn't required, but will certainly be useful; many graphs and equations will be shown!

Registration: USD 240. Detailed handout notes – some of which form portions of the second edition of Mr. Poynton's book – will be provided. To register, access Go To Training.or see www.poynton.com/w/ACES

Charles Poynton
tel +1 416 535 7187
charles@poynton.com
www.poynton.com

ACES 1.0 AND BEYOND – OUTLINE

Introduction to ACES	The logarithmic nature of human visual perception – or is it a power function? The zone system, the importance of 18% grey. The key ACES concept: Picture rendering. Colour appearance effects (Hunt, Stevens, Bartleson-Breneman), how they are issues in digital cinema and HD, and how they are addressed in ACES. Contrast ratio ("dynamic range"). The primacy of the reference display (art and craft upstream, science downstream).
Colour science	Colour acquisition, the XYZ system and its derivatives, colour display, additive primaries, nonphysical primaries. Colourspace transformations. Perceptual uniformity. Colour appearance models.
ACES	The two central ACES colourspaces (AP0 and AP1); the two image states (ACES and OCES). The four ACES transforms: IDT, LMT, RRT, ODT. The two reference devices: RICD, RP. The two log formats, ACESproxy and ACEScc. ACEScg colourspace.
DI and Colour grading	The concept of working space. "Linear" mode (lift/gamma/gain) and "log" mode; CONTRAST and BRIGHTNESS reinterpreted.
Cameras and input transforms	Camera spectral sensitivities. White balance. The necessity of 3×3 matrix transform (*colour formation matrix,* CFM). Power function coding, log coding, quasilog coding. Overview of IDTs; how an IDT is constructed.
Displays and output transforms	Digital cinema reference projector (DCI P3); HD colourspace (BT.709/BT.1886), UHD colourspace (BT.2020). How to acquire or build an ODT. Colour calibration.
Emerging technology	HDR acquisition. HDR displays; spatially modulated backlights. Tone mapping. OLED and laser displays.

Questions & discussion

Charles Poynton specializes in the physics, mathematics, and engineering of digital colour imaging systems, including HD and digital cinema (D-cinema). He is the author of *Digital Video and HD Algorithms and Interfaces,* recently published in its second edition, and he is a Fellow of the Society of Motion Picture and Television Engineers (SMPTE). Twenty five years ago, he chose the number 1080 (as in 1920×1080) for HD and digital cinema standards, thereby establishing "square pixels" for HD and digital cinema. In 1998, he was responsible for introduction of the Adobe RGB (1998) colourspace.