



Annual Report
of the
National Illumination Committee of Great Britain

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1st October 2017 to 30th September 2018



National Illumination Committee of Great Britain

Report for the year ending 30 September 2018

Firstly, I would like to thank Teresa Goodman for her work as Chair of CIE-UK. At the last AGM, we essentially swapped roles, so I am pleased that she has been able to continue as a Vice-Chair.

The main CIE conference this year was the CIE “Topical Conference on Smart Lighting”, held in Chinese Taipei in April. This was the successor to the “Lighting Quality and Energy Efficiency” series which had been held over a number of years. All attendees were made very welcome, especially by Professor Ronnier Luo, who was keen to point out the highlights of his home city. The conference was preceded by a series of tutorials on colour vision and healthful lighting. The conference itself included 37 oral presentations, 24 presented posters and 38 other posters.

We are very aware of the need to increase the visibility of CIE-UK. Steve Fotios was co-opted to lead the redevelopment of the CIE-UK website. We hope to see this go live in the near future. Assuming it doesn't end up on the cutting room floor, you may even see a video of me.

As a charity, we continue to support the science of light and lighting through financial assistance to UK members to attend CIE events. The reports from those events are an important aspect of the process to ensure that others are able to receive some benefit from that investment. Please take the time to read the reports contained in this Report.

Members receive 66% discount on CIE publications, so please make use of this. CIE-UK also benefits from sales to people in the UK through a discount to our annual subvention to CIE.

We value feedback from our members, so please contact us if there are things we can do better or if you have suggestions for developing the membership. We do have an outreach kit to help anyone who needs some props for talks. If you are interested, please contact us.

An organisation like CIE-UK can only exist through the financial support of its members and the time given freely by the Trustees. I would also like to acknowledge the tireless work of Allan Howard, our Executive Secretary. He ensures we do the right things at the right time, as well as providing us all with relevant information.

Finally, I extend thanks to you all for your support to CIE-UK and to CIE more generally.

John O'Hagan

Chair CIE-UK



National Illumination Committee of Great Britain

Financial Statements
Year to 30 September 2018

CIE Division 1 : Vision and Colour

Terms of reference

The Terms of Reference of Division 1 are:

To study visual responses to light and to establish standards of response functions, models and procedures of specification relevant to photometry, colorimetry, colour rendering, visual performance and visual assessment of light and lighting.

Division Officers:

Division Director:	Youngshin Kwak
Division Secretary:	Li-Chen Ou
Division Editor:	Peter Hanselaer
Associate Directors:	Nana Itoh (Vision) Ellen Carter (Colour)

Activities and achievements

Activities and achievements of the Division during the year October 2016 – September 2017 were as follows:

Publications:

CIE 015:2018 Colorimetry

This publication which replaces CIE015:2004 provides the recommendations of the CIE concerning colorimetry:- use of the standard colorimetric observers and standard illuminants, the reference standard for reflectance, the illuminating and viewing conditions, the calculation of tristimulus values, chromaticity coordinates, colour space coordinates and colour differences and various other colorimetric practices and formulae. As a new feature, the publication also includes further details of advanced colorimetry, including colour appearance models, and new findings on cone-fundamental-based tristimulus functions, with appropriate references to other CIE publications. Additionally, new illuminants for different LED types are introduced.

CIE 228 Grey-Scale Calculation for Self-Luminous Devices

Contemporary colour media, to which a self-luminous grey (or more generally, neutral) scale would apply, include light emitting diode (LED) displays and liquid crystal displays (LCD). Every colour-difference calculation has a neutral or achromatic component. In stand-alone mode, this neutral scale can be used to calculate barely-visible threshold changes in luminance, equal-appearing suprathreshold steps of grey scale, matching grey appearance or conspicuousness of grey targets during visual search.

Some technical committees met in April 2018 in Taipei.

TC 1-85: Update CIE Publication 15:2004 Colorimetry and TC 1-93: Calculation of self-luminous neutral scale were closed following the publications listed above.

A number of other Technical Committees and Reporterships were closed. A new Reportership DR 1-69 'Applicability of Metrics for Evaluating Reflected Glare on Displays', was opened.

A new research forum 'Revisiting Correlated Colour Temperature' was proposed in Taipei. This is to look at whether other chromaticity coordinates etc. provide better correlation with perception than the obsolete u,v chromaticity coordinates currently used.

Status of Technical Committees, Reporterships and Research Fora

During the last year there were 15 Technical committees (6 Vision and 9 Colour), 6 joint Technical Committees, 12 Reporterships and 1 Research Forum.

TC 1-63: Validity of the Range of CIE DE2000

To investigate the application of the CIE DE2000 equation at threshold, up to CIELAB colour differences greater than 5. Chair: Klaus Richter (DE)

This Technical Committee (TC) is working closely with TC1-81 and has evaluated further colour difference sets in common with TC1-81 for large colour differences. Further work has been deferred until after the TC 1.81 report is published. As the maximum time limit for a committee has been exceeded, the TC was closed and will be reactivated as new TC when TC 1.81 report published.

TC 1-76: Unique Hue Data

To study and report on unique hue data, including an analysis of the scatter of those data: this to include practical viewing conditions.

Chair: Sophie Wuerger (GB)

Second draft of Technical Report produced.

TC 1-81: Validity of Formulae for Predicting Small Colour Differences

1. To evaluate available formulae for small colour differences (<~2.0 CIELAB).
2. To define a visual threshold colour difference.

Chair: Klaus Richter (DE)

The Technical Report was updated following comments received.

TC 1-83: Visual Aspects of Time-Modulated Lighting Systems

1. To investigate and report on current research on the perception of visual artefacts of temporally modulated lighting systems, including flicker, the stroboscopic effect and the phantom array effect.
2. Design methodology and gather data on the visibility of temporal artefacts.
3. Build a model for the visibility of temporal artefacts and their dependence on environmental, demographical and lighting parameters.

Chair: Dragan Sekulovski (NL)

Working draft of Technical Report is in preparation.

TC 1-84: Definition of Visual Field for Conspicuity

To define and classify functional visual fields for universal tasks and develop guidelines for the layout of visual information to increase the visibility of visual signs, displays and markings.

Chair: Nana Itoh (JP)

Working draft is being under revision. Technical Committee activity extension to 2019 approved.

TC 1-85: Update CIE Publication 15:2004 Colorimetry

Closed after publication produced.

TC 1-86: Models of Colour Emotion and Harmony

To recommend models of colour emotion and harmony based on existing psychophysical data obtained by different research groups or networks for applications in the colour design area.

Chair: Li-Chen Ou (TW)

A key paper related to the TC work was submitted in late 2017 to Color Research and Application and was accepted in April 2018. Working Draft of report is in progress.

TC 1-88: Scene Brightness Estimation

1. To investigate current research on brightness estimation methods using a calibrated luminance image of a real indoor scene
2. To compare brightness estimations of real indoor scenes with those predicted
3. To recommend a method to predict the brightness of specified regions of a scene from a luminance image of that scene.

Chair: Yoshiki Nakamura (JP)

Not enough data for report. The committee has passed the 4 year limit. Committee closed. Work to be continued in another way.

TC 1-89: Enhancement of Images for Colour Defective Observers

To study, evaluate and recommend image enhancing techniques for colour defective observers and to provide test procedures for the evaluation of those techniques.

Chair: Po-Chieh Hung (US)

Committee Draft produced, revision is in progress.

TC 1-91: Methods for Evaluating the Colour Quality of White-Light Sources

To evaluate available new methods for evaluating the colour quality of white-light sources with a goal of recommending methods for industrial use. (Methods based on colour fidelity shall not be included: see TC1-90).

Chair: Yandan Lin (CN)

Met in Taipei. Terms of reference updated: 'recommending' changed to 'introducing'. Draft 5 of report produced.

TC 1-92: Skin Colour Database

1. To investigate the uncertainty in skin colour measurement and to recommend protocols for good measurement practice.
2. To tabulate skin colour measurements that accord with these protocols covering different ethnicity, gender, age and body location.

Chair: Kaida Xiao (GB)

New skin data study was conducted in Leeds (British women, 300 subjects, 4 ethnic groups, spectrophotometer measurement, and Facial image system).

Uncertainty of skin colour measurement - evaluation of spectrophotometer and TSR, also spectrophotometer vs. TSR; Spot measurement vs. Image Measurement.

The TC was extended to 2020.

TC 1-93: Calculation of self-luminous neutral scale

Closed after publication produced.

TC 1-95 The Validity of the CIE Whiteness and Tint Equations

Based on published and new experimental work the TC shall seek to recommend modifications to the existing CIE Whiteness and Tint Equations to extend their application to illuminants other than D65. Furthermore the TC shall review the restrictions imposed on the validity of the equations to samples that are measured on the same instrument at nearly the same time, and review the colorimetric limits hitherto set. If enough experimental data justify it, the TC may recommend modifications to the current CIE Equations for Whiteness and Tint.

Chair: Robert Hirschler (HU)

Work on whiteness perception is under way. Work on whiteness magnitude will start soon. More research to be focussed on whiteness formulae for non-D65 illuminants. Sets of whiteness samples shall be made available for TC members to be able to conduct comparable research on the visual vs. instrumental evaluation of whiteness.

TC 1-96 A Comprehensive Model of Colour Vision

Based on the published work and new experimental work should seek to recommend a model or models of colour vision that predicts of the appearance of coloured stimuli viewed in typical laboratory conditions. This shall include stimuli that appear as both related and unrelated colours, that are viewed under illumination from photopic down to scotopic levels, and that have varying size. The model shall also include a uniform colour space.

Chair: Ronnier Luo (GB)

Met in Taipei.

Data collection completed. A number of publications on Colour Appearance Models (CAM), Chromatic Adaptation Transforms (CAT) and Uniform Colour Spaces (UCS) have been made recently. Change of committee strategy to focus on CAT16, CAM16, CAM16-UCS, rather than CAT02, CIECAM02, CAM02-UCS. Also to include new 3rd dimensional colour scales: Vividness, Saturation, Blackness, Whiteness.

The remaining work on CAM16 extension to unrelated colours needs to be completed. A first draft of the report is expected by the end of 2019. The TC was extended to 2020.

TC 1-97 Age- and Field-Size-Parameterised Calculation of Cone-Fundamental-Based Spectral Tristimulus Values

1. Following on from CIE TR 170, to recommend a procedure for age- and field-size-parameterised calculation of cone-fundamental-based spectral tristimulus values, compliant with the principles of the CIE XYZ concept.

2. To deliver a computer program for the calculations.

Chair: Jan-Henrik Wold (NO)

Met in Taipei. New beta version of computer program produced.

JTC 01 (D1/D2/D4/D5): Implementation of CIE 191:2010 Mesopic Photometry in Outdoor Lighting

1. To investigate adaptation and viewing conditions and define visual adaptation fields in outdoor lighting.

2. To define lighting applications where mesopic photometry could be used. To provide guidelines for implementing mesopic photometry in outdoor lighting.

Chair: Stuart Mucklejohn (GB)

Working Draft of Technical Report is in preparation.

JTC 07 (D1/D3): Discomfort caused by glare from luminaires with a non-uniform source luminance

1. To review the literature on glare from non-uniform light sources to identify the parameters that influence the discomfort prediction (UGR) and define limits to the applicability of the UGR formula.
2. To propose a correction to the UGR formula that takes into account the non-uniformity of glare sources.

Chair: Naoya Hara (JP)

Working Draft of Technical Report is being modified.

JTC 08 (D1/D2/D3/D4/D5/D6/D8) Terminology in light and lighting

To address any issues regarding terms and definitions related to the International Lighting Vocabulary (ILV). This includes coordination within CIE Divisions to maintain and update the ILV, coordination with IEC on questions related to the incorporation of ILV terms and definitions into IEC 60050-845 "International Electrotechnical Vocabulary. Lighting", coordination with ISO/TC 12 on questions related to the incorporation of ILV terms and definitions into ISO 80000-7 "Quantities and units – Part 7: Light and radiation" and any further terminology issues within CIE.

Chair: Peter Zwick (DE).

JTC 09 (D1/D2/D3/D6) CIE system for Metrology of ipRGC influenced light response

This International Standard will define spectral sensitivity functions, quantities and metrics to describe radiation for its ability to stimulate each of the five photoreceptor types that can contribute, via the melanopsin-containing intrinsically-photosensitive retinal ganglion cells (ipRGCs), to retina-mediated non-visual effects of light in humans.

This International Standard will be applicable to visible optical radiation in the wavelength range from 380 nm to 780 nm. In addition, this Standard will include information concerning the effects of age and field of view (FOV) when quantifying retinal photoreceptor stimulation for ipRGC-influenced light (IIL) responses.

This International Standard will not give information for particular lighting applications, or for the quantitative prediction of IIL responses.

This International Standard will not address health or safety issues such as those resulting from flicker or photobiological safety and will only relate to retinal photoreception.

Chair: Luc Schlangen (NL)

Publication of CIE/ISO standard expected late 2018.

JTC 10(D1/D8) A new colour appearance model for colour management systems: CIECAM16

To recommend a new colour appearance model, CIECAM16, to replace the CIECAM02 model for colour management systems. Chair: Changjun Li (CN)

Update of draft Technical Report expected by end of 2018.

JTC 12 (D1/D2/D8) The measurement of sparkle and graininess

To provide a methodology to measure sparkle and graininess, and to develop a measurement scale. Measurands will be defined and the requirements for their measurements will be well normalized, in such a way that different instruments can provide the same spectrophotometric data from the same specimen. A psychophysical method will be recommended to obtain visual data, and its correlation with the spectrophotometric data will be worked out to develop the measurement scale for sparkle and graininess.

Chair: Alejandro Ferrero (ES)

JTC 16 (D1/D8) Validity of Chromatic Adaptation

Recent experimental work revealed the incomplete chromatic adaptation under white light, especially those with low CCT and off-Planckian chromaticities, which are important to the performance of chromatic adaptation transforms. This was not considered in existing chromatic adaptation transforms (CATs). The TC will review the existing CATs and propose modifications by including a two-step transform to take the effect of white light chromaticity on degree of chromatic adaptation into consideration.

Chair: Minchen (Tommy) Wei

Work is continuing on the draft report. A discussion forum was created for the definition of sparkle.

Reporterships

R1-53 Frédéric Leloup Gloss Perception and Measurement

Report submitted. Closed.

R1-58 Phil Green Liaison with ISO TC130 Graphic Technology

Closed due to inactivity in last few years.

R1-60 Guihua Cui Future colour-difference evaluation

Watching for expected new publications in this area.

R1-61 Aurelien David Source whiteness metric

Closed due to inactivity in last few years.

R1-62 Sophie Jost Typical LED spectra

Report of many types of LED Spectra submitted. A number were used in the update to CIE 15:2018.

Although work complete, left open until after publication of CIE 15:2018, in case of questions on LED data.

R1-63 Changjun Li Tristimulus Integration

No new work this year.

R1-64 Changjun Li Real Colour Gamut

No new work this year.

R1-65 Taiichiro Ishida Categorical Colour Identification

Closed.

R1-66 Hiroyasu Ujike The Effect of Dynamic and Stereo Visual Images on Human Health

Report is being finalised.

R1-67 Youngshin Kwak Revisiting Correlated Colour Temperature

Research forum proposed.

R1-68 Kees Teunissen / Yoshi Ohno A Gamut Area Measure and Colour-shift Graphic, based on CIE 13.3-1995

Draft technical note (TN) produced. Based on the comments received, it was decided to simplify the document and publish the TN in support of an Excel calculation tool that can replace the old CIE DOS-based tool.

R1-69 Shao-Tang Hung Applicability of Metrics for Evaluating Reflected Glare on Displays

New.

Research Fora

Research Forum 3 (RF-03) Identifying and carrying-out research needed for specifying perceptually relevant, colour-related, aspects of white-light sources

Chair: Kees Teunissen, NL

Established at the Jeju meeting in October 2017. Met in Taipei, discussed the scope. 31 participants and 30 who would like to participate in the RF.

Proposed change of approved title: "Identifying and carrying-out research needed for specifying perceptually relevant, colour-related, aspects of white-light sources", to "Matters relating to specifying colour rendition of white-light sources"

Report presented by:

Peter Clarke

UK Representative CIE Division 1

19 November 2017

CIE Division 2: Measurement of Light and Optical Radiation

Terms of reference

The Terms of Reference of Division 2 are:

Most of the work in CIE Division 2 relates to the provision of guidance on the correct measurement of the optical radiation (ultraviolet, visible and infrared radiation) emitted by lamps, luminaires and other sources and on metrics and best practice for the characterisation of detectors and materials. Such measurements are essential to ensure the safe and effective working of a very wide range of products with which the public come into regular contact, including: traffic lights, car headlamps, airport runway lights and railway signals; high visibility clothing; ultraviolet lamps used, for example, in medical treatment of skin conditions and for the curing of dental epoxies and other adhesives; pharmaceuticals; lighting in homes, offices, schools, shops and so on; and visual displays used not only for entertainment applications (television, computer gaming, cinema etc.) but also in areas such as medical diagnosis and surgical training. Optical radiation measurements are also essential for monitoring the impact of human activity on the environment e.g. ozone depletion, land use, changes in land and sea temperature, deforestation and climate change.

Major activities and achievements of the Division during the year October 2017 – September 2018 were:

- Two new CIE Technical Reports have been published by Division 2:
 - CIE 229:2018 Groundwork for measurement of effective intensity of flashing lights
 - CIE 198-SP2:2018 Determination of measurement uncertainties in photometry supplement 2: spectral measurements and derived quantities
- The Division met in Eindhoven, The Netherlands on 13th June 2018 in conjunction with a workshop on selected LED-related topics organised by the NC Netherlands (NSVV).
- A total of 12 Division 2 Technical Committees (TCs) met on 14th and 15th June in conjunction with the Division meeting, covering topics ranging from the highly specific (e.g. the measurement of sparkle and graininess) to the more fundamental (e.g. goniophotometry and integrating sphere photometry). UK representatives are actively contributing to the work of most of these TCs.
- Three TCs are nearing the end of their work and the relevant Technical Reports are expected to be published shortly: TC2-29 Measurement of detector linearity; TC2-51 Calibration, characterisation and use of array spectroradiometers; and TC2-75 Photometry of curved and flexible OLED and LED sources.
- New TCs, Research Fora and Reporterships have been proposed and/or established during the year as follows:
 - TC2-90: LED reference spectra for photometer calibration
 - TC2-91: Optical measurement methods of LED Packages and LED arrays
 - TC2-92: International standard format for the electronic transfer of luminaire optical data
 - TC proposal: Measurement of total transmittance, diffuse transmittance and transmittance haze – application form being prepared
 - JTC 12 (joint with D1 and D8): The measurement of sparkle and graininess
 - JTC proposal: Integrative lighting (joint with D1) – approved by D2
 - DR2-81: Flash effective intensity calculation

- DR2-82: TN on clarification of the difference between adjustment, calibration and verification
- The following TCs and Reporterships were closed during the year:
 - TC2-49 Photometry of flashing lights (Technical Report published)
 - R2-55 Simple practical guide for measurement uncertainty estimations (supplement to CIE 198) (no consensus on the objectives for this Reportership and no progress reported)
 - R2-58 Standard lamps: availability of and alternatives to commercially available incandescent sources (a very useful report and spreadsheet was produced, which has been archived in the D2 Reporterships section of D2 Members area of CollTool and will be reviewed periodically)
 - R2-61 Review of published D2 publications (no longer needed since DD2 has automatic responsibility for this review)
 - R2-71 Towards a CIE standard illuminant / source L (new TC established on this topic)
 - R2-72 Towards a new CIE file format for luminous intensity distributions of luminaires (new TC established on this topic)
 - R2-73 Colour luminance file format specification (no longer a requirement from automotive manufacturers for this topic)
 - R2-74 Physical characterisation of new visual effects in the field of appearance of materials (new JTC established on this topic)
- At the last D2 meeting the Division 2 Management Team announced a new initiative aimed at helping TCs for which there is an urgent stakeholder need to complete their work as quickly as possible. Under this initiative up to 4 TCs may be identified as "Urgent TCs" and as such have special privileges (such as priority access to the D2 TC meeting schedule), as well as being supported by a dedicated member of the D2 Management Team. They are required to report on progress every 6 months and to hold a meeting (either WebEx or face-to-face) at least once every 3 months. The TCs currently specified as "Urgent" are:
 - TC 2-83: CIE Standard on test methods for OLED light sources (mentor: Armin Sperling)
 - TC 2-86: Glare Measurement by Imaging Luminance Measurement Device (ILMD) (mentor: Tony Bergen)
 - TC 2-88: Standard Reference Solar Spectra for Industrial Applications (mentor: Hiroshi Shitomi)
 - TC 2-89: Measurement of Temporal Light Modulation of Light Sources and Lighting Systems (mentor: Joanne Zwinkels)
- For many years a significant proportion of the work of the Division has been focused on the measurement and characterisation of solid state lighting (SSL) products (particularly LEDs) and this has already resulted in a number of Technical Reports and Standards, with more underway. However recent years have seen other topics steadily gaining in importance (e.g. the use of specialist measurement instruments, measurement uncertainty, and numerical evaluation of complex visual appearance attributes) and this trend has continued over the past year. Particular aspects currently being considered, either within TCs or Reporterships, are:
 - Methods for correcting for factors such as spectrometer stray light
 - Calibration and use of imaging devices for photometric measurements
 - Measurement of visual effect materials, including BRDF measurements

- Reference solar spectra for industrial applications
- Temporal light measurement
- Measurement of lighting for road vehicles
- Recent developments relating to fundamental measurement methods (goniophotometry, spectroradiometry, integrating sphere photometry, absolute radiometry etc.).
- Division 2 was highly active in the development of the CIE strategy for future research and several of the priority topics identified have a strong 'measurement' theme. The Division also maintains its own list of additional topics, which complement those in the higher level strategy, including uncertainty evaluation, calibration and use of complex measurement instrumentation (ILMDs, array spectrometers etc.), methods for visually-complex materials, and test methods for SSL.
- The next meeting of Division 2 will be held in Washington DC in July 2019, as part of the 29th Quadrennial Meeting.

Full details of recent activities within Division 2, including details of all the Technical Committees and Reporterships, are available on the Division 2 area of the CIE website:

<http://www.cie.co.at/technical-work/divisions/division2>

Active Technical Committees + UK Members

JTC-02 (CIE-CCPR)	Principles Governing Photometry	Teresa Goodman (JTC Co-chair)
TC2-29	Measurement of detector linearity	Teresa Goodman
TC2-50	Measurement of the optical properties of LED assemblies	Teresa Goodman
TC2-51	Calibration of diode-array spectrometers	Teresa Goodman
TC2-59	Characterisation of imaging luminance measurement devices	
TC2-62	Imaging-photometer-based near field goniophotometry	
TC2-67	Photometry of lighting and light-signalling devices for road vehicles	
TC2-68	Optical measurement methods for OLEDs used for lighting	
TC2-69	CIE classification system of illuminance and luminance meters	Teresa Goodman
TC2-72	Evaluation of uncertainties in measurement of the optical properties of solid-state lighting devices, including coloured LEDs	
TC2-74	Goniospectroradiometry of optical radiation sources	Teresa Goodman
TC2-75	Photometry of curved and flexible OLED and LED sources	
TC2-76	Characterisation of AC-driven LED products for SSL applications	
TC2-77	Fundamental concepts	Teresa Goodman
TC2-78	The goniophotometry of lamps and luminaires	
TC2-79	Integrating sphere photometry and spectroradiometry	Teresa Goodman
TC2-80	Spectroradiometric measurement of light sources	Teresa Goodman
TC 2-81	Update of CIE 065:1985 (Absolute radiometers)	
TC2-82	Revision of CIE S014-2	Teresa Goodman
TC2-83	CIE Standard on test methods for OLED light sources	
TC2-84	Recommendations on LED package test data reporting	

- TC2-85 Recommendation on the geometrical parameters for the measurement of the Bidirectional Reflectance Distribution Function (BRDF)
- TC2-86 Glare measurement by Imaging Luminance Measurement Device (IMLD)
- TC2-87 Broadband UV LED radiometric measurements between 320 nm and 420 nm
- TC2-88 Standard reference solar spectra for industrial applications
- TC2-89 Measurement of temporal light modulation of light sources and lighting systems
- TC2-90 LED reference spectra for photometer calibration
- TC2-91 Optical measurement methods of LED Packages and LED arrays
- TC2-92 International standard format for the electronic transfer of luminaire optical data

Active Reporters

- R2-60 Discussion on the definition of luminance/radiance
- R2-64 Technical Note on errors of measurement in spectrophotometry
- R2-69 TN on the validation of a near-field goniophotometer
- R2-75 TN on the use of "Accuracy" and related terms in the specifications of testing and measurement equipment
- R2-76 TN on measurement uncertainties for testing of LED Lamps, Luminaires and Modules
- R2-77 Measurement of quantities relating to photobiological safety of lighting products
- R2-79 Measurement of total transmittance, diffuse transmittance, and transmittance haze
- R2-80 Metrology of laser based lighting
- R2-81 Flash effective intensity calculation
- R2-82 TN on clarification of the difference between adjustment, calibration and verification

Teresa Goodman

UK Representative CIE Division 2

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CIE Division 4 Interior Environment and Lighting Design

The Division 4 Terms of Reference are:

To study the procedures and prepare guides for the design of exterior lighting and signalling including work, recreation and transportation areas

Divisional Officers:

Director: Dionyz Gasparovsky (ST)
Associate Directors: Raoul Lorphevre (BE), Steve Fotios (GB), Sermin Onaygil (TR)
Secretary: Maurice Donner (NL)
Editor: Nigel Parry (GB)

The primary aim of the work of the Division is to enhance safety in transport by the publication of relevant technical reports and standards. The Division currently has several active technical committees working on a wide variety of topics.

Review of last Conference:

CIE Visibility Symposium, Berlin – May 24-25th 2018

The CIE Visibility Symposium was preceded by the annual meeting of the Division and associated technical committees. The UK delegate, Nigel Parry attended: he was also present in his capacity as Divisional Editor.

The Symposium was held at the Technical University of Berlin, which has produced 10 Nobel Prize winners plus the designer De Bouer of the V2 rocket and the Saturn 5 rocket that took man to the moon.

This specialist symposium attracted speakers from around the globe from Australia to the States. There was a total of 20 papers plus several technical workshops looking at the Universities technical laboratories and the outdoor lighting test track. I have highlighted a few of the interesting papers below.

Adjacent to The University is a large park and within the park is an avenue of rescued working Gas lights from around Germany,



One Hundred Years of Lighting Research – Woot Van Bommel

Reminded us all that the very first Gas lamps date back to 1802 with a Dutch researcher, followed by the carbon arc lamp 1810 and the Tungsten lamp about 1879.

Lighting application started from 1918, about 'where should the light go' and visibility

Jack Waldrum showed picture of silhouette vision but with glare. So bright road surface (background) and two cats one white and one black are both visible.

So, the basics of road lighting being bright surface with no glare remain true today.

Took us from Visibility of objects in the 1920s, up to 1960's with DeBoer research and Visual comfort introduced. This is key to a safe environment. He highlighted the Smax (relative max luminance slope) to give appraisal of uniformity and Van Bommel suggested maybe a UI gradient measure could be introduced?

In 1932 Philips produce the first discharge lamps, and installed in a tunnel in Belgium in 1933

From 1970, CIE 93 looking at Lighting and accidents with average reduction of 30% with lighting, with Hargreaves study on relationship between light levels and accidents around London.

Also, about the driving tasks, such as rate a car decelerates so be able to detect when a car is slowing, accelerating or changing direction and how lighting can assist

Lighting the surround is important and can be done with LEDs

Now more up to date research considering Neurological aspects., such as micro sleeps on unlit roads, that studied numerous subjects on a 415 km journey at night and noted that all participants had micro sleeps during the driving task, individually these are of a very short time span, but over the whole journey totalled 6 minutes of being asleep, the researchers are looking for a similar distanced lit roads but yet to find a continuous section to date.

Impact on Safety – Ron Gibbons

From past research showed how light can and does reduce accidents.

He outlined his recent research and sometimes too much uniformity isn't always a good thing.

We know there is a correlation between lighting and accidents but don't know what exactly it is!

So, he looked at what causes crashes. With 250 lorries and 3000 personal vehicles, this looks at how the driver behaves and traffic, typical three things will cause,

- so, speeding, tailgating, unsafe actions.
- Unexpected event, and
- behavior such as using phone

Colour and target detection showed 4100k worked best, and detection early rates are better under 4000-5000k light sources

Are we getting close to knowing what is the Right Light at the Right Time in about the Right Place?

Road Safety at Night – Joanne Wood Brisbane, Australia

Looked at visual impairment and how aging impacts on mesopic vision. She advised that Visual acuity from standard eye tests do not work for the real world.

Contrast sensitivity is worse when in Mesopic levels and Glare sensitivity tests are common but difficult to relate to night time driving tasks. Also, movement sensitivity is also worse under mesopic levels

So, another Test track, (seems like everyone has one these days) and her testing was done on closed test track in Brisbane. Volunteers were given task to do and recognise objects as they drove around the track, but they were fitted with goggles with increasing blur and with astigmatism added, and how this affected their ability to carry out the tasks.

How pedestrian visibility and older drivers recognised pedestrians at half the distance as compared to young drivers and the importance of reflective materials at night. This included testing for cyclists.

Reflective points for Biomotion works even better than reflective vests. The testing suggested that there is a marked improvement when we can see movement resembling a human. They compared a static 'standard' reflective vest against one which highlighted joints, elbows and knees etc and propose that this would increase visibility of pedestrians to drivers by a substantial step

Lighting for Pedestrians - Steve Fotios UK

Reminded us of the purpose of road lighting, and looked at 1992 standards, and how they got to the values and 10 lux was deemed good, 5 lux OK, and 2.5 lux poor to adequate from the Simons field study around London which set the BS 3.1, 3.2 and 3.3 levels at that time

Steve considered the current standards P1 – P6 and questioned where these levels came from and also the current point scoring CIE system of starting from the lowest lighting class and adding points based upon road conditions, such as parked cars, to raise the lighting class to the 'appropriate' level as it seemed to Steve to be quite arbitrary to the points and values chosen.

Previous research testing had shown 2 lux is enough for trip hazards and additional light makes no difference to our performance and for our feeling of safety / reassurance research has shown 10 lux is enough, above 10 lux seems to make no difference

So current standards levels source is unknown, but new empirical data is emerging and will be included in TC4-52 report due out next year. Let's see if it will influence the next set of international Standards.

Economic Benefits of Road Light - John Bullough (on behalf of Mark Rea)

Looked at recent study in Minnesota, and found that Urban locations had best improvement from lighting but more like 10% than the earlier 30% benefit /cost ratio

But how to ascertain visibility and using the Minnesota data. So how does that help justify use of lighting.

So, looking at benefit /cost ratio and significant benefit for urban intersections, and even for rural junctions. Proves (based on limited data) that lit junctions are a cost benefit to society.

Visibility Concepts around the World – Stephen Volker

Looks at the benefits of Visibility concepts. Using different lighting styles can have different results using same flux

Propose New Design process and as we see luminance Stephan suggested that designers really needs to know the road reflectance and surround luminance. So, he was suggesting that in Berlin they could test all the main roads reflectance and that could be advised to LED luminaire manufacturers and appropriate lens designs could be made for each reflectance variation footprint.

He concluded that as there are so many variables that are beyond the control of the lighting manager then the safest option is to reduce the speed limits in our Urban centres.

On dipped beam we can only see 60 -70m ahead, this equates to 60km/hr!!

Determining Visibility - Ron Gibbons

Colour is starting to become more prevalent in recognition of pedestrians. Also, movement highlights the pedestrians. A test to illuminate a junction box and how we see with the car's headlamps and static road lighting and how a subject's contracts changes as the vehicle travels through the lit box

So, a detection distance at 90th percentile detection distance then it would probably be 21 lux for a safe stopping distance

Existing visual performance models are still not adequate and require more research, which is always good news for researchers.

Small target model experiment in Italy -Giuseppe Rossi

Italy allows a dimming/dynamic lighting approach based on environmental and traffic conditions and a comparison between the Object visibility factor and small target recognition was carried out. Giuseppe advised in detail on the test methodology and noted how much impact headlamps have on the targets. Results will be proposed to the Italian national standards body next year

Division 4 Meeting Report:

This Div. 4 meeting and was an interim meeting held in Berlin, Germany

Dionyz (DG) formally opened the meeting and noted apologies.

The DD strategic plan for the division is to:

- Consolidate the Merger
- Focus on Team work
- Improve efficiency
- Strengthen role of education
- Become more transparent
- Support collaboration

Associate Directors are:

AD1 Steve Fotios (GB) – Fundamentals in outdoor lighting

AD2 Raoul Lorphevre (BE) – Lighting & signaling for transport

AD3 Sermin Onaygil (TR) – Exterior applications

Maurice Donners as DS and Nigel Parry as DE

Division's strategic plan and way of working

Report from Associate Directors

Reports uploaded to Coll Tool

Report from Division Editor

No reports have been submitted to the editor since Korea Meeting

New report on Obtrusive light has been published

Report from Division Secretary

Korea minutes uploaded

Progress reports on Technical Committees

TC4-11 High level Matters _ Technical Tour of Berlin

TC4-12 Night-time lighting of gardens

TC4-15 - Some 52 comments have been received and it is required to make some colleraltion, it is now in enquiry stage and corrections required > Web meeting to be arranged to address comments

TC4-33 - Glare, Stephan Voelker. > meeting in Berlin and still expecting to complete in 2018

TC4-45 Headlamps. No Update, DD to contact chair No Feedback. Considering re-starting TC

TC4-47 LED Application. Draft is almost finished, new Chair in place, but awaiting update

TC4-50 Road reflectance. Guiseppe Rossi, Meeting in Berlin due out 2020

TC4-51 Optimization of Road Lighting. Pal Larson. No Meeting in Berlin No activity since Juju. Pal will prepare Draft in autumn Giuseppe and Sermin offered to assist in preparation and any extra research.

TC4-52 Lighting for Pedestrians. Steve Fotios Presentation of work plan at meeting in Berlin. The draft TR due late 2018

TC4-53 Tunnel lighting: Long Meeting in Berlin, much input being delivered, may produce an early draft next year

TC4-54 Road lighting for ageing drivers. Making progress, met in Berlin requires extra research.

Division 5 TC that are now Division 4

TC4-55 Sports Lighting. Alan Smith – at CD stage

TC4-56 Urban Master planning: Proposed Diana Del Negro, to complete as at CD stage with committee approval due by end of 2017

TC4-57 Sports Lighting for Television – Met in Berlin, document is 80% finished and maybe completed in 2018 - Alan Smith

JTC-001 Application of Mesopic Photometry. TN published, still awaiting TR

JTC008 finalising Report

JTC11 Maintenance factors, at AD stage, plan to publish late 2018

Reports from Division Members

None

Review of CIE publications and Standards

DD showed colour coded table of existing /current publications that require work in the next few years. 5 more reports to review to complete

New Items - Technical Committees, Reporter ship and Research Fora

TC4-40 – Retro reflective traffic signs – DG in touch with former Chair. Need to establish new TC. Contact Haydn Yeo, (UK- Highways England) if he could take lead on this.

TC5-27 Artificial light and impact on natural environment

TC4-36 – Visibility Design for Roadway Lighting. Berlin Workshop should be starting point for this revival. Sermin Onaygil to be chair

TC4-46 – Road Traffic Lights – Photometric properties of Roundel Signs. Members please re-apply Document completed ISO have started work on this.

CIE 136 Update to Guide to Lighting of Urban Areas

CIE 99 Update to Lighting Education

TC4 XX Guide for Floodlighting (CIE94-1993)

TC4 XX Guide for prevention of lighting pollution by coloured and dynamic lighting to residential buildings

Reporter ships:

R4 XX New reportership on Mine Lighting. Open cast and underground

RF4-1 Documents Review

RF4-2 Research Strategy & Priorities. Update table with input from division members and to update on regular basis.

RF4-3 Standardization of Standards & priorities (linked to ISO 274)

Visibility on Adverse Weather Conditions - Hyensou Pak. LED headlamps review of their performance reporter ship approved

Obtrusive Light – propose new standard item in ISO. No proposer

Lighting of Open Cast Mines- No proposer

Railway Applications – No proposer – Axel Stommer could do the job

Consider new TC to review CIE 115

Technical Committees that met in Berlin

The following TCs met in Technical University, Berlin where I attended the meeting, a short comment on each follows in order of the TC number.

- TC4-33 Discomfort & Disability Glare in Road Lighting Stephen Volker
 - Stephan and his committee have been studying this key factor for many years and is hoping to have a report in the next 18 months ready for publication, A final draft should be available next summer and publication ready for Quadrennial meeting in June 2019
 - Next meeting at Washington DC June 2019

- TC4-50 Road Surface Reflection Giuseppe Rossi
 - The question of road reflection characteristics has been in development for a considerable time with an update being held as part of the Berlin meeting. Much work has been done, but more measurements are required to be completed. A typical representation from each country is requested as current r table are based on roads data from the 1970's. Type of pavement, date of measurement and measurement device is required, but is it available (do we have UK measurements?) Proposed new format for r tables:XML
 - It is possibly ready for publication in 2019. Part of the project with conduct comparison between commercial goniophotometers and calibrated academic laboratories.
 - Next meeting at Washington DC June 2019

- TC4-52 Lighting for Pedestrians - Steve Fotios
 - Steve Fotios is the chair and the driving force behind this committee and his own and linked research is progressing well.
 - Steve outlined the refined contents of the report. Perhaps 2 lux as a minimum is coming out from the study so far. Looking at Obstacle detection, Reassurance, Evaluating People and Visibility to Drivers.
 - A final draft should be available during the summer and publication ready for Quadrennial meeting in June 2019
 - Next meeting at Washington June 19

Steve added a note on WG4 Lighting for Cyclists

- TC4-53 Tunnels Lighting Evolution Raoul Lorphevre
 - The committee is progressing well and an aspect that was discussed in some details is the stopping distance. Dennis (Sweden) presented findings on Stopping distance research and related internal light levels with visibility was outlined.
 - Giuseppe outlined recent work on Italian Tunnel lighting designs
 - Dutch study, compared several standards and countries approach, proposed use improved LTP, and 50% lighting for twilight zone in short tunnels (between 20-50% LTP)
 - Norwegian study suggested using UGR (interior lighting - unified glare ratio) for a measure of discomfort glare in tunnels.
 - Further research will be done to update this information. Final draft maybe end of 2019
 - Next meeting at Istanbul 6/7 Dec 18. WebEx Late June 18
- TC4-54 Road Lighting for Ageing Drivers Maurice Donners
 - Maurice Donners is the chair and outlined the ToR which is to propose improvements to existing standards for the aged.
 - A survey of older drivers has been carried out, although an aspect as to who is ageing as the eye starts to affect performance from the 40's onwards. Biological and chrorical age not the same. From survey it noted that dark adaptation, discomfort glare and decreased performance due to rain were key points.
 - Ron Gibbons outlined some studies on colour detection and contrast
 - A four-year plan was outlined A final draft should be available next summer and publication ready for Quadrennial meeting in June 2019
 - Next meeting at Washington DC June 2019
- JTC 13 Depreciation Maintenance of Lighting Systems Dionyz Gasparovsky
 - Nigel provided an update on JTC11 Lighting Maintenance Factors - way of working. Report is basically complete, with comments about use of new terms. It should go for AD ballot in next few weeks and still looking to publish in 2018.
 - Dionyz, confirm that JTC13 will bring new knowledge and research to the field.
 - New terms for maintenance for the luminaire and for the surfaces. It was noted that there are still many issues relating to road surface reflectance's which will have an influence upon the design. Following discussion Dionyz agreed to look at new suitable terms to be used.
 - This report will follow the IEC workflow on lumen depreciation related to thermal management of LEDs and the associated Lifetime metrics.
 - An outline document was shared, and volunteers requested to draft each section
Next meetings will be in Washington DC June 2019

Future Division 4 meetings

The next general meeting of will take place in Washington DC, USA

2019: June - Quadrennial (USA Washington DC) (Proposed Maintenance Factor Workshop)

2020 Annual D4 Meeting with Workshop

2021 CIE Mid-Term (Malaysia is bidding)

Nigel Parry

UK Representative - CIE Division 4

October 2018

TCs (UPDATED LIST WILL BE IN COLL TOOL)

TC new	TC old	TC Name	TC Chair
JTC 1		Implementation of CIE 191:2010 Mesopic Photometry in Outdoor Lighting	Stuart Mucklejohn (GB)
JTC 8		Terminology in light and lighting	Peter Zwick (DE)
JTC 11		Light and Lighting – Maintenance factor	Nigel Parry (GB)
TC4-11		High Level Matters (D4/mtg Activities)	Nigel Parry (GB)
TC4-12		Nighttime lighting of beer gardens	Raoul Lorphevre (BE)
TC 4-15		Road Lighting Calculations	Sermin Onaygil (TR)
TC 4-33		Discomfort Glare in Road Lighting	Stephan Völker (DE)
TC 4-45		Performance Assessment Method for Vehicle Headlamps	Gert Langhammer (DE)
TC 4-47		Application of LEDs in Transport Signalling and Lighting	Steve Jenkins (AU)
TC 4-50		Road Surface Characterization for Lighting Applications	Giuseppe Rossi (IT)
TC 4-51		Optimizing of Road Lighting	Pal J. Larsen (NO)
TC 4-52		Lighting for pedestrians: new empirical data	Steve Fotios (GB)
TC 4-53		Tunnel Lighting Evolution	Raoul Lorphevre (BE)
TC 4-54		Road lighting for ageing drivers	Maurice Donners (NL)
TC 4-57	TC 5-20	Guide for Sports Lighting	Alan Smith (GB)
TC 4-56	TC 5-21	A Guide to Urban Lighting Masterplanning	Müjgan Serefhanoglu-Sözen (TR)
TC 4-55	TC 5-26	Guide for the Lighting of Sport Events for Colour Television and Film Systems	Alan Smith (GB)
N/A	TC 5-28	Guide on the Limitation of the Effects of Obtrusive Light	Nigel Pollard (GB)

Reporters (UPDATED LIST WILL BE IN COLL TOOL)

R4-34	Bob Parks	Retro reflective and other passive devices as Energy Savers
R4-36	Axel Stockmar	CEN/TC169, Lighting Applications
R4-37	Pentti Hautala	CEN/TC226, Road Equipment
R4-38	Elizabeth Alvarez del Castillo	IAU (International Astronomical Union)
R4-39	Ad de Visser	GTB (The International Automotive Lighting and Light Signalling Expert Group - Groupe de Travail "Bruxelles 1952")
R4-41	Axel Stockmar and Cyril Chain	Lighting for Elderly
R4-42	Cyril Chain	LUCI (Lighting Urban Community International)
R4-43	Jean-Claude Martin and Eric Dumont	PIARC
R4-44	Alwyn Williams	IALA (International Association of Marine)
R4-47	Steve Jenkins	LED Billboards
R4-48	TBN	Intrusive Light
R4-49	Chao-Hua Wen	Flicker from Lighting on High Speed Road
R4-50	Dionyz Gasparovsky	Document Status - Joint with DIV5

CIE Division 6: Photobiology and Photochemistry

The Terms of Reference of Division 6 are:

To study and evaluate the effects of optical radiation on biological and photochemical systems (exclusive of vision).

The work of Division 6 is directly related to the health of people and more generally to the ecosystem. It considers both the beneficial and detrimental implications of exposure to optical radiation.

Division Officers:

Division Director:	John O'Hagan (UK)
Division Secretary:	Luke Price (UK)
Division Editor:	Eric Liggins (UK)
Associate Directors:	Karl Schulmeister (AS)
	David Sliney (US)
	Shu Takeshita (JP)

- The annual meeting of Division 6 took place on 27th June 2018 by WebEx. 16 people attended: the UK was represented by John O'Hagan, Luke Price, Eric Liggins, Ann Webb, Michael Lynn and Antony Young.
- During the year, there were no new D6 CIE publications. However, D6 contributed to an article in LED Professional magazine (CIE considers the "good and bad" of light, by John O'Hagan, Luke Price and Luc Schlangen, 68, July/August 2018, pp 24-25) which is available to download ([Download LpR #68](#))
- The next annual meeting is intended to take place on 20 June 2019 in conjunction with the 29th Session of the CIE in Washington DC, USA.

Status of Technical Committees, etc

TC6-52 Proper Measurement of Passive UV Air Disinfection Sources (Richard Vincent)

After some rounds, involving DE6 and CB feedback, the latest comments were received in September 2017, and it is planned that a revised document be prepared and voted upon, moving towards publication.

TC6-64 Optical Safety of Infrared Eye Trackers Applied for Extended-Durations (David Sliney)

TC6-64 is still an active TC. The report has been through the DE and is just waiting for some minor amendments. The TC will close automatically when the report is published.

JTC-4 Visual, Health, and Environmental Benefits of Windows in Buildings during Daylight Hours (Jan Wienold)

D6 has proposed Dr David Sliney from the US as the joint Chair for this committee. This has allowed the JTC to progress (the previous joint Chair was from Italy, which is no longer a member of CIE).

JTC-5 Joint Technical Committee to Revise CIE S009/IEC 62471 (John O'Hagan)

This is progressing towards a draft for comment by JTC5 members.

JTC-8 International Lighting Vocabulary (Peter Zwick)

All CIE Divisions are involved in this JTC. The final draft was circulated for vote in 2018 and publication is imminent.

JTC-9 CIE System for Metrology of iPRGC Influenced Light Response (Luc Schlangen)

The BA had agreed that JTC-9 could apply for a fast-track route to publication. The Draft International Standard (DIS) 026 was circulated for vote in 2018 and publication is expected around the end of 2018 or early 2019. A tutorial on the Standard is planned for March 2019 in Eindhoven, The Netherlands.

R6-43 Illuminators for Treatment of Infant Hyperbilirubinemia (Graham Hart, Michael Lynn)

This report is nearing completion.

R6-44 Optical Radiation Hazard Measurements in the Workspace (David Sliney, Robert Angelo)

The report is being finalised and is expected to be published soon.

John O'Hagan

UK Representative CIE Division 6

Director, Division 6

30 November 2018

CIE Division 8: Image Technology

Terms of reference

The Terms of Reference of Division 8 are: To study procedures and prepare guides and standards for the optical, visual and metrological aspects of the communication, processing, and reproduction of images, using all types of analogue and digital imaging devices, storage media, and imaging media.

Division Officers:

Division Director:	Po-Chieh Hung
Division Secretary:	Christine Fernandez-Maloigne
Division Editor:	Danny C. Rich

Activities and achievements

Activities and achievements of the Division during the year October 2017 – September 2018 were as follows:

The most recent formal meeting of CIE Division 8 was held as part of the 25th Color and Imaging Conference in 13th September, 2017 in Scandic Lillehammer Hotel, Lillehammer, Norway. 34 people attended (8 via the internet) including eight Country Representatives, six Technical Committee Chairmen and one Reporter.

Two new JTCs (JTC 12 and JTC 16) were proposed and approved to establish in 2018.

Status of Technical Committees

TC8-12 Image and video compression assessment	Active
A Technical Report has been submitted to the board and it is hoped that it will be published soon.	
TC8-13 Colour gamuts for output media	Active – meets regularly by WebEx
TC8-14 Specification of spatio-chromatic complexity	Active – meets regularly by WebEx
TC 8-15 Archival colour imaging	Active- meets regularly by WebEx
TC report is in preparation.	
TC 8-16 Consistency of colour reproduction within a single reproduction medium	Active- meets regularly by WebEx
TC8-17: Methods for Evaluating Colour Difference between 3D Colour Objects	Active- face to face TC meeting in October
JTC 10 (D8/D1): A new colour appearance model for colour management systems: CIECAM16	Active TC report is in preparation
JTC 12 (D1/D2/D8): The measurement of sparkle graininess	Active TC established in 2018

JTC 16(D1/D8): Validity of Chromatic Adaptation	Active TC established in 2018
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Status of Reporters

R8-14: Office Lighting for Imaging	Active
R8-15: A survey on Quality Metrics on Stereoscopic Imaging,	Active
R8-16: Material Adjustment Transforms	Active
R8-17: Literature Survey on Uniform Colour Space for Imaging Applications including Wide Colour Gamut and High Dynamic Range Images	Active

Next meeting will be hosted in 12 November 2018 in conjunction with 27th Color and Imaging Conference in Vancouver, Canada.

Report presented by:

Dr Kaida Xiao
UK Representative CIE Division 8

09/11/2018

APPENDIX A

THE CIE & NIC

Each country participating in the work of the International Commission on Illumination (the CIE) forms a National Illumination Committee (NIC). This Committee is representative of all bodies in that country which have an interest in light and lighting.

The CIE:

- provides an international forum for the discussion of all matters relating to science technology and art in the fields of light and lighting
- co-ordinates the international activities of individuals and organisations, to identify outstanding and fundamental issues pertaining to light and lighting and to find solutions
- develops basic standards for measurement and application design
- publishes Technical Reports and Standards and maintains liaison with other international standards organisations.

The CIE technical programme is divided into seven Divisions covering Vision and Colour; Physical Measurement of Light and Radiation; Interior Environment and Lighting Design; Lighting and Signalling for Transport; Exterior and Other Lighting Applications; Photobiology and Photochemistry; and Image Technology. Each Division establishes Technical Committees (TCs) with international representation of experts, to undertake specific tasks. Each TC is disbanded when the work is complete.

The CIE holds a Sessional Conference every four years, which reviews the latest developments in the field and plans the work of the divisions and their Committees for the next quadrennium.

The CIE Central office is based in Vienna. The Secretary General and her assistants are responsible for the administration associated with co-ordinating the activities of all member countries and for publishing the Commission's Technical Reports and Standards.

The CIE is supported through the time and expertise of individuals, most of whom are associated with companies, institutions and organisations interested in light.

The CIE is supported financially by each country's National Illumination Committee which contributes according to a Central Office allocation based on the scale of assessments for the contribution of Member States of the United Nations Organisation, but with modified upper and lower limits. Each NIC depends on contributions from supporting organisations, income from the sale of published Technical Reports and Standards and from the organisation of seminars.

The National Illumination Committee of Great Britain is supported by sponsoring and co-operating organisations. Many universities and colleges participate, as do Government Departments and official bodies interested in or concerned with the design, development and use of light. There are also representatives of the lighting industry as well as independent consultants and architects representing professional bodies.

The NIC selects and sends delegates to the sessions of the CIE. It keeps in close touch with developments throughout the world, both in research and in practical applications, by personal contact as well as via the issues of the CIE News and CIE Division Activity Reports. It also ensures that the British contributions are made known and properly recognised in other countries.

Great Britain, one of the founder members of the CIE, established its National Illumination Committee in 1913 and since then has played a major part in the development of the Commission. The original decision to establish the CIE was considerably influenced by Leon Gaster, the founder of the British Illuminating Engineering Society, now the Society of Light and Lighting.

APPENDIX B

CONSTITUTION OF THE NATIONAL ILLUMINATION COMMITTEE AT 30 SEPTEMBER 2018

Officers and Trustees

Chair	John O'Hagan
Vice Chair	Teresa Goodman Stuart Mucklehohn
Honorary Secretary	Steve Fotios
Honorary Treasurer	Nigel Parry
Secretariat	
Executive Secretary	Allan Howard 4 Symonds Green Road, Stevenage, Herts SG1 2HA

Sponsoring Organisations

Institution of Lighting Professionals	Nick Smith Allan Howard
Society of Light & Lighting	Brendan Keely Peter Raynham John Fitzpatrick

Cooperating Organisations

Ceravision Limited	Stuart Mucklejohn
College of Optometrists	Alan Smith
Colour Group (Great Britain)	Vien Cheung
Public Health England	John O'Hagan
International Association of Lighting Designers	Kevin Theobald, Emma Cogswell
Lighting Industry Association	Tariq Malik
National Physical Laboratory	Teresa Goodman
Society of Dyers and Colourists	Andrew Filarowski (Ronnier Luo)
Thorn Lighting Ltd	Peter Thorns
Trinity House Lighthouse Service	Alwyn Williams
OrangeTek Ltd	Nigel Parry
Qinetiq Ltd	Dr Eric Liggins
Tintometer Ltd	Dr P J Clarke
VeriVide Ltd	John Dakin

Participating Universities

University of Liverpool	David Carter
Loughborough University	John Mardaljevic
University of Manchester	Ann Webb
University of Reading	Geoff Cook
University of Sheffield	Steve Fotios
University College, London (The Bartlett)	Kevin Mansfield Peter Raynham

Individual Members

Enrico Biabchi
Mike Hall
Gareth Johns
Gareth Jones
Leslie Lyons
Martin Morgan-Taylor
Nigel Pollard
Nick Smith
Ian Tutt
Christopher Wilkes
Michael Pointer
Diana Del-Negro

CIE Division Representatives

Division 1	Peter Clarke
Division 2	Teresa Goodman
Division 3	John Mardaljevic
Division 4 / 5	Nigel Parry
Division 6	John O'Hagan
Division 8	Kaida Xiao

Appendix C

Reports from recipients of the 1975 bursary.

As a general principle, funds are available from the 1975 Fund to support travel and subsistence to attend CIE business meetings: this includes CIE Division meetings, CIE Board of Administration meetings, and CIE Technical Committee meetings.

Each individual who receives support is required to provide a written report (of around 1,000 words) on the event they attend, or the work they carry out, for distribution to members through the web site and these will also form part of the annual report.

Report for CIE 2018 Smart Lighting Conference

Introduction

“CIE 2018 Smart Lighting” and associated tutorials on “Colour Vision and Healthful Lighting”, which will be held from April 24-28, 2018 in Taipei and hosted by the CIE Associate National Committee of Chinese Taipei. As part of the meeting, a CIE Division 1 general meeting and various technical committee meetings were held on 28 April. This report has been prepared by Dr Kaida Xiao, from the School of Design at the University of Leeds, UK. The topic will cover the CIE Division 1 meeting and TC meetings for CIE TC 1-92.

Attendance

I attended the CIE Division 1 general meeting as the Technical Committee Chair for CIE TC 1-92. As the TC chair, I organised and chaired technical committee meeting for CIE TC 1-92, Skin Colour database. I also attended the Technical Committee meeting of TC 1-96, A Comprehensive Model of Colour Vision, as a TC member.

Key activities

1. CIE Division 1 general meeting

During the general D1 meeting, current progress and the next work plan for each technical committee were discussed. Highlights included:

- A Technical Report (CIE 228:2018 Grey-Scale Calculation for Self-Luminous Devices) written member of TC 1-93, Calculation of Self-luminous Neutral Scale was published in 2018 and the TC has been automatically closed.
- A new Research Forum entitled “Revisiting Correlated Colour Temperature” (Youngshin Kwak, KR) with the Scope described below was approved by Division 1.
- Appointment of a new liaison officer, Michael Royer, for liaison from Division 1 to IES (Color Committee), was approved by Division 1.

The next meeting will be held as part of the CIE 29th Session 2019 to be held in Washington DC, USA, 17-22 June 2019.

2. Technical Committee meeting of CIE TC 1-92 Skin Colour database

The TC was established in 2013 and this is the fifth TC meeting. A large amount of work has been carried out to collect data for the skin colour database and to investigation the uncertainty of skin colour measurement. In this TC meeting, We intend to wrote the TC report and close the TC next year. I summarised the progress of TC work in skin colour measurement and their measurement uncertainty. Further work in how to apply skin colour data is suggested by me and discussed with all attendees. Professor Norimichi Tsumura from Chiba University Japan, introduced his work on skin colour analysis and discuss the possibility to apply skin data to computer graphic application. Finally, Professor Yoko Mizokami introduced her research in visual perception of facial image and also discussed plan to collaborate with this TC for colour vision research. Professor Suchitra Sueeprasan from Thailand, Professor Yung-Kyung Park from South Korea and Dr Yue Qiao, Dr Yang Yang from L’Oreal R&D discussed possible follow up research after this TC.

What you go out of the event / activity attended

During this event, I attended the CIE 2018 Smart Lighting conference, the CIE Division 1 general meeting and the TC 1-92 meeting and TC 1-96 meeting. I also had many useful discussions with other Division members.

It is my great honour to attend the CIE Division 1 general meeting and I thank CIE-UK for their financial support.

Dr Kaida Xiao
31 August 2018
University of Leeds

Funding awarded to: Steve Fotios

Event: CIE Expert Tutorial and Workshop on Research Methods for Human Factors in Lighting. Aalborg University, Copenhagen, Denmark. 12-14 August 2018.

My contributions to this event were:

- Organiser / member of scientific committee
- Session chairman (*Measuring perception and performance in the lab and field studies*)
- Invited presenter (*Miss-use of Category Rating Scales*)
- Organiser of the subsequent PhD research methods symposium (LumeNet).

Miss-use of Category Rating Scales

Do responses gained using category rating accurately reflect respondents' true evaluation of an item? 'True' in this sense means that they have a real opinion about the issue, rather than being compelled by the survey to speculate an opinion, and that the strength of that opinion is faithfully captured. This presentation describes some common issues which suggest that it should not be simply assumed that a response gained using category rating reflects a true evaluation. That assumption requires that an experiment has been carefully designed and interpreted, and examples are shown where this is not the case

This presentation, and the aim of the other presentations curated for the session, was to extend the discussion of research methods reported in CIE 212:2014 (*Guidance towards best practice in psychophysical procedures used when measuring relative spatial brightness*. 2014. ISBN 978-3-902842-51-0) which resulted from TC1-80 led by S Fotios.

Summarising the session, three new TCs were proposed:

- CIE 212:2014 (TC1-80) is repeated for discomfort glare
- Minimum expectations in statistical analyses
- Physiological / behavioural measurement as a parallel to subjective evaluation.

Leading up to this event I was co-convenor (along with Jennifer Veitch and Kevin Houser) of a workshop session (*WS7: Judging the Scientific Quality of Applied Lighting Research*) at the 2017 mid-term CIE Session in Jeju. This workshop discussed the requirements of good research, for example the need for internal control in an experiment (counterbalancing and null conditions), ethical approval, statistical analysis and complete reporting. Unfortunately these requirements are lacking in much lighting research which is one reason for disagreement at conferences and for slow advance in knowledge.

There were four sessions at the conference:

1. Planning
2. What and how to measure
3. Measuring perception and performance in the lab and field studies
4. Post experiment

These were designed to follow the main stages of conducting and reporting an experiment. Each session contained two or three invited presentations and a workshop section for several contributed presentations. The schedule was set up to allow more time for discussion than tends to happen at conventional lighting conferences.

A particular desire was to encourage attendance from PhD students. Our strategy for doing this was keeping the student registration fee as low as possible. While the local organisers were supportive, it took a lot of work from the scientific committee to convince CIE that reduced fees should be offered. If lighting research is to continue, a stream of well-educated PhD students is essential.

Outcomes

- *Was the conference aim achieved?*

Yes: it encouraged discussion about research methods, which is often absent at conferences in favour of apparently interesting results (which are meaningless if the methods used were not correct).

- *Where your aims achieved?*

My aims were to give a presentation to disseminate the findings of research carried out at Sheffield university; to expose my PhD students to key researchers; and to encourage others to focus on methods. I am working with others to propose new TCs (research methods for discomfort glare: ensuring valid interpretation when using eye tracking). I achieved personal success in all of these aims.

- *What learning did you gain?*

The presentations by Jennifer Veitch and Kevin Houser drew my attention to correct terminology (e.g. construct validity and definitions of variables). By using correct terminology we may better design and report an experiment and thus lead to more robust research.