Two Methods for Colour Comparison

User needs of professionals and others:
Absolute (professionals) und relative colorimetric reproduction

***Absolute* CIELAB data**
h_{ab} hue
C^*_{ab} chroma
L^* lightness

Visual comparison softcopy − hardcopy
Test of agreement with test files

***Relative* CIELAB data**
h_{ab} hue
c^* relative chroma
n^* relative blackness

Test of visual equal relative spacing of either softcopy or hardcopy
Test of equal spacing with test files

Advantages and disadvantages:

Advantage:
Colorimetric reproduction of hue, chroma, lightness
Disadvantage:
Colour spaces of TV and Print show differences, often important colour **areas are clipped**

Advantage:
Colorimetric reproduction of hue, *relative* chroma and *relative* lightness
Colour spaces of TV and Print show differences, No colour areas **are clipped**
Disadvantage:
Tolerable small changes of chroma and lightness

ZE380−3

User input and output needs:

Remark:
For output linearisation see ISO/IEC TR 19797

Interpretation of input data *rgb* as *undefined* colour data
rgb (−> rgb)
no special device colours

Interpretation of input data *rgb* as *device* colour data
rgb (−> olv)*
Device lookup table *olv* − rgb'*, 8*LCH** data

Interpretation of input data *rgb* as *elementary* colour data
rgb (−> rgb)*
Device lookup table *rgb* − rgb''*, 8*LCH** data

application program creates colour data file;
Output / download **of colour file to colour printer or monitor**

Test: Equally spaced device and elementary hue output?

Purpose:
Output linearisation
If the output is regular then measure lookup table *rgb − LCH** and calculate lookup tables *olv* − rgb', rgb* − rgb''*

Test with test file:
Is the device output equally spaced for any of the six device hues *OYLCVM* and for the grey scale?

Test with test file:
Is the device output equally spaced for any of the four elementary hues *RJGB* and for the grey scale?

ZE381−3

Colorimetric measurement problem for fluorescent (foto) paper

Measurement problem only for *absolute* and not for *relative* colour reproduction

Example of measurement
Two measurement devices A and B measure two CIELAB b^* data for two yellow colours no. 1 and 2:
Device A *without* measurement of fluorescence (example *xy*-device)
$b^*_{A1} = 100$ and $b^*_{A2} = 90$.
Device B *with* measurement of fluorescence (professional device)
$b^*_{B1} = 90$ and $b^*_{B2} = 81$.

***Absolute* colour reproduction**
For equal measurement data of A and B the visual colour difference is $\Delta b^*_{A2,B2} = 9$
This is three times *above* the colour tolerance $\Delta E^*_{ab} = 3$ of ISO/IEC 15775.
Result:
Measurement device A is **not** appropriate.

***Relative* colour reproduction**
Measurement differences of A and B:
$\Delta b^*_{A1,A2} = 10$ and $\Delta b^*_{B1,B2} = 9$
This is a measurement failure of $\Delta b^* = 1$
The failure is three times *below* the colour tolerance $\Delta E^*_{ab} = 3$ of ISO/IEC 15775.
Result:
Measurement device A **is** appropriate.

Remarks: compare CIE 163:2004, The effects of fluorescence in the characterization of imaging media.

For the achromatic colour no. 1 the devices A and B may measure:
$b^*_{A1} = 0$ and $b^*_{B1} = -10$
This is again an measurement shift $\Delta b^*_{A1,B1} = -10$
which is based on the fluorencent paper in the application.

ZE380−7

Colour data in file, user choice and output needs:

Colour data file with input data *rgb* as *undefined* colour data
rgb (−> rgb)
no special device colours

User interpretation
of colour data for output:
1. Default output device
2. Output interpretation as *device* data
3. Output interpretation as *elementary* data

Test: Equally spaced device and elementary hue output?

1 **Device uses default value:**
Device uses lookup table *olv* − rgb'* for output.
Is the device output equally spaced for any of the six device hues *OYLCVM?*

2 **Device uses lookup table *olv* − rgb'* for output.**
Is the device output equally spaced for any of the six device hues *OYLCVM?*

3 **Device uses lookup table *rgb* − rgb''* for output.**
Is the device output equally spaced for any of the four elementary hues *RJGB?*

Remark:
For output linearisation see ISO/IEC TR 19797

ZE381−7

See for similar files: http://www.ps.bam.de/ZE38/; www.ps.bam.de/ZE.HTM
Technical information: http://www.ps.bam.de Version 2.1, io=1,1

BAM registration: 20070901-ZE38/L38E00N1.PS/.TXT
application for measurement of monitor systems

BAM material: code=rha4ta