



Annual Report
of the
National Illumination Committee of Great Britain

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1st October 2016 to 30th September 2017



National Illumination Committee of Great Britain

Report for the year ending 30 September 2017

As I write this I have just returned from the CIE Midterm meeting, held in the beautiful location of Jeju Island, South Korea. Despite the slightly uneasy political situation in that part of the world at present, the meeting was very well-attended, with delegates from all corners of the globe. It was also of a high technical quality, covering a diverse range of topics including colour quality, metrology, interior lighting, road lighting, lighting and health, and visual perception. With more than 100 oral presentations (including presented posters), 110 posters and 7 workshops there was plenty of opportunity to fulfil one of the CIE's key objectives, of sharing of information and encouraging debate; I think it's fair to say that everyone involved came away with plenty to think about and lots of ideas to explore. The associated CIE technical gatherings were equally lively and productive, with more than 40 TCs taking the opportunity to meet and all except Division 8 holding their annual meeting. Further details are available later in this report.

This CIE Midterm meeting was particularly momentous, since it marked the launch of the new Division 4, entitled Transportation and Exterior Applications. This was marked by a champagne toast at the end of the General Assembly Meeting and congratulations to the first Director of the new Division, Dr Dionyz Gasparovsky. The new Division 4 is constituted with 3 Subdivisions: Fundamentals in outdoor lighting; Lighting and signalling for transport; and Exterior applications, and all TCs previously active in both the old Divisions 4 and 5 have been transferred across to the new Division.

Closer to home, CIE-UK has continued to provide support to members involved in CIE activities and to facilitate the exchange of information between the members. We would welcome your suggestions on how to do this even more effectively; please feel free to contact any of the Trustees, or the Division representatives, if you have any ideas to put forward or would simply like to know more about either CIE-UK or the CIE in general.

I would like to close by thanking you all for your support for CIE-UK, and CIE more generally, during the past year. I look forward to seeing as many of you as possible at future CIE events.

A handwritten signature in black ink, appearing to read 'T. Goodman'.

Teresa Goodman
Chair of CIE-UK

The
National Illumination Committee of Great Britain
Registered Charity No. 257185

Financial Statements
Year to 30 September 2017

Year to 30 September 2017

Unrestricted Funds

| | Note | 2107 £ | 2016 £ |
|--|------|-----------|-----------|
| Receipts | | | |
| Subscriptions | | 8,458 | 9,335 |
| Investment Income - listed investments | | 13,315 | 10,070 |
| Investment Income - Bank deposits | | 1 | 3 |
| Fees Receivable for Publications & Seminars Manchester 2015 | 3 | 274 | 549 |
| Delegates Fees | | | |
| Sponsors | | | 8,400 |
| Exhibitors | | | |
| Grants | | | |
| Sundry | | | 1,402 |
| Sub total | | - | 9,802 |
| | | ----- | ----- |
| Total Receipts | | 22,047 | 29,758 |
| | | ----- | ----- |
| Payments | | | |
| Charitable activities | 2 | 19,130 | 7,696 |
| Governance | 2 | 407 | 146 |
| Fees to 121 | | | 3,705 |
| | | ----- | ----- |
| Total Payments | | 19,536 | 18,260 |
| | | ----- | ----- |
| Net Receipts/(Payments) | | 2,511 | 11,498 |
| Cash funds brought forward | | 51,191 | 176,402 |
| Transfer to Investment Account (121) | | | (130,000) |
| | | ----- | ----- |
| Cash funds carried forward | | 53,702 | 57,900 |

All amounts relate to continuing activities
 The notes on pages 3 and 4 form part of these accounts

1 ACCOUNTING POLICIES

(a) GENERAL

The financial statements are prepared as Receipts and Payments accounts under the historical cost convention, as modified by the revaluation of investments, and within the guidance of Charity legislation.

(b) FUNDS

The Committee has divided its funds into categories according to their nature and purpose as follows:

Unrestricted Funds

Funds available for the Committee to pursue all of its objectives under its Rules, and comprise:

General Fund

This represents the undesignated accumulated surpluses from funds available for the general objectives of the Committee.

Designated Fund

Funds designated by the Committee to pursue a particular objective or group of objectives under the Rules and comprise:

1975 Fund

This Fund has the objective of raising and designating funds for the purpose of furthering the Committee's objectives in supporting CIE and other technical meetings and events.

It may also be used for Educational and Research awards coming within the purview of the Committee.

(c) INVESTMENTS

Investments, listed and otherwise, are shown at market value. Unrealised gains are incorporated within the fund balances to which the investments relate and are identified as unrealised.

Market value is based on mid market prices for listed investments.

(d) RESERVES POLICY

In the recent past the UK Lighting Industry has fragmented into smaller units and certain public institutions, which formerly had interests in lighting research, have been reorganised to the detriment of their research effort. In these circumstances, the Trustees see only limited opportunities for fund raising. Accordingly, in order to meet their continuing obligations to pay the UK contribution to the International Commission on Illumination (CIE) and to support UK researchers participating in CIE activities, the Trustees need a continuing stream of investment income to supplement members' subscriptions and the income from fund raising.

To continue supporting UK researchers at the present level, the amount of investment income necessary is deemed to be about £20,000 p.a., requiring reserves in the range £375,000-£475,000. The charity now has such reserves in place.

The Trustees monitor and review this policy annually at their Spring meeting.

2 Analysis of Payments

| | International & Technical Liaison | Technical Advice & Publications | Governance | 2017 Total | 2016 Total |
|------------------------------------|---|---------------------------------------|------------|---------------|---------------|
| | £ | £ | £ | £ | £ |
| Subventions Paid | 19,130 | - | - | 19,130 | 146 |
| Secretarial Services | - | - | - | - | - |
| Office Services & Running Costs | - | - | 407 | 407 | 144 |
| Meeting Costs | - | - | - | - | 7,550 |
| Manchester 2015 | - | - | - | - | 8,404 |
| HMRC VAT | - | - | - | - | (1,691) |
| | ----- | ----- | ----- | ----- | ----- |
| | 19,130 | - | 407 | 19,536 | 14,553 |
| | ----- | ----- | ----- | ----- | ----- |

There were no employees in the year (2017: None)

No Trustee received any remuneration (2017: None)

It is the policy of the Committee not to reimburse Trustees for expenses incurred in carrying out their duties as Trustees. However, Trustees, in common with other members of the Committee, can be reimbursed expenses incurred whilst carrying out other specific tasks for the Committee.

No Educational Awards or Grants were made during the year (2017: None).

3 Manchester 2015

NICGB put in a successful bid at the 2011 CIE Quadrennial Meeting to hold the 2015 CIE Quadrennial meeting in Manchester. These are the receipts and payments incurred in fulfilling the bid.

4 Foreign currency assets

A balance of €693 was held at 30 September 2017 by the CIE Central Bureau, Vienna, being the National Illumination Committee's commission for sales of CIE publications to UK residents less the CIE subvention. It has been converted at the rate of €1.15 = £1 applicable at 2017.

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:

x043:2016 Proceedings of the 4th CIE Expert Symposium on Colour and Visual Appearance 6 – 7 September 2016, Prague, Czech Republic

CIE 224:2017 CIE 2017 Colour Fidelity Index for accurate scientific use

CIE TN 007:2017 Interim Recommendation for Practical Application of the CIE System for Mesopic Photometry in Outdoor Lighting

Most technical committees met during the year with 12 meeting at the CIE Midterm Meeting, Jeju Island, Korea. As yet there are no published minutes from the Korea meeting.

Korea Workshops on 'Colour quality' and 'Illuminant L and LED Reference Spectra'.

Status of Technical Committees

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 TC is working closely with TC1-81 and has evaluated further colour difference sets in common with TC1-81 for large colour differences.

Met in Korea

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)

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

To evaluate available formulae for small colour differences. Klaus Richter (DE)

A new draft of the document was produced during the year.

Met in Korea

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

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)

Met in Korea

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)

Met in Korea

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

To update CIE Publication 15:2004 taking into consideration the current CIE/ISO standards on colorimetry and the work of TC1-36 Fundamental Chromaticity Diagram with Physiologically Significant Axes. Chair: Ellen Carter (US)

A third committee draft has been 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)

Met in Korea

TC 1-88: Scene Brightness Estimation

To investigate current research on brightness estimation methods using a calibrated luminance image of a real indoor scene

To compare brightness estimations of real indoor scenes with those predicted

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)

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)

Met in Korea

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)

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)

Met in Korea

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

To recommend a formula or computational method for an achromatic, neutral or gray scale for self-luminous (i.e. non-reflective) surfaces. (This computation complements CIE Lightness, L^* , which serves a similar purpose for reflective surfaces.) Chair: Robert Carter (US)

A draft technical report, 'Grey-scale Calculations for Self-luminous Devices', has been produced. Commenting on this report end on 13th December 2017.

Met in Korea

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)

Met in Korea

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)

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 Korea

JTC 1 (D1/D2/D4/D5): Implementation of CIE 191:2010 Mesopic Photometry in Outdoor Lighting

To investigate adaptation and viewing conditions and define visual adaptation fields in outdoor lighting. To define lighting applications where mesopic photometry could be used. To provide guidelines for implementing mesopic photometry in outdoor lighting. Chair: Stuart Mucklejohn (GB)

Met in Korea

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)

Met in Korea

Reporterships

- R1-53 Frédéric Leloup Gloss Perception and Measurement
- R1-58 Phil Green Liaison with ISO TC130 Graphic Technology
- R1-60 Guihua Cui Future colour-difference evaluation
- R1-61 Aurelien David Source whiteness metric
- R1-62 Sophie Jost Typical LED spectra
- R1-63 Changjun Li Tristimulus Integration
- R1-64 Changjun Li Real Colour Gamut
- R1-65 Taiichiro Ishida Categorical Colour Identification
- R1-66 Hiroyasu Ujike The Effect of Dynamic and Stereo Visual Images on Human Health
- R1-67 Youngshin Kwak Revisiting Correlated Colour Temperature
- R1-68 Kees Teunissen / Yoshi Ohno A Gamut Area Measure and Colour-shift Graphic, based on CIE 13.3-1995

Report presented by:

Peter Clarke

UK Representative CIE Division 1
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 the correct 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; barcode readers in supermarkets; 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.

Activities and achievements

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

Two new CIE Technical Reports have been published by Division 2:

CIE 225:2017 Optical measurement of high power LEDs

CIE 226:2017 High speed testing methods for LEDs

One new CIE Technical Note has been published by Division 2 during this period (joint with D1 and D4):

TN 007:2017 Interim recommendation for practical application of the CIE system for mesopic photometry in outdoor lighting

Division 2 organised a CIE Tutorial and Practical Workshop on LED lamp and luminaire testing in accordance with CIE S025 from 8th to 11th May 2017, which was held in the optics laboratories of the National Metrology Institute of Switzerland (METAS). The focus of the event was the practical implementation of the CIE international LED measurement standard in industrial test laboratories and it included demonstration sessions allowing participants to see state-of-the-art measurement equipment including several goniophotometers, integrating spheres, spectroradiometers and tuneable lasers. A number of TCs working on LED measurements also took the opportunity to meet and the results of two European research projects related to photometry and radiometry, i.e. MESaLL (<http://www.eng62-mesail.eu>) and PhotoLED (<http://photoled.aalto.fi>) were presented.

The Division met in Jeju, South Korea on 26th October 2017 in conjunction with the CIE 2017 Midterm Meeting.

A total of 15 Division 2 Technical Committees (TCs) met on 27th and 28th October 2017, again linked with the CIE Midterm meeting. These covered a range of topics, ranging from the highly specific (e.g. test methods for OLEDs) to the more fundamental (e.g. uncertainty evaluation for coloured LEDs, goniophotometry, array spectrometers and integrating sphere techniques). 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; TC2-49 Photometry of flashing light; and TC2-51 Calibration, characterisation and use of array spectroradiometers.

Two new TCs were established during the year:

TC2-88: Standard reference solar spectra for industrial applications

TC2-89: Measurement of temporal light modulation of light sources and lighting systems

New TCs, Research Fora and Reporterships have been proposed and/or established during the year as follows:

JTC proposal: The measurement of sparkle and graininess (joint with D1) – approved by D2

TC proposal: Guidance relating to 0°:d (d:0°) reflectance instruments – application form being prepared

RF proposal: BRDF data handling and visualisation – proposal being refined in discussion with stakeholders

R2-80: Metrology of laser based lighting

Reportership proposal: Measurement of effective intensity of flashing lights – proposal being refined

The following TCs and Reporterships were closed during the year:

TC2-63 Optical measurement of high power LEDs (TR published)

TC2-64 High speed testing methods for LEDs (TR published)

TC2-65 Photometric measurements in the mesopic range (2 TNs published)

R2-52 Flicker measurement and flicker index study on SSL (TC 2-89 established)

R2-57 Monitoring progress of IEC TR 62778 (changed to Liaison activity)

R2-74 Physical characterisation of new visual effects in the field of appearance of materials (new TC proposed on this topic; R2-74 to be closed once this new TC has been approved)

R2-78 Investigation of the need for documentary guidance relating to 0°:d (d:0°) reflectance instruments (new TC proposed on this topic; R2-78 to be closed once this new TC has been approved)

The Division 2 Management Team

The team have instigated 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 are 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. It was emphasised during Division 2 meeting that this initiative is not intended to diminish the importance of other TCs; all TCs are still considered to be equally important and TCCs are still requested to complete the work of their TC in a timely manner. The 4 TCs identified at present 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)

Although a significant proportion of the work of the Division continues to be focused on the measurement and characterisation of solid state lighting (SSL) products (particularly LEDs), other topics relating to the use of measurement instruments and measurement uncertainty are gaining in importance. Particular aspects currently being considered, either within TCs or Reporterships, are:

Measurement and control for LEDs and OLEDs

Practical approaches to uncertainty evaluation for industrial applications

Methods for correcting for factors such as spectrometer stray light

Calibration and use of imaging devices for photometric measurements

Classification system for illuminance and luminance meters

Measurement of visual effect materials, including BRDF measurements

Standard illuminants for SSL 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 Eindhoven, The Netherlands, from 12th to 15th June 2017.

Full details of recent activities within Division 2, including details of all the Technical Committees and Reporterships, are available on the Division 2 website: <http://div2.cie.co.at/>

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 |
| TC2-49 | Photometry of flashing lights | Teresa Goodman, Ian Tutt, Alwyn Williams |
| TC2-50 | Measurement of the optical properties of LED assemblies | Teresa Goodman, Menno Schakel |
| 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 | |
| TC2-69 | 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 | Menno Schakel |
| TC2-77 | Fundamental concepts | Teresa Goodman, Menno Schakel |
| TC2-78 | The goniophotometry of lamps and luminaires | Menno Schakel |
| 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 | Menno Schakel |
| TC2-85 | Recommendation on the geometrical parameters for the measurement of the Bidirectional Reflectance Distribution Function (BRDF) | |
| 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 | Menno Schakel (TCC) |

Active Reporters

| | |
|-------|---|
| R2-55 | Simple practical guide for measurement uncertainty estimations |
| R2-56 | Monitoring progress in regional metrology organisations (RMOs) |
| R2-58 | Standard lamps: availability of and alternatives to commercially available incandescent sources |
| R2-60 | Discussion on the definition of luminance/radiance |
| R2-61 | Review of published D2 publications |
| R2-64 | Technical Note on errors of measurement in spectrophotometry |
| R2-68 | Measurement of light output degradation of LED light source |
| R2-69 | TN on the validation of a near-field goniophotometer |
| R2-70 | Guide for the field photometric measurements for the verification of lighting systems |
| R2-71 | Towards LED based standard calibration sources for photometry |
| R2-72 | Towards a new CIE file format for luminous intensity distributions of luminaires |
| R2-73 | Colour Luminance File Format Specification |

- 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

Teresa Goodman
UK Representative CIE Division 2
teresa.goodman@npl.co.uk

CIE Division 3 Interior Environment and Lighting Design

Division 3 of the CIE has an overall aim to examine the various factors which influence the satisfaction of the occupants of a building with their environment, including the effects of both daylighting and electric lighting. The objectives of the Division are to study and evaluate those factors, to provide guidance on relevant design criteria, to study design techniques (including relevant calculations) for the interior lighting of buildings, to incorporate the findings and those of other CIE divisions into lighting guides for interiors in general or of particular types. These aims and objectives are focused on providing illuminated environments which are of direct benefit to the users of those environments. The international nature of the Division allows those benefits to be disseminated to all member countries including the UK. In particular the Division draws on the contribution of several members from the UK who are active on 4 technical committees (TC). The Division 3 Editor, responsible for all publications is also from the UK.

- The Division 3 Executive held WebEx meetings on the following dates: 23/01/2017; 20/04/2017; 16/01/2018. The next ones (TBC) are scheduled for March 2018 and June 2018.
- A number of WebEx meetings were held on largely monthly basis from June 2017 onwards to develop, progress and finalise the details for the D3 "CIE EXPERT TUTORIAL AND WORKSHOP ON RESEARCH METHODS FOR HUMAN FACTORS IN LIGHTING". The event is now confirmed and advertised on the CIE webpages. It will take place during August 2018 in Copenhagen, Denmark.
- JM could not attend the CIE 2017 MIDTERM MEETING, JEJU ISLAND, SOUTH KOREA due to teaching commitments.

As noted in previous reports, the small number of active TCs in D3 remains a concern, particularly in daylighting. Despite efforts to encourage wider participation, this worrying downwards trend persists.

Daylighting research has historically received a small fraction of the funding allotted to either electric lighting (mainly from manufacturers) or in the more general area of built environment supported by research councils, but with a heavily restrictive focus on energy. Thus daylighting research is often pursued by enthusiasts/academics without significant funding or support. In other words, sustained more by good will rather than 'hard cash'. Daylighting researchers have, necessarily, adapted to this funding landscape. And much of the quality daylighting research carried out in recent years has been relatively low-cost. However, with ever increasing pressure on academics to justify the time spent on unfunded work, the capacity to contribute to any significant degree on 'personal projects' is gradually being eroded. This reality has become impossible to ignore in recent years since its most obvious manifestation has been with the difficulty experienced in recruiting volunteers to participate actively in CIE Technical Committees. A number of compounding factors have not helped. In particular for academics, the lack of visibility of CIE publications serves to discourage wider participation. As a way to begin to address the issue of visibility, JM proposed to D3 Chair (J. Veitch) that CIE make freely available prominent publications from past conferences. This appears to have been taken up.

The CIE is not alone in having to confront the challenges noted above. However, in certain areas, the traditional encouragements to participation either no longer apply or carry much less weight than they used to. We should therefore consider potentially radically new ways to renew interest in, and commitment to, the various work programmes of the International Commission on Illumination, in particular the technical committees.

Active Technical Committees + UK Members

| | | |
|----------------------|--|----------------------------|
| TC3-53 | REVISION OF CIE S 008 JOINT ISO*CIE STANDARD: LIGHTING OF WORK PLACES - PART 1: INDOOR | P. Thorns |
| TC3-54 | REVISION OF CIE 16-1970: DAYLIGHT | J. Mardaljevic, F. Anselmo |
| TC3-55 | METRICS FOR SUNLIGHTING AND DAYLIGHT PASSING THROUGH SUNSHADING DEVICES | J. Mardaljevic |
| TC3-56 | ASSESSMENT OF DISCOMFORT GLARE FROM DAYLIGHT IN BUILDINGS | - |
| JTC 04 (D3/D6) | VISUAL, HEALTH, AND ENVIRONMENTAL BENEFITS OF WINDOWS IN BUILDINGS DURING DAYLIGHT HOURS | J. Mardaljevic, L. Price |
| JTC 06 (CIE- ISO) | ENERGY PERFORMANCE OF LIGHTING IN BUILDINGS - ISO | |
| TC3-55 | DISCOMFORT CAUSED BY GLARE FROM LUMINAIRES- WITH A NON-UNIFORM SOURCE LUMINANCE | |

Active Reporters

| | |
|--------|---|
| DR3-29 | Variable transmission glazing (VTG): Current trends and future prospects for uptake by the building sector (J. Mardaljevic) - ongoing |
| DR3-31 | Available Daylight Metrics (J. Mardaljevic) - ongoing |

John Mardaljevic

UK Representative CIE Division 3

CIE Division 4: Transportation and Exterior Applications

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:

The CIE 'Smart Lighting for Better Life' conference was held at Ramada Plaza Hotel, in Jeju 20-28th October 2017, which was followed 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.

Conference Review:

There were at least 50 papers on lighting with a few GB presentations during the conference. Steve Fotios had a couple of papers but the road lighting papers were only around 10

Conference numbers were again less than expected with some 200 delegates from around the globe.

Division 4 Report:

Technical Committees:

The following TCs met in Jeju, Korea at the Ramada Plaza hotel, and 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 Berlin 24/25 May 18

TC4-50 Road Surface Reflection Giuseppe Rossi

The question of road reflection characteristics has been in development for a considerable time with a workshop being held as part of the Jeju meeting and this is leading to a small rewrite of the current draft report. It now looks like it could be ready for publication in 2019

Next meeting at Berlin 24/25 May 18

TC 4-51: Optimization of Road Lighting Pål Larsen

This committee has moved slowly since the last meeting and is still awaiting research from around the globe to be able to complete. An annex will include practical advice and options.

Next meeting Webex 17th February 18 and at Berlin 24/25 May 18

TC4-52 Lighting for Pedestrians - new empirical data Steve Fotios

Steve Fotios is the chair and the driving force behind this committee and his own and linked research is progressing well. A final draft should be available next summer and publication ready for Quadrennial meeting in June 2019

Next meeting at Berlin 24/25 May 18

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. The existing report contains a complex formula, but doesn't consider the latest vehicle technology. Further research will be done to update this information. Final draft due end of 2019

Next meeting at Berlin 24/25 May 18

JTC 11 ISO 274 Maintenance Factors Nigel Parry

This was the third meeting of the joint CIE/ISO committee and following comments from the committee will move to the standards voting stage early next year with a view to publication in mid-2018. The committee is set to produce a standard through ISO and is based on existing CIE reports for indoor and outdoor lighting. (CIE 97 and 154)

Next meeting at 5/6 March 18 in Milan

JTC 12 Depreciation Maintenance of Lighting Systems Dionyz Gasparovsky

This is a brand-new committee and is set to deliver a report in 4 years. It will review all the current inputs and in view of LED technology look at new metrics and parameters more pertinent to the technology. It will be a Technical Report and the Terms for Reference were agreed.

The committee is looking at a new factor for accounting for distortion of luminous intensity from say dirt build up.

Next meetings will be Webex in February, and meeting in Taipei in April and/or Berlin in May 2018

Division 4 Meeting:

Dionyz (DG) introduced himself as the new Divisional chair and formally opened the meeting and noted apologies.

As a new combined division Dionyz noted the Div. 4 and Div. 5 minutes of previous meetings as agreed and introduced the new DMT. These being the new Associate Directors: Steve Fotios (Fundamentals in outdoor lighting), Raoul Lorphevre (Lighting and signalling for transportation) and Sermin Onaygil (Exterior Applications), with Maurice Donners staying on as Secretary and Nigel Parry remaining as Editor.

DG outlined regular DMT meetings and his aim is to improve the efficiency of TCs, with education to be more transparent and increase the use of the Coll Tool.

He noted that if working on a TC then they should be a member of the NC, but this is optional depending on each countries requirement.

DG introduced the new Joint Research Forum, which will probably be shortened to RF

The Divisional Editors are to receive an agreed job role and new Division members will in future receive a 'Welcome Pack'

The CIE website is being given a facelift

As part of the divisions merger an NC can only have one Divisional member with voting rights but can appoint alternative divisional members (ADM)

Future Division 4 meetings

The next meeting of will take place in Berlin, although it is possible some TC's will meet in Teipei in April.

2018: Berlin in May

2019: June - Quadrennial (USA Washington DC)

Nigel Parry

UK Representative - CIE Division 4

Nov 2017

Current 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) |

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 26th October 2017 in conjunction with the CIE 2017 Midterm Meeting and Conference, Juju Island, Republic of Korea. 16 people attended: the UK was represented by John O'Hagan, Luke Price, and Ann Webb.
- During the year, the following was published:
219:2016 Maintaining Summer Levels of 25(OH)D during Winter by Minimal Exposure to Sunbeds: Requirements and Weighing the Advantages and Disadvantages
- The next annual meeting is intended to take place by WebEx.

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)

Jan Wienold was in the process of trying to resurrect the JTC, which aims initially to produce two or three Technical Notes, and had already received material from a number of different members.

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. It was hoped that the standard will be published towards the end of 2018.

JTC-9 Quantifying ocular radiation input for non-visual photoreceptor stimulation (Luc Schlangen)

The first draft was out for voting amongst the JTC members, which should be complete in mid-November 2017. The standard will provide for five separate action spectra relating to non-visual effects, for melanopsin photoreception and four of which were consistent with existing CIE visual standards for rods and cones. The BA had agreed that JTC-9 could apply for a fast-track route to publication.

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.

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

This report is nearing completion.

John O'Hagan
UK Representative CIE Division 6
Director, Division 6

23 January 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 2016 – September 2017 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.

A technique report (CIE 223:2017, Multispectral Images Format) recommended by TC 8-07 has been published in Feb 2017 and the TC is automatically closed.

Three new TCs (TC 8-16, TC 8-17 and JTC 10) was proposed and approved to establish in Feb 2017. A new reporter ship R 8-17 was proposed and approved.

Status of Technical Committees

| | |
|--|--|
| TC8-07 Multispectral imaging | Closed |
| TR had been published in February 2017, so the TC has been automatically closed. A new research forum proposal about "Spectral imaging"; | |
| 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 | Active- face to face TC meeting in Sep |
| TC8-17: Methods for Evaluating Colour Difference between 3D Colour Objects | Active- face to face TC meeting in October |

| | |
|--|--------|
| JTC 10: A new colour appearance model for colour management systems: | Active |
| TC report is in preparation | |

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 HighDynamic Range Images | Active |

Next meeting will be in conjunction with 26th Color and Imaging Conference next November in USA.

Report presented by:

[Dr Kaida Xiao](#)

UK Representative CIE Division 8

[22/10/2017](#)

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 2017

Officers and Trustees

| | |
|--------------------|--|
| Chair | Teresa Goodman |
| Vice Chair | John O'Hagan |
| Honorary Secretary | Peter Raynham |
| Honorary Treasurer | Nigel Parry Peter Clarke Nigel Pollard |

Secretariat

| | |
|---------------------|--|
| Executive Secretary | Allan Howard 4 Symonds Green Road, Stevenage, Herts SG1 2HA |
|---------------------|--|

Sponsoring Organisations

| | |
|---------------------------------------|---|
| Institution of Lighting Professionals | Stuart Bulmer 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 |

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.

CIE-UK 1975 Fund
Personal Report of CIE Mid-term meeting, Jeju Island, South Korea
October 20-28th, 2017

The CIE Mid-term meeting, 2017 was held on Jeju Island, South Korea. It was my last CIE event with any Presidential commitments and I thank CIE-UK and the 1975 fund for their support of my attendance.

As the Past President my first role (20/10/17) was personnel related, joining the President (Yoshi Ohno) for a P&DR with the General Secretary (Kathy Nield). This also involved some discussion of the search for a new Office Manager for Central Bureau as Leo Trausnith is moving on.

The Saturday 21st and Sunday 22nd October saw attendance at day-long meetings for first the Board of Administration and then the General Assembly. At the latter the new President Elect, Peter Blattner (METAS, Switzerland and currently DD2) was voted into office by the GA. The meeting ended with the introduction of Dionyz Gasparovsky as the Director of the new Division 4: Transportation and Exterior Applications, and a celebration of the new Division. The BA had tasked me, as Past President, with exploring the amalgamation of the previous Divisions 4 and 5, and the celebrations for the new Division 4 were a suitable culmination of that task. The baton of Presidential support passed from the Past President to the President Elect at the Conference Dinner on Tuesday evening (24/10/17).

The conference part of the meeting was held from 23rd -25th October. For me, most of the highlights were on the 25th with a plenary talk from Jennifer Veitch on achieving good lighting, then a session on Lighting and Health in which I presented and where my favourite paper was that by Martine Knoop who showed a novel way of illustrating the spatial and spectral distribution of daylight/lighting reaching the eye. After lunch I attended sessions on Eye-related metrology and Lighting and health in interior lighting. The afternoon ended with an excellent workshop on Research Methods run by Jennifer Veitch with the assistance of Steve Fotios and Kevin Houser. By reference to a seminal and historical work they showed how not to present lighting research, and detailed what is required of good research and reporting by today's standards.

The latter part of the week was dedicated to Division and TC meetings. I completed my TCC role in 2016 with the publication of TC report 219:2016 'Maintaining Summer Levels of 25(OH)D during Winter by Minimal Exposure to Sunbeds: Requirements and Weighing the Advantages and Disadvantages' so only had commitments to D6, which meeting was held early on the morning of 26/10. I managed to attend much of the meeting before having to leave for the airport. In my absence (although previously discussed with DD6) the Division agreed that a new TC should be opened to consider the standardisation of the action spectrum for previtamin D₃ synthesis in TC Report 174:2006, and I was nominated as TCC. A call will follow for TC members although several have already been suggested.

Congratulations to the local organisers for a very well run and carefully scheduled event. They even considered the well-being of participants with early morning walks, pre-conference, to local places of interest, and a very well attended evening walk to a lighthouse along the coast from the conference venue. There the UK's Alwyn Williams was put on the spot and provided an impromptu explanation of all things lighthouse.

Report on the CIE 2017 Midterm Meeting and Conference, Jeju Island, South Korea

20-28 October 2017

John O'Hagan

20 October 2017

CIE Division Directors Meeting

This was the fourth meeting of Division Directors for 2017. Dionyz Gasparovsky was welcomed as the Director of the new Division 4 "Transportation and Exterior Applications" with the following terms of reference: To study and prepare guides for the design of exterior lighting and light signalling. The old Divisions 4 and 5 have been concluded.

A CIE Standardisation Strategy was presented by Ad de Visser, Vice-President Standards. Key to this is ensuring that CIE remains responsible for the development and maintenance of fundamental standards, whilst application standards are the responsibility of ISO and IEC. Once CIE decides to develop a standard, ISO or IEC will be given the opportunity to collaborate. If they do not wish to, the work will be carried out in CIE alone.

A joint advisory group (with ISO) will have DD3 and DD4 as permanent members. DD1, DD2, DD6 and DD8 will be members for specific topics.

DDs were asked to consider whether any existing Technical Reports were now ready to be converted to Standards.

CIE members who were able to, were encouraged to engage with the national standardisation bodies which shadow ISO and IEC (both are BSI in the UK).

The Strategy should be completed by March 2018.

It was recognised that an increasing amount of CIE work is cross-divisional. Therefore, there needs to be a mechanism for joint Research Fora. This would need a change to the Code of Procedure.

The work of JTC8 in developing the next edition of the International Lighting Vocabulary was nearing completion. It was hoped to have a parallel publication (CIE and IEC) by the end of 2018.

21 October 2017

Board of Administration

The ISO/CIE Partner Standards Development Organization (PSDO) Agreement was discussed. This is near finalisation and lays down how ISO and CIE will work together. This document will replace the current Memorandum of Understanding. One item of concern was how the CIE logo will be retained with triple logo standards, for example when the EN (or BS EN) version is published. The PSDO is supported by an Implementation Guide.

A new JTC (Divisions 3 and 4) was approved: Depreciation and Maintenance of Lighting Systems.

A shortened approval process for JTC9 (CIE System for Metrology of IPRGC Influenced Light Response) will be drafted by Vice-President Standards.

A shortened approval process for JTC11 (Light and Lighting – Maintenance factor – Way of working) was approved.

Vice-President Publications presented a report on the sales of publications. There were a few publications that sold very well.

Vice-President Technical presented the suggested outline for the next Quadrennial Session in Washington DC. The Conference was likely to be 17-19 June 2019, with business meetings and TC/Division meetings either side.

The Treasurer presented his report.

22 October 2017

General Assembly

I attended the General Assembly at the alternate UK delegate: Teresa Goodman, the UK delegate attended as the CIE Secretary. 25 of the 38 NCs were represented.

The meeting started with a commemoration of colleagues who had passed away since the last meeting:

Professor Cornell Bianchi (1932-2017), Honorary President, CIE NC of Romania

Hans Allan Löfburg (1938-2017), President, CIE, 1999-2003; Vice-President Technical, 1991-1999.

Reports were presented by the President, Vice-Presidents Technical, Publications and Standard, by the Treasurer and the General Secretary.

There were no awards to GB NC members, but Peter Zwick, the Technical Manager of CIE received an award, which was a complete surprise to him.

Peter Blattner, currently DD2, was approved unanimously as CIE President Elect, 2017 to 2019.

There was some discussion about NC communications. Australia suggested brochures: one an overview and another more detailed one explaining the structure of CIE. A number of NCs supported the use of video.

23 October 2017

Conference Opening Ceremony

Seungnam Park welcomed attendees to the Conference on behalf of the local organising committee and CIE President, Yoshi Ohno, formally opened the Conference.

Two invited papers followed. The first was by Seoyoung Choi (Korean Institute of Lighting Technology) on Contents Development for Office Smart Lights. He raised a number of differences

between Korean and Western populations, which included the preference for higher colour temperatures in Korea – 6000K vs 3000K – and the lighting in different indoor environments. The only common factor seemed to be for relaxation in a lounge, where both populations preferred 100 lux at 2700K.

Robert Hirschler (Technical University of Budapest) presented an Overview of AIC Activities and Plans for the Future. The Association Internationale de la Couleur (AIC) had met the previous week in another part of Jeju Island. He presented a history of the organisation. A summary of the history and all proceedings are available on the AIC website: <http://www.aic-color.org/index.htm>. CIE Vice-President Publications, Ronnier Luo, received the AIC Judd Award for 2017.

Session OS3 – Glare

There were five papers in this session.

Ronnier Luo started the session with “Generic Glare Models for Predicting Non-Uniform and Coloured Led Sources”. Three experiments were carried out to accumulate glare perception data from luminaires having different uniformities and spectral power distributions. Two generic glare models were developed to fit the visual data in Experiments 1 and 2. Their performance was also tested using Experiment 3 data. They outperformed the UGR and the other state of the art models.

Clotilde Pierson presented “Discomfort Glare from Daylighting: Influence of Culture on Discomfort Glare Perception”. A field study was conducted in Chile and Belgium, for which a total of 288 measures of the lighting environments and subjective glare assessments were collected. Statistical analyses of the Belgian and Chilean datasets showed that Chileans perceive discomfort glare differently than Belgians. It is therefore hypothesised that existing discomfort glare indices might not be suited for Chilean subjects accustomed to a different type of lighting environment.

Yukio Akashi’s paper was “Ageing Effects on Discomfort Glare Sensation and their Mechanisms”. This study analyzed the relationship between each of the visual characteristics and Borderline between Comfort and Discomfort (BCD) luminance. The results of the analyses suggested that for the small glare source people who have clearer lenses and larger pupils, and therefore higher retinal illuminance values tend to have lower BCD luminance values. On the other hand, for the larger glare source, people who have larger effective (clear) lens areas seem to have higher BCD luminance values. However, people with very small effective lens areas seem to also have high BCD luminance values.

Jan Wienold stood in for the next slot with “Comparison of Luminance-Based Metrics in Different Lighting Conditions”. Several studies have shown that UGR does not represent daylight glare very well. He was undertaking luminance maps using calibrated cameras.

Toshie Iwata presented “Effects of Task and Views on Discomfort Glare from Windows”. The purpose of this study is to identify the effects of the type of task, the direction of view from the observer to the window, and the view through the window on discomfort glare evaluation. The effect of the angle between the line of sight and the window pane on Glare Sensation Vote (GSV) was not found. Although the artificial window experiment suggested the computer task resulted in significantly higher GSV than the paper task, when the line of sight of the worker was perpendicular to the

window pane, the real window experiment showed no significant difference. It was found that the view through the windows had the possibility to relieve discomfort caused by glare from windows.

Workshop 3 – Discomfort Glare Evaluation for Daylight and Artificial Light

This workshop covered a lot of the material already presented in oral session OS3. Reference was made to the work of Technical Committee 3-56: Assessment of Discomfort Glare from Daylight in Buildings and JTC7: Discomfort caused by glare from luminaires with a non-uniform source luminance. Issues raised included the variation of daylight throughout the day and season and whether the perception of what is acceptable has changed over the last 50 years.

24 October 2017

CIE Communications Discussion

An early morning meeting of a few BA members was convened to discuss how CIE should communicate. It was agreed that short video sequences could be posted on the CIE YouTube channel to feature significant issues, including new publications. Ideally, each video should have a common introducer – perhaps the General Secretary – followed by the relevant expert. It was proposed that for a new publication, this should ideally be the TC Chair, who would be asked why, who and what questions.

Invited Paper – plenary session

Hyeon-Jeong Suk presented a paper on “Experience of Coloured Light in Daily Life”. He had carried out psychophysical studies in a lab environment with different spectral power distributions: a total of 147 combinations of lighting. Most participants preferred lighting scenarios near the blackbody locus. After the lab experience, tuneable LEDs were trialled in a school with three pre-sets: easy, normal and focus. The level of the lighting could also be adjusted.

Session OS5 – Road Lighting

There were three papers in this session.

Stefan Källberg presented “Night-Time Visibility of Road Signs with Modern Headlamps”. They investigated whether modern vehicle light sources such as LED and HID influence the visibility of road signs compared to traditional halogen lamps, with focus on colour recognition and retroreflection. The results show that LED headlamps significantly affect the coefficient of retroreflection for blue, red and green signs, with lower retroreflection in the red and higher for blue and green. As for colour recognition it is shown that different viewing geometries will have a minor impact on the road sign face colour, while different types of headlamps will produce quite significant colour shifts. However, as the separation between different colours tend to stay the same or even increase with LED or HID compared to halogen lamps, the risk for misjudging nearby colours is considered small.

Steve Fotios gave a dynamic presentation on “Influence of Ambient Light Level on Pedestrian Activity and Accidents on Pedestrian Crossings”. A fundamental question for road lighting is whether changes in ambient light affect road users. This work concerned pedestrians, and used the daylight savings time (DST) clock change to determine whether ambient light influence travel choice (i.e.

whether to walk or not) and the risk of pedestrian involvement in a traffic collision whilst using a pedestrian crossing. Analysis of automated counters installed in a US city suggests that there is a significant increase in walking in daylight conditions relative to dark. Analysis of accidents at a pedestrian crossing using the UK STATS19 accident record suggests a significant increase in pedestrian accidents in dark relative to daylight. Using the DST transition means that these changes can be more confidently associated with changes in light than with changes in pedestrian or driver demographics or other variables.

“Colour Transitions in Road Lighting” was due to be presented by Maurice Donners, but was presented by someone else (Kays?). To test the effect of road lighting in a range of colours on visibility, the reaction time of subjects under several light colours was tested, after having adapted to one of the other light colours. The test was performed on a scale model road, equipped with LED lighting at two different light levels with observers looking through a slit. Reaction time depended on light level and light colour transition. Data suggest that the final colour determines performance, instead of the transition itself. Most colours used did not result in large performance decreases. Narrow band blue, with 16 % to 28 % of targets not seen, a doubling of brake reaction time and a 47 % increase in stopping distance, does not seem to be a suitable colour for lighting roads. Finally, for the majority of test subjects, there was no correlation between their subjective rating of visibility and their actual performance in terms of reaction time.

Session OS9 – Interior Environment and Lighting Design

There were three papers in this session.

Dong Hyun Kim presented “Light, Emotion and Interaction”. Five lighting designers were invited to devise two sets of lighting design concepts, referred to as ‘lively’ (pleasing and with high activation) and ‘relaxing’ (pleasing and with low activation). Then, a controlled experiment with a total fifteen light settings was set up, consisting of ten designers’ settings and an additional five settings (referred to as ‘miscellaneous’). The self-assessed emotions of 42 participants showed that changes in Correlated Colour Temperature (CCT) or illuminances did not have an impact on pleasantness level but only influenced subjective activation/sleepiness level. Five out of ten designers’ settings have resulted in the participants’ feeling to be either ‘lively’ or ‘relaxing’. The results suggest that illumination with a CCT range of 5,000K to 5,500K combined with accent lighting that were smartly controlled to shift its colour properties from saturated blue to cyan colour are associated with ‘lively’ feelings whereas a ‘relaxing’ emotion seems to be associated with non-dynamic luminous environments in a CCT range of 2,700K to 3,000K, provided by either a combination of a ceiling light and pendant lights with a globe-shaped lampshade, or a combination of a pendant lights with the shade, a table lamp and cove effects on a ceiling. It was also noticed that using table lamp solely for task lighting, combined with accent lighting providing a directional light pattern in the field of view resulting in a high degree of ‘relaxing’ emotion.

Matthieu Iodice’s paper was “An Experimental Protocol to Objectively Characterize Discomfort Glare Using Physiological Measurements”. Most studies about discomfort glare rely on psycho-visual experiments, where participants evaluate their own perception: ratings on semantic or numeric scales, adjustments of source luminance, pair comparisons, etc. But only few used physiological measurements to collect objective data. Investigations with physiological measurement devices can be divided in two categories: studying the relationship between discomfort and physiological data,

or using directly physiological data to qualify the discomfort provided by a visual scene. This study belonged to the first category. The aim of this study was to design an experimental physiological procedure and set-up which would conciliate controlled laboratory parameters and real lighting situations. In such conditions, the physiological measurements could give relevant information about practical lighting applications.

Tomoko Taniguchi presented "Study on Glare during Playing Badminton in Gymnasiums using LED and HID Floodlights". The purpose of this study was to model the physical lighting conditions associated with glare in gymnasiums. Subjective experiments were carried out in eight gymnasiums in Japan. The result of these subjective experiments showed that the larger the angle of the subject's line-of-sight from the horizontal plane, the larger the degree of glare from the floodlight and the lower the visibility of the shuttlecock in front of the floodlight. Using the degree of glare as a dependent variable and the candidate predictor variables as independent variables, a multiple regression analysis was carried out and the multiple correlation equation was obtained. This equation shows that increasing the reflectance of the ceiling can reduce the degree of the glare.

Johanna Enger presented "A Typology for Light Quality in Spatial Context". The study was conducted as a step in an interdisciplinary research project that aimed to develop definitions of quality of light based on the visual and emotional aspects of light experience. The purpose of the study was to develop a typology of lighting quality in spatial context based on knowledge of visual perception and practitioner's principles of qualitative lighting design. The study resulted in a systematic visualization of different combinations of light and colour which illustrated the effects on both the perceived contrast ratio and the experience of a light environment. The typology can be used as a tool for visual evaluation of light quality, both in research and practice to complement photometric measurements.

25 October 2017

Invited Papers – plenary session

Hirohisa Yaguchi opened the session with "CIE 2017 Colour Fidelity Index". Technical Report, developed by TC 1-90, is a research report describing a general colour fidelity index, R_f , as a scientifically accurate measure of colour fidelity with respect to a reference illuminant. The important improvements of this measure, relative to the current colour rendering index, are the update of the colour difference calculation, in particular the object colour space, and the incorporation of 99 test-colour samples which provide a more uniform distribution of slope and curvature values as a function of wavelength and which have colour appearance values that are more widely and uniformly distributed in the three dimensions of a uniform colour space. However, R_f is not a replacement of the general colour rendering index, R_a , neither for the purpose of rating and specification of products nor for regulatory or other minimum performance requirements. Relations of R_f to R_a and to luminous efficiency were also discussed.

Jennifer Veitch stood in for an invited speaker who pulled out close to the date of the Conference with a presentation "Achieving Good Lighting Quality with Integrative Lighting: Opportunities and Challenges. Jennifer referred to the importance of knowing the level of light actually reaching the eye, as compared with that arriving on a horizontal plane. Care is needed with the use of dynamic

lighting. Individuals will have to “own” their light exposure since individual preferences vary dramatically. There are many benefits in getting this right.

Session OS11 – Lighting and Health

I chaired this session, which contained five oral presentations.

Ann Webb opened the session with “Sunlight Exposure: Do we get enough and should we care?” Studies in Manchester considered the number of minutes per day people were outside, comparing weekdays with weekends. Cumulative solar UV doses received by adults were assessed using polysulphone dosimeters, supported by exposure diaries. South Asians tend to seek shade, whereas Caucasians seek sun, but both groups spent a similar amount of time outdoors. Weekend doses were similar to the total weekday doses. Adults tend to receive 2-3% of the total available ambient UV. Adolescents (13-15 year old) South Asian and Caucasians received similar doses during the week, but Caucasians received much higher doses at weekends. The range of 25(OH)D was massive. However, most individuals were adequate by the end of summer, except for the South Asians. This group tend to cover up, so need much more solar UV.

Yuki Akizuki presented on a “Preliminary Study on Spectral Characteristics for Identification of Skin Colour under Circulatory Dysfunction using Artificial Skin Samples”. To assist development of appropriate light sources to diagnose circulatory dysfunction conditions effectively based on the colour appearance of patient’s skin under emergency situation in disaster sites, a set of urethane skin model samples had been developed, which simulate visual characteristics of real human skin under different circulatory dysfunction conditions (shocked, healthy, and congested) for young female/male and elderly female/male. Their characteristics had been evaluated by calculation of samples’ colour differences under various light spectra compared to those of real skin. Visual evaluation experiments had been conducted using these samples to evaluate the distinction between different circulatory dysfunction conditions under the optimized light-emitting diode (LED) light spectra used in their previous study. The developed urethane samples were found better in closeness of colours to real skin than previously-used paper colour charts, but it needed further improvements in matching spectral reflectance characteristics. The experimental method directly comparing perceived colour differences of the samples under the LED lights and reference lights (broadband spectra) was found useful for such evaluation.

Pei-Jung Wu gave a paper on “The Influence of LED Lighting with Different Proportions of Blue-Light Wavelengths on Humans”. The physiological effect of working environments with different white-light LED lighting on humans was studied to find out the indoor lighting for keeping high work efficiency and reducing visual fatigue. The experimental lighting conditions contain 2 colour temperatures (4000K/6000K), 2 illuminations (400 lux/700 lux), and 3 dominant wavelengths of blue light (420nm/460nm/480nm). Reading and tasks were executed in the experimental process, in which the participants’ brainwave, heart rate variability, blinking rate, and critical flicker fusion threshold were measured. The results showed little influence on visual fatigue under the white-light LED source with low colour temperature and 460nm blue-light wavelength. Nevertheless, the LED source with high illumination, high colour temperature, and 420nm blue-light wavelength suggested improved concentration.

Martine Knoop presented “Characterisation of Daylight’s Spatial and Spectral Distribution to Assess its Impact on Human Beings”. Lighting to enhance alertness or sleep quality, to reduce desynchronisation of the circadian rhythm or to treat seasonal affective disorder is generally realised with electric lighting, even though daylight can be very effective in inducing these so called non-image forming (NIF) effects. Relevant characteristics of lighting conditions for NIF effects are the amount, the origin and the correlated colour temperature of the light, as well as duration and timing. Daylight offers high lighting levels during the day, a strong bluish component in its spectrum and an appropriate direction of the light due to the position of windows in a façade. Current daylight design uses metrics that are insufficient in showing the potential of daylight to induce NIF effects. This presentation showed a differentiated characterisation of daylight provision using spectral information of many sky patches and the quantification of daylight direction.

Falk Wieland’s paper was “Methods to Quantify the Effect of Light Exposure in Humans and their Practical Application.” By using artificial lighting for the investigation of medical research hypotheses there are new challenges for the evaluation of the data and the results obtained. In this presentation, the effect of light exposure was quantified by electroencephalography (EEG) data, heart rate, blood samples, pupillometry data and self-rated sleepiness. Pupillometry data was evaluated using the Pupillen Unruhe Index (PUI). Heart rate and heart rate variability (HRV) were analysed and melatonin concentration of the blood samples was shown. Since there is no agreed standard of EEG data evaluation, one approach on spectral analysis of the data was presented and remarks on using EEG to characterise the influence of light was given.

Workshop 6 – Temporal Light Artefacts in Automotive and General Lighting

This half-day workshop was organised by Automotive Lighting LED-IT Convergence Education and the Institute of Industrial Technology, both of Yeungnam University, Korea.

Conveners: Chan-Su Lee, KR; Tran Quoc Khanh, DE

Workshop Program

Introduction: lighting quality & temporal-light artefacts

13:30-13:35 Opening

13:35-14:10 (Invited Speaker) Human Centric Lighting - Peter Bodrogi (TU Darmstadt, DE)

14:10-14:30 (Invited Speaker) Temporal Light Modulation Effects on Cognitive Function and Health: Steps towards Greater Understanding - Jennifer A. Veitch, National Research Council of Canada, CA

Flicker & Stroboscopic effect

14:30-14:50 Investigation of spectral flicker and stroboscopic effects - Alexander Herzog (Darmstadt, DE)

14:50-15:10 Acceptability Criteria for the Stroboscopic Effect Visibility Measure - Dragan Sekulovski (Philips, NL)

15:10-15:30 The Link Between Percent Flicker and the Flicker Index Provides a Simple and Powerful Tool for Classifying Responses to Variable Light Sources - Luke Price (Public Health England, UK)

15:30-16:00 Coffee Break

Phantom array effect

16:00-16:40 (Invited Speaker) Human Visual Systems and Spatial Sensitivity - Arnold Wilkins (University of Essex, UK)

16:40-17:00 Phantom Array Effect on Automotive Lighting - Chan-Su Lee (Yeungnam University, KR)

Application & TLA effect to human

17:00-17:20 Effects of Non-Visual Optical Flicker in an Office with Two Different Light Sources - Maria Nilsson Tengelin (SP Technical Research Institute of Sweden, SE)

17:20-18:00 Panel discussion

26 October 2017

JTC8 – Terminology in Light and Lighting.

Peter Zwick gave an excellent presentation on the history of the ILV and its current revision. At a meeting in 2011 with IEC (which I also attended) it was agreed that the ILV and the IEC IEV (Section 845) will be harmonised.

Division 6 Annual Meeting

I chaired this meeting, which was attended by 16 individuals. Reports were received from TC Chairs and Reporters. A review will be carried out of D6 Technical Reports to see if any would benefit from conversion to standards. At the instigation of a Chinese group, a reportership will start on the potential impact of indoor lighting on myopia.

JTC5 – Review of IEC 62471/CIE S009

The draft of the text was reviewed and it is hoped to move to JTC voting in early 2018.

Annual Progress Report

JTC 1: Implementation of CIE 191:2010 Mesopic Photometry in Outdoor Lighting

TCC: S. Mucklejohn

TC Co-chair: T. Goodman

TCS: T. Uchida

Date: 2017.10.27

TC meetings

Since the last D4 meeting TC has met as follows:

| No. | Date | Place | Participants |
|-----|------------|----------------------|---|
| 10 | 2016.3.8 | Melbourne, Australia | 14 members (incl. 2 via WebEx) & 18 observers |
| 11 | 2017.1.9 | WebEx | 9 members |
| 12 | 2017.6.7 | WebEx | 7 members |
| 13 | 2017.9.27 | WebEx | 7 members |
| 14 | 2017.10.27 | Jeju, Korea | |

Changes in membership

During preparation for voting on DTN it became apparent that the official list of JTC 1 members held by CIE did not include several of the regular contributors. Thus, membership was reviewed and some missing contributors were added. The updated member list is attached to this report.

Current WD number/document version

- TR from WG1: Draft No.3
- TN from WG2: Drafting and approval process was finished. Published as CIE TN007:2017

Progress of work

CIE Technical Note 007 titled 'Interim Recommendation for Practical Application of the CIE System for Mesopic Photometry in Outdoor Lighting' was published 22 May 2017. The Technical Note repeatedly emphasizes that the recommendations must be regarded as interim and are subject to change depending on the findings and conclusion of the TR which is under development.

To prepare the TR WD, a literature survey is underway. It basically aims to collate the scientific evidence needed to reinforce, and refine where appropriate, the TN recommendations regarding the visual tasks where the mesopic photometry could be applied. Based on the TN contents and the literature survey, the TR structure has been outlined and was circulated to TC members after the 13th meeting.

Others

No other issues.

Report for CIE Mid-term meeting 2017

Introduction

The CIE Mid-term meeting was held on 20-28 October 2017 in the Ramada Plaza Jeju Hotel, Jeju, South Korea. As part of the meeting, a CIE Division 1 general meeting and various technical committee meetings were held on 26-28 October. 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 and TC 8-17.

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* and CIE TC 8-17 *Methods for evaluating colour difference between 3D colour objects*. I also attended the Technical Committee meeting of JTC 10 *A new colour appearance model for colour management systems: CIECAM16*, 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 224:2017 CIE 2017 Colour Fidelity Index for accurate scientific use) written by TC 1-90 *Colour Fidelity Index*, was published in 2017 and the TC has been automatically closed.
- A Technical Note (CIE TN 007:2017 Interim Recommendation for Practical Application of the CIE System for Mesopic Photometry in Outdoor Lighting), written by members of JTC 1 *Implementation of CIE 191:2010 Mesopic Photometry in Outdoor Lighting*, was published in 2017.
- A CIE Division 1 Research Forum, *Matters relating to specifying colour rendition of white-light sources* was established during the plenary Division 1 meeting. The function of this research forum is to facilitate ongoing knowledge exchange and research with the goal to develop a set of specification items that together provide a complete description of the colour rendition properties of white-light sources.

The next meeting will be in conjunction with CIE 2018 Smart Lighting Conference in April Taipei.

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. Most recent work has involved the measurement of skin colour before and after sports' activities and before and after intensive sun exposure for Chinese people. These data will be used to test current physical models for skin chromophore prediction. The life of the TC has been extended for another 2 years with the intent for the TC to submit a Technical Report during 2018.

3. Technical Committee meeting of CIE TC 8-17 *Methods for evaluating colour difference between 3D colour objects*.

This TC was established earlier in 2017 and this is first TC meeting. The TC intends to collect new colour-difference data using 3D objects, which will produced either by conventional technology or 3D printing technology. During the TC meeting, the current 3D colour printing technology and the colour perception difference between 2D and 3D objects were introduced. Professor Ronnier Luo from University of Zhejiang, China, gave a presentation to summarise the limitations of the current

CIE recommended colour-difference formula. Professor Pei-Li Sun from the National Taiwan University of Science and Technology, Taipei, Taiwan shared his work in 'Estimating Appearance Differences of 3D Objects with an RGB Camera'. Finally, a plan for colour 3D printing test objects and an experiment to investigate colour difference assessment were discussed.

What you go out of the event / activity attended

During this event, I attended the CIE mid-term conference, the CIE Division 1 general meeting and the TC 8-17 meeting, the TC 1-92 meeting and JTC 10 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

13 November 2017

University of Leeds

Event: CIE Mid Term Session, October 2017, South Korea.

Steve Fotios

The conference part was three full days of research presentations.

I gave two oral presentations during the conference:

Fotios S, Uttley J. Influence of ambient light level on pedestrian activity and accidents on pedestrian crossings. Proceedings CIE 2017 mid-term session on Smarter Lighting for Better Life. October 23 – 25, 2017, Jeju, South Korea. pp. 137-142. DOI 10.25039/x44.2017.OP20

A fundamental question for road lighting is whether changes in ambient light affect road users. This article concerns pedestrians, and uses the daylight savings time (DST) clock change to determine whether ambient light influence travel choice (i.e. whether to walk or not) and the risk of pedestrian involvement in a traffic collision whilst using a pedestrian crossing. Analysis of automated counters installed in a US city suggests that there is a significant increase in walking in daylight conditions relative to dark. Analysis of accidents at a pedestrian crossing using the UK STATS19 accident record suggests a significant increase in pedestrian accidents in dark relative to daylight. Using the DST transition means that these changes can be more confidently associated with changes in light than with changes in pedestrian or driver demographics or other variables.

Fotios S, Uttley J, Liachenko-Monteiro A, Mattoni B, Bisegna F. Field surveys of reassurance in two European cities using Boyce's day-dark approach. Proceedings CIE 2017 mid-term session on Smarter Lighting for Better Life. October 23 – 25, 2017, Jeju, South Korea. pp. 180-184. DOI 10.25039/x44.2017.OP26

This article describes two field studies carried out in parallel, in two European cities, to investigate the relationship between lighting and reassurance. Given that using only ratings of reassurance carried out only after dark tend to lead to the trivial result that more light is better, these studies used the day-dark approach proposed by Boyce et al. The results suggest that horizontal and cylindrical illuminance are highly correlated: we therefore use horizontal illuminance. For a difference along the day-dark scale of 0.5 units, with ratings captured using a 1-6 rating scale, these results suggest optimum illuminances of 7.0 lux and 10.0 lux.

Both papers contribute to TC4-52.

I was co-convenor (along with Jennifer Veitch and Kevin Houser) of a workshop session (WS7: *Judging the Scientific Quality of Applied Lighting Research*). 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. This workshop was a pre-cursor to the CIE 2018 Workshop and Tutorial on Research Methodology (Aalborg University, Copenhagen, Denmark, August 2018) for which I am co-organiser along with Ásta Logadóttir of SBI Denmark and an advisory committee of John Mardaljevic, Jennifer Veitch and Kevin Houser. This is the first ever CIE meeting to discuss methods rather than results. One reason I am co-organiser is that this will follow-up my previous work as chairman of TC1-80 (*Research Methods For Psychophysical Studies Of*

Brightness Judgements) which led to the publication CIE report 212:2014. Guidance Towards Best Practice In Psychophysical Procedures Used When Measuring Relative Spatial Brightness. Commission Internationale De L'Éclairage, Vienna, 2014. ISBN 978-3-902842-51-0.

I was chairman for one conference session (PS4).

I attended conference sessions (and workshops) on discomfort glare and brightness perception. One particular hot topic was measurement and prediction of discomfort glare. There was one oral session (OS3) devoted to this followed by a workshop (WS3). The papers were:

- OP11 Ming Ronnier Luo. Generic glare models for predicting nonuniform and coloured led sources
- OP12 Clotilde Pierson. Discomfort glare from daylighting: influence of culture on discomfort glare perception
- OP13 Yukio Akashi. Ageing effects on discomfort glare sensation and their mechanisms
- OP14 Tomoko Taniguchi. Study on glare during playing badminton in gymnasiums using led and hid floodlights
- OP15 Toshie Iwata. Effects of task and views on discomfort glare from windows

It is a hot topic because there is a need to develop a new model (or, validate an existing model) that accurately predicts discomfort in a range of conditions. Unfortunately the papers presented tended not to give sufficient attention to internal validation (such as null conditions) nor consider the influence of stimulus range bias, which means that any attempt at resolving the issue are unlikely to be a successful and permanent resolution.

The conference was followed by two days with scheduled meetings of Division and Technical Committees.

I attended the Division 4 meeting. This is the new Division 4 that represents all considerations of outdoor lighting by merging the former Divisions 4 (Lighting and Signalling for Transport) and 5 (Exterior Lighting and Other Applications). This work of this division is critical for outdoor lighting because many national standards (including those within the EU) tend to adopt its recommendations.

This meeting was chaired by the new director, Dionyz Gasparovsky, with one task being to gain approval for a new management team. My nomination as associate director of D4 for fundamental issues was unanimous and has been sent to the CB for approval. For the bulk of the meeting we largely discussed formalities of TC progress to ensure that established committees do reach an appropriate outcome.

I led one TC meeting, TC4-52 (*Lighting for pedestrians: New empirical data*) to present progress to date. This is the completion of the first drafts of three sections of the report, and the plan to complete the remaining sections by summer 2018. Each section focuses on a specific visual need (e.g. obstacle detection, interpersonal judgements, reassurance, visibility of pedestrians etc) to address four points:

1. Is it important?
2. Data available

3. Tentative proposal of lighting quality
4. What further research is required?

I intended to lead a meeting of the research group on Lighting for Cyclists but did not do so because (1) it was not scheduled on the timetable, and (2) there were insufficient people in attendance to make it worthwhile - in particular, Maurice Donners was not able to attend. I attended TC4.33 discomfort glare, TC4-51 optimisation of road lighting, TC4-50 road surface reflectance and JTC-1 application of the mesopic system.

Outcomes

- *Where your aims achieved?*

My aims were to present two oral papers to disseminate the findings of research carried out at Sheffield university: to show progress in the technical report (from TC4-52) that will lead to these findings being placed in design guidance; to encourage better methods when conducting research (WS7), and to meet with researchers working on similar topics. I achieved personal success in all of these aims.

- *What learning did you gain?*

After one set of presentations my question to the authors was "why should I believe these results?" with the expected response being mention of control conditions, randomisation, and multiple methods. The responses I received were somewhat disappointing. The learning I gained was that there is a serious need for the workshop (WS7) and workshop/tutorial (Copenhagen 2018) on research methods.

- Overall evaluation of event

It was a worthwhile event to attend because there was a reasonable turnout. It would have been better if located in Seoul rather than Jeju Island so that attendees could have reduced their carbon emission due to travel by the need for an internal flight.

Report for CIE Division 8 general meeting

Introduction

A CIE Division 8 general meeting was held in 13 September 2017 in the Scandic Lillehammer Hotel, Lillehammer, Norway, as part of the 25th IS&T/ SID Color and Imaging Conference 2017. 34 people attended the Division meeting (8 via the internet) including eight Country Representatives, six Technical Committee Chairmen and one Reporter. This report has been prepared by Dr Kaida Xiao, from the School of Design at the University of Leeds, UK.



Attendance

I attended the CIE Division 8 general meeting as the CIE national representative for Great Britain and also as Technical Committee Chair for CIE TC8-17 *Methods for evaluating colour difference between 3D colour objects*. I also attended the Technical Committee meeting of TC8-16 *Consistency of colour reproduction within a single reproduction medium*, hosted on 11 September 2017.

Key activities

During the general D8 meeting, current progress and the next work plan for each technical committee were discussed. Highlights included:

- A Technical Report (CIE 223:2017, Multispectral Image Format) written by TC 8-07 *Multispectral imaging* has been published in February 2017 and the TC has been automatically closed.
- Three new TCs (TC8-16, TC8-17 and JTC10) were proposed and approved for establishment in February 2017. A new reportership R8-17 was also proposed and approved.

Status of Technical Committees

| | |
|---|---|
| TC8-07 Multispectral imaging | Closed – A TR had been published in February 2017 and the TC has been automatically closed. A new research forum proposal about “Spectral imaging” is being considered. |
| TC8-12 Image and video compression assessment | Active – A Committee Draft TR has been submitted to the Central Bureau |
| 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 in preparation |
| TC 8-16 Consistency of colour reproduction within a single reproduction medium | Active – face-to-face TC meeting in September 2017 |
| TC8-17: Methods for Evaluating Colour Difference between 3D Colour Objects | Active – face-to-face TC meeting in October 2017 |
| JTC 10: A new colour appearance model for colour management systems: CIECAM16 | Active – TC report is in preparation |

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 |

The next meeting will be in conjunction with 26th Color and Imaging Conference in November 2018 in the USA.

What you go out of the event / activity attended

During this event, I not only attended the Division 8 general meeting and the TC 8-16 meeting, but also had many discussions with other Division members. For example, I had an informal meeting for TC 8-17 members, between myself (TC Chairman) and a number of TC members (Dr Peter Morvic, Dr Ester Perales and Mr Yoav Bressler) to consider our working plans. I also had a meeting with Dr Noel Richard and Prof Christine Fernandez to discuss a new experimental plan for spatio-chromatic complexity assessment (TC 8-14) and it has been agreed the experiments for this work will be conducted at the University of Leeds next year.

It is my great honour to attend the CIE Division 8 general meeting as the national representative of Great Britain and I thank CIE-UK for their financial support.

Dr Kaida Xiao
13 November 2017
University of Leeds