

GLASGOW COLOUR STUDIES GROUP

Notes following the Twenty-Sixth Meeting, 22nd April 2015

The twenty-sixth meeting of the GCSG took place in Room 1, English Language, University of Glasgow. Thanks are due to Carole Biggam who organized the meeting, to Christian Kay who designed the poster, to Carole Hough who introduced the speaker, and to Christian Kay and Carole Hough who organized the refreshments.

Our speaker was Emma Armstrong, Stage Technician, Renfrewshire Arts and Museums.

Emma Armstrong spoke on 'Lighting Up Shakespeare: The Metamerism of Jacobean Stage Lighting Using Modern LED Technology'

Her abstract is as follows:

This project delves into the history of stage lighting focussing on candlelight, and analyzing colour, intensity, flicker and ambience. The aim of the project is to match these effects using modern lighting methods. Can candlelight be artificially recreated?

Commentary (by Carole Biggam; checked by Emma Armstrong)

Emma began by giving the dictionary definition of *metamer*: 'A stimulus that is physically different from another stimulus but evokes the same perceptual response; *esp.* each of two or more colours with different spectral properties that are perceived by an observer as being indistinguishable' (*Oxford English Dictionary* online, *metamer*, n.¹ sense 2). Emma also explained that she uses the term *Jacobean* as shorthand for the Tudor and early Stuart periods.

Some modern productions of Shakespearean and later plays aim to reproduce the effect of a candlelit stage and theatre but, of course, the use of real candles would create a serious safety problem, so the need arose to create a metamer. Emma researched a method to recreate the 'warm', gentle light of candles, including a flicker effect which would react to the events on-stage, for example, in a fight scene, the flickering should increase.

In the sixteenth and seventeenth centuries, tallow candles were used for lighting. They consisted of animal fat with a rush or hessian wick, and they created an unpleasant smell and lots of smoke, especially those made of lower quality tallow. Illustrations from the time show chandeliers of tallow candles hanging above the audience, and a row of candles, each with a backward reflector, along the front of the stage. It was essential to trim these candles regularly, no matter what was happening on stage, and this was achieved by a man called a *snuffer*, who crawled along the front of the stage during the performance. The audience itself was quite well-lit by the chandeliers as they were often a part of the play but hot fat would have dripped at times onto the people below, hence many of them can be seen wearing hats during the performance.

Emma also had to consider prop lighting such as lanterns for actors to carry, and cressets, metal 'baskets' filled with a mixture of tallow and rush, set alight, and mounted on a pole or on a wall. Emma designed appropriate versions of lanterns and cressets for her LED technology.

When considering modern alternatives, Emma experimented with tungsten lighting, as in older light-bulbs but the colour changes as this form of lighting grows dim, and the use of lighting gels does not solve the problem entirely. LED lighting is different in that the colour does not change. Furthermore, it is cool and uses only a low wattage, but LED lights are monochromatic. Emma conducted experiments with a spectro-radiometer of both RGB (red, green and blue) and OWG (orange, white and green) and, when tested with the standard white tile, the tri-stimulus values were matched. The same tests were done with different colour backgrounds, which would obviously be relevant to the colours of the actors' costumes. In conclusion, she chose RGB for the main stage lighting, and OWG for the lanterns and cressets, but neither LED has exactly the same spectrum as that of tallow-candle light. Each tallow candle should produce 10 lux, although they fade over time.

Emma also conducted experiments with informants. One experiment involved viewing a tungsten light, dimmed to match the intensity of candlelight, and a tallow candle against a white background. Participants were given seven lighting filters to place in front of the light bulb, and then had to say which one was the closest match to the candlelight. The same experiment was then conducted with a white mask to create shadow. Unfortunately, only one person chose the same match each time. Emma then carried out some colour matching experiments with tallow candles, and OWG LEDs which could be adjusted using 8-bit control. Participants were asked to adjust the LEDs until they felt a match had been achieved. After converting the results to percentages, she found that the results were very scattered across the graph. The same happened with RGB LEDs. There was no time delay involved, and no pattern attributable to the age, gender or technical knowledge of the subjects, so the conclusion was reached that colour matching is difficult for most people.

Emma used the results of her investigations at the 'Shakespeare at Hope' festival at Liverpool Hope University in 2009. She used 6x Pulsar Chromaflood 200 LEDs, with the units fixed above the stage like chandeliers. There was a warm lighting effect as with candlelight. The lanterns and cressets used had OWG LEDs with flicker, the lanterns using a silicon 'flame', and the cressets containing polythene 'flames'. It was interesting to hear from the audience that they felt warm in this light although the LEDs were actually not producing heat.

News

If you have suggestions for, or offers of GCSG meetings (any format) for the 2015-16 programme, please contact Carole Biggam at c.p.biggam@btinternet.com Please note that we attempt to produce a balanced programme (i.e. different disciplines) and do not necessarily accept talks in the order in which they are offered. Nonetheless, all offers are most welcome and will be acknowledged and recorded.

Please report any colour-related news on our discussion list at ColourStudies@jiscmail.ac.uk Do feel free to ask the membership any colour questions or to begin a discussion on a particular topic.