

Contemporary trends in lighting design

by Paul Pamboukian, Pamboukian lightdesign

What are the contemporary trends in lighting? Essentially – and I've been involved in lighting for the past 25 to 30 years – not much has changed in terms of lighting design; Richard Kelly's principles remain. So what is contemporary about lighting design other than the technology?

Our industry is young and in its hundred and thirty odd years there have been relatively few sources available, barring the incandescent lamp, which was the prime source for much of that time. Then the solid state revolution arrived. Like a whirlwind, it has taken over all lighting technology and, within a few years, we find that all those wonderful light sources, particularly incandescent lighting, have been swept away or are in the process of becoming redundant.

LED has changed our lives. In some ways for the better; flexibility, control and all those wonderful things. However, we are still to understand more about what it does for, or to, our health. For me, the most contemporary trend in lighting is how human beings relate to light, and the subject is topical, largely because of LED.

We take light for granted. Few of us consider that light is invisible or that, as a mysterious visitor from the cosmos, it should be spoken about with reverence. We know the effect of light and how it affects us. As practitioners, we tend to forget the lofty elements of light. How magical it is, the

immediate effect on our moods it has in the way we respond to a dark overcast morning, a brilliant sunset, a bright sunny day, the dramatic sunrise, a wintry blue Norwegian or Scandinavian feel – those long blue hours which are incredibly beautiful.

As lighting practitioners we tend to be involved with the technology of light, which of course is a means to an end. But we often forget that the end is applying light for people and for biological life. So I will concentrate on this aspect of sensing light and how we relate to it. Lighting inspires us, it inspires attention, but it also wakes us up and gets us feeling, 'this is fantastic!'

Isn't this what we should be doing with our projects, our interiors and exteriors? Has modern life numbed our senses? We wouldn't go to a restaurant and eat a meal that is inedible, and we'd send back corked wine. Yet, we tolerate interior and exterior spaces where the lighting is intolerable, even though we appreciate and are inspired by daylight.

Does utilitarian lighting have to mean ugly light? Why do we have ugly light when we can have pleasant light? There is a history involved in this. There is a norm that external lighting doesn't have to be of the same quality as internal lighting.

Pamboukian lightdesign was approached to look at the lighting at Biel Station in Switzerland. It had been renovated two years before but, according to public feedback, was only 80% approved or

acceptable, so the railway authorities thought more action was needed. There was nothing really wrong with the station square, but they were worried about security, safety and the general atmosphere of the station, which was not a great space.

The external lighting of the neo-classical station building was dull so we added light, picking out the station from the square so that on approach it felt more like an urban space, with more intimacy. We added light to the façade, lifting the architecture and encompassing the square with human scale light columns to close off the space. In the dreary big main hall we created an up-down solution to light up the ceiling, which is beautiful, lit the barrel vault, and introduced some down lighting to lift the floor.

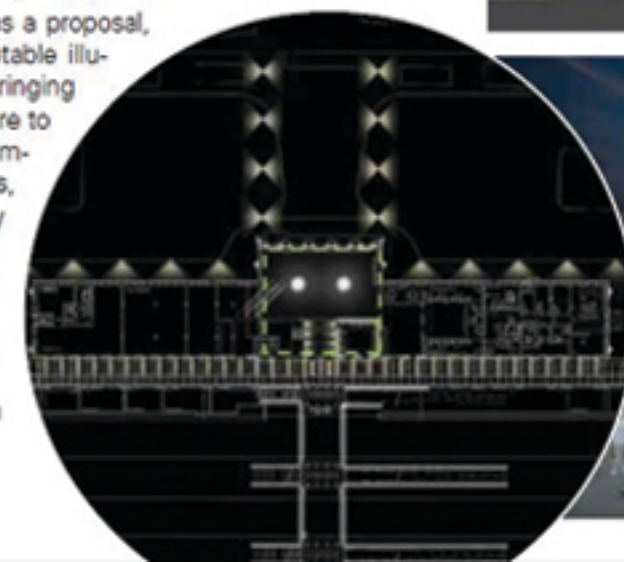
The waiting room had a beautiful mural, but was dead. We lit up the walls to bring reflected light into the space and lighten it up. The concourse was also dull so we lit the columns and did some work on the façades, introducing red lines (same as the SBB red) in the ceiling. In the concourse they had rather nice downlights, low glare and locally manufactured. We animated the space by adding strip light along the glazing to brighten it up and humanise the space.

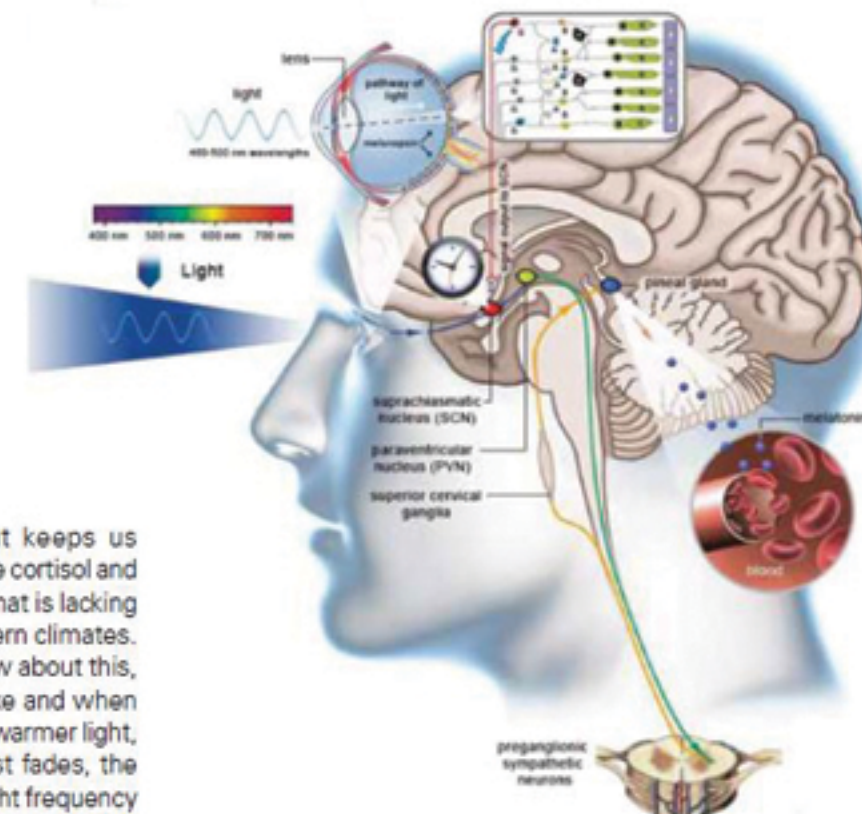
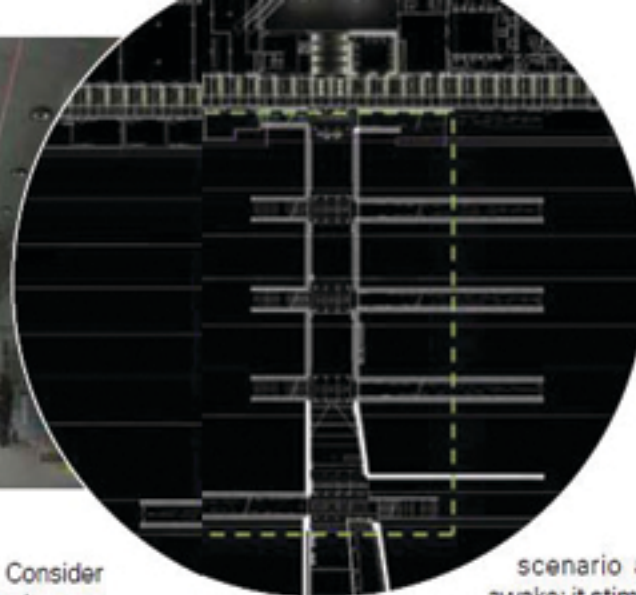
There were dropped ceilings at the platform accesses which we used as a basis for our intervention. We gave the authorities the option of having a time related colour change, so that during night and day they could have different colours. In the night time scenario, the light shifts towards the warmer tones and during the day the light is cooler. On the accesses to the platforms we added light into the hand rails to lift the spaces.

In the junction of the underpass, which is particularly dead at night, we clad the columns in glass and created ambient light sources. These serve as a visual cue down the axis so commuters see the glowing elements. We simplified the wedges of light on the walls of the intersection space with an upright component.

In essence, it was a proposal, in a perfectly acceptable illuminated space, of bringing light that related more to the people who commute on a daily basis, at all times of the day – from early in the morning to late at night. The idea was to keep the light moving all the time.

In 1973, Dr John





Ott wrote a book called *Light and Health*. A banker and part-time stop frame animator, Ott did all the live stop-frame animation for the Disney movies, including *Living Desert*, in which he showed flowers opening in slow motion. Working with plants in a hot house, he would have to wait a whole season before he could start filming them. He would set up his equipment, be at the ready, and the plants wouldn't flower. He discovered it was to do with light and began experimenting with short-wave ultra-violet and infra-red light. He got incredible results. This was in the 1950s when health and light started becoming a topic to be explored. It had to do with an understanding of how daylight affected us, how it set our clock, how we related this to artificial lighting and what artificial lighting was doing to us.

I had read the book and had an idea of circadian lighting when we illuminated Biel Station. Then I went to visit the Lighting Research Centre at Rensselaer Polytechnic Institute in Troy, up-state New York. The researchers there investigate the effects of health and light covering many, many subjects. Circadian lighting and the circadian clock have become the mainstay of their research. One of their projects was to develop the dynamic circadian light for the Boeing 777 Dreamliner – the constantly changing warm to blue light in the aircraft helps to reset travellers' circadian clocks during inter-continental travel.

As designers working in this field, how do we question our responses to light? At the start of any

conversation on light there is natural light. Consider sunset, where does the term 'happy hour' come from? Interestingly, it is the light as we go from a predominantly blue-spectrum daylight into the warmer tones of the evening when light levels drop. The warm light is the trigger for the development of melatonin, the feel good sleepy hormone that brings us down and makes us tired. Happy hour is exactly that, we feel relaxed, we feel like a drink. We are happy.

Why is candle light romantic? Why is fire light so entrancing? The predominantly warm spectrum of fire light brings us into a more meditative state which is why people talk and tell stories around a campfire and the wonderful thing about candle light as we all know is that it is romantic, we feel good, we say things we wouldn't normally say in daylight. We are not the same people at night. Lighting people know this. It is fantastic chatting to like-minded people, but we normally speak to people who are adding up a sub-total whilst we're talking.

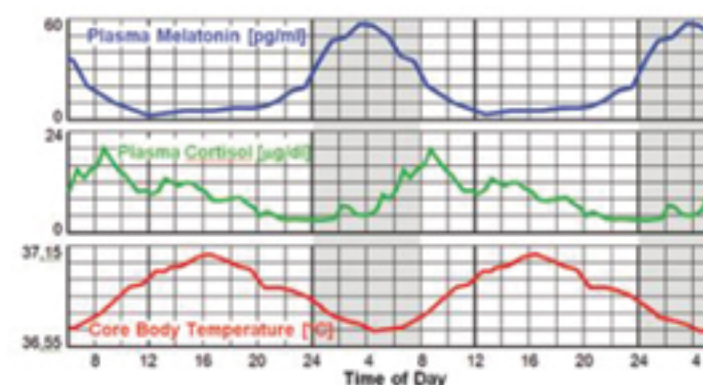
When we mock-up hotel rooms and people say let's look at the night setting, draw the curtains and switch on the lights, I explain that this is not going to look the same tonight. We have to look at it with our night eyes because we are different people at night. Night is the beginning of a daily cycle of renewal.

Our normal vision is tuned, it is most sensitive. We have non-visual ganglion cells in our eyes which are sensitive to blue-green, which is in the region of 480 nanometres. This is our state of wakefulness. The reaction to blue-green light is our daytime

scenario and what keeps us awake; it stimulates the cortisol and serotonin and serotonin is what is lacking when people get depressed in Northern climates. It is called SAD syndrome. We all know about this, but do we think about it? We're awake and when the evening comes we're exposed to warmer light, the intermediate just after the coolest fades, the light levels drop and there is a warm light frequency that comes in before darkness, which triggers the circadian system. This happens around 540 nanometres, which is sleep-inducing.

Consider the graph alongside. The melatonin level is down at midday and starts to rise in the evening, peaking at around four o'clock in the morning. We often wake at that time to pull up a blanket as temperature levels have dropped. Our cortisol and melatonin work inversely. In the morning, as the melatonin starts to drop we get a spike of serotonin, which is stimulated by daylight. It is entrenched in our hormonal systems. What they found at Rensselaer is that when our circadian clock goes out of sync, all sorts of illnesses can result. The more we disrupt our melatonin cycles, once we've interrupted them, the longer it takes for them to pick up again. If this happens regularly it can have serious consequences. Blue rich night light sources in children's bedrooms are a particular no-go.

How do we bring colour and movement, which are intrinsic to natural light, into our built environments so that light flows naturally with colour change? How do we bring a new breath, a new



impulse to interior lighting that uses LED technology which is controllable and, under the right circumstances, colour is not a problem. In the old days it was an effort to mix colour, we had to use filters, etc, but LED has changed that game. How are we going to apply it?



sunrise/sunset setting – +/- 2700K: 6h00 - 6h30
18h00 - 18h30

crossfade setting – +/- 3500K: 6.30h00 - 11h00
18.30h00 - 23h00

daylight setting – 5000K: 11h00 - 18h00
23h00 - 6h00

The first circadian system we applied was for the Gauteng Nerve Centre in Kaalfontein for PRASA. The centre operates 24 hours a day and controls the switching for most of the trains in Gauteng. The architect wanted an illuminated ceiling; however, budget kicked in which led to a modified version of the ceiling. The luminaires were fixed to the catwalks. A barrisol-type of luminaire was attached to its underside. Fluorescents of different colour temperatures were placed inside the light boxes, as we were a little unsure of the performance of LED at the time. They were mixed and controlled to create a lighting scenario on a cyclical basis. It was a constantly changing scenario. We had ceiling strips of flat, even light but outside, the sky, particularly with cloud, was changing all the time. A clear blue sky is quite dull – the sky becomes interesting when it is textured and light catches cloud. We programmed the different states and the client wanted everything clean and white.

We ended up with a sunrise and sunset setting, about 2700 K, which occurred between 06h00 and 06h30 when it got into this colour temperature. It then moved into a cross-fade setting of roughly 3500 K. This would progress until 11h00. The same thing occurred at night; they had to reverse day and night as day had to be simulated for night, and night for day once the night staff arrived. When people are most tired they need the coolest light to stimulate serotonin levels so that by 06h00 they get to a sunrise state, which would really be their sunset, to stimulate melatonin. The last setting is the daylight setting, about 5000 K.

This was an interesting experiment for us because of the isolated space. There was no daylight

and the artificial lighting simulated some kind of movement. Just the movement of the light made staff feel something was 'happening' and they were not sitting in capsules. There was a time when the mood of casino lighting was constant night; even that way of thinking has changed.

I heard Jonathan Speirs give a presentation on the Grand Mosque in Abu Dhabi. It deals with what I call the poetic movement of light. Again it's got to do with dynamic light. The exterior lighting concept is based on the lunar cycle, which is very important in the Islamic calendar. They created a gobo-type broken-up light on the domes. The moon-like features are motivated by the direction of Mecca and all the patterns give consistency of movement. There is an element of direction and time. At full moon the building is white and as the moon waxes or wanes, the light moves more into a saturated blue. The last setting happens on the 14th of each month after the full moon, when there is no moon. The setting goes blue. This is an old theatre trick – blue light is closest to darkness, it is dark, but you can see. The cycle continues repeating with the warm inner spaces which are amenable, contrasting with the blue. Speirs and Major often contrast blue with warm colours contrasting the spectrum, because warmth includes and embraces.

To get back to contemporary trends in lighting, I'd like to suggest that we are approaching the stage where we are inextricably linked to the question: Lighting design, effect or necessity? **LID**

Paul Pamboukian presented this paper on 15 May as the keynote address at the 2017 IESSA Congress in Cape Town.

