



# The Metaphor, Metaphysics and Music of Light

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*Here Tom McLeish explores a question that returns to worry him whenever he hears science talked about publicly, be it live or broadcast. He is increasingly troubled that science is not more like music. The sense of comparison is their cultural settings – music is universally ‘possessed’ in a way that science is not. The question is a double one therefore: why is, in this sense, science song-less? And how can it become symphonic? The role that light plays in this exploration will emerge.*

Music is a serious business – it requires, at its highest level, the greatest expertise, hard-won brilliance, collaborative energy and individual sustained labour of which human beings are capable. It delivers in return one of the most satisfyingly creative and life-interpreting genres of all art. Music stirs our deepest longings, echoes our pains and trumpets our joys. It has sung the story of hope and despair, of worship and celebration for as many centuries as people and communities have been aware of those things. It establishes a timeless canon of forms that can be called to mind in musical memory, yet in performance it stitches the same form into diachronic experience. It takes the material stuff of the world, its string, horn, skin, wood and metal – and charges them with the resonances of art under craftsmen and musicians’ skill.

But music is not confined to the domain of experts. It is culturally and communally possessed. By a continuous Jacob’s ladder of individuals moving up and down a hierarchy of ability, expertise and experience, those who are making their first tentative whistles and scrapes are in continuity with the finest exponents of the concerto and sonata. Furthermore – music is performative. Without the critically-listening audience taking their place on the stairway, even the greatest musician is without an earth for their electricity, has no interior worlds to illuminate and receives no reflection of, no response to, her interpretations. The essential point: to be an audience does not require the ability to perform, but is integral to the community and process within which art is generated and received. I know whose account of Schumann’s piano concerto I prefer and I can say why with some confidence, but I would be unable to play a note of it however hard I tried.

## Science and contemplation

It is not so with science, which in the telling words of Jacques Barzun (1964) ‘is not with us an object of contemplation’. Humanity has severed an ancient link between itself and one of its greatest cultural creations. As I have traced before (McLeish 2014), the activity we now know as ‘science’, abstracted as it is into the culture and privilege of expertise, is in historical continuity with a tradition of contemplative observation and re-creation of nature from as long ago as any other artefact speaks of distinctive humanity. Natural Philosophy of the early modern era is the immediate predecessor, drawing on a tradition that in ancient cultures was called ‘Wisdom’.

Wisdom responds, as articulated by philosopher and

theologian Paul Fiddes (2014), to a strange aspect of the human predicament, namely the distance that opens up for the human alone among animals, between material nature and ourselves. Arendt (1958), Heidegger (2002) and Steiner (1989) have all given voice to this ‘broken contract’ in the late modern world. In ancient times Kokoethe complains:

*I turned my mind to know and to search out and to seek wisdom and the sum of things ... See, this is what I found, says the Teacher, adding one thing to another to find the sum, which my mind sought repeatedly, but I have not found (Ecclesiastes 7:25, 27-8)*

His desire to see – and the deep subficial perception of ‘seeing’ with the engaged mind was known well to the ancient world – resonates with the motivation and experience of science today. A universal reengagement with disciplines that inherit the tradition of Wisdom, albeit distantly, must change the way that education and the media work in the way that they engage with science itself. It will not do to make better science documentaries – at least not of the kind that enshrine the experts in mystical auras of hidden (and certain) knowledge of which we are given at best superficial grasp, and none at all of the groping uncertainty of process. Science engagement needs to move from the presentational to the performative, from the final to the processive.

## Dimensions of light

In an essay to make this concrete, we turn to light itself as a field in the material world, as a multivalent idea in the mind, and the great metaphor of understanding itself. Light plays a pivotal role in the history of natural philosophy, also sitting at the nexus of our attempted comparative juxtaposition of science and music. Perhaps the most important text in the intellectual history of light is Robert Grosseteste’s treatise of c. 1220 *De Luce* (Gasper *et al.* 2016). At the focal point at which the reassessment of Aristotelian texts and Islamic commentaries on them meets Christian scholarship in the high medieval renaissance, Grosseteste makes use of these antecedents to look to the future. He takes Avicenna’s Aristotelian development of ‘first form’ in one hand, and the Biblical priority of created light in the other – and for the first time identifies them. In an astonishing ‘Newtonian leap’, this provides him at one stroke with a theory of the extension of matter and with

a cosmogony of the universe as a whole. He knows, and explains mathematically, why no number, however big, of infinitesimal atoms could ever fill the tiniest volume. So he conjectures that light, 'or something with the same properties as light' indwells all solid matter endowing it with extension. Without a particle of presentist retro-projection, his insight deserves the remark that, 700 years later, it was the wave theory of matter that first explained the extensive stability of ordinary matter.

That which can fill out a table can fill out the cosmos – so Grosseteste invokes his extraordinary 'Medieval Big Bang' (Bower *et al.* 2013) in which light (*lux*) forms and shapes matter, first expanding the primordial sphere of the cosmos. The reradiated light from the firmament (*lumen*) converges inwards, concentrating matter before it and crystallising out the 9 other celestial spheres. It is a monumental and masterful vision, and a consummate exercise in early theoretical physics. But it also takes the 'metaphysics of light' to its highest peak, at which the new chapter, the 'physics of light', can be truly begun. It can surely be no coincidence that in the wake of *De luce* and Grosseteste's other optical works, the pace of a deepening understanding of optics quickened: Roger Bacon's *Optics*, Theodoric of Freiburg's solution of the rainbow, Newton's *Optics*.

### Light and sound

Grosseteste's later work on sound, equally perceptive in its identification of transmitted vibration as the source of auditory sensation, continued to invoke the underpinning form of light as its generative energy. So it seems fitting to experiment, as a first step, with the still misty vision of a 'performative science' by taking inspiration from the science of light, and by yoking it to a performance of music similarly inspired by the idea of light. As I write, this experiment is planned (and funded) but not completed. During the international '*Lumière*' festival in Durham of November 2015, the Institute of Advanced Studies will collaborate with the Durham Singers and the University Physics Department and Trevelyan College in a short concert, linked intimately with an afternoon of public experimenting with colour, refraction and reflection.

The music spans four centuries, from early renaissance to a première of a new work. The concert is an exploration of our opening question, with the insight that if science and music can be like each other, this might be most evident when they are in each other's' company. So the pieces echo not only the metaphorical power of light as inner illumination (Handel's *Eternal Source of Light Divine*), of dawning hope (Pärt's *Morgenstern*), of luminous love (Byrd's *O Lux Beata Trinitas*), but also explores further and more structurally into properties of light that require observation, thought, even theorising, to grasp.

We will think about light as a rich composite of different wavelengths: Light of different frequencies (visible and invisible) creating different hues and saturations maps onto harmonies and dissonances built from sounds of different frequencies (audible and inaudible). The section starts with The skies in their magnificence by contemporary British composer Cecilia McDowall, to a text by Thomas Traherne about colour and the lights of the skies. Then follow two pieces about light – one renaissance (Victoria), one late 20th C (Pärt), where (in particular) you can really hear colours unfolding in the music.

The second aspect we explore in both experience and music is that of light as carrier of information or of 'Words'. We understand the velocities and chemistries of distant stars by the information carried on their light – the missing wavelengths and their delicate shifts. In the same way, sound conveys information both natural and intended. Light-inspired music often picks up the resonance of the theological 'logos', of conveyed ordering principle. In contemporary physics, the 'field theory' of light orders and collates charged matter. Three settings of 'Oh gladsome light' from renaissance to contemporary (Tallis, Rachmaninov and Burrell) reflect on

the structured bringing-into-being that light carries into the material world.

Finally the music moves into light's creative force. In the Big Bang itself, continuing cosmic structures shaped by radiation, and by photosynthesis sustaining life on Earth today, light shapes and orders the universe. The lived experience of humans is often articulated in terms of a search of light. Another piece by a contemporary British woman composer begins the set (Janet Graham's *The Light*). This is the premier performance and the original poem reflects many of the previous themes throughout the concert. But it points towards life as a reflection on light and a search for it. Brahms' dark motet *Warum ist das Licht* picks up that theme too. Harris answers those questions, in *Holy is the True Light*, like balm, and reflects on the life of the Saints inspired by the Light. We plan to finish with that most complex, mathematical and conceptually perfect of composers, in J.S. Bach's motet *O Jesus Christ, mein Leben's Licht*, to finish the parallel musical and scientific reflections on light as structure, energy and metaphor.

Light is both that which gives understanding, and a puzzle itself to be understood. The musical exploration does not leave listeners where they began – something is understood about light, materiality and nature. Music allows us to connect the affective and the cerebral in a way that needs to be breathed again into our possession of science. And it allows us to live with the unanswered questions as well.

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He is speaking at next year's *Mystics and Scientists conference*.