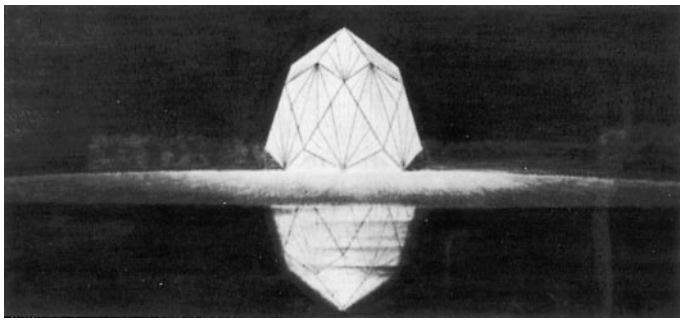
conceives light as a building material and incorporates it purposefully into the overall architectural design. He also pointed out – and he was the first to do so – that, with regard to architectural lighting, artificial light can surpass daylight, if it is applied purposefully and in a differentiated way.

Lighting engineers still tended to practise a quantative lighting philiosophy. It was the architects who were now beginning to develop new concepts for architectural lighting. From time immemorial, daylight had been the defining agent. The significance of light and shadow and the way light can structure a building is something every architect is familiar with. With the development of more efficient artificial light sources, the knowledge that has been gained of daylight technology was now joined by the scope offered by artificial light. Light no longer only had an effect coming from outside into the building. It could light interior spaces, and now even light from inside outwards. When Le Corbusier described architecture as the "correct and magnificent play of masses brought together in light", this no longer only applied to sunlight, but also included the artificially lit interior space.

This new understanding of light had special significance for extensively glazed facades, which were not only openings to let daylight into the building, but gave the architecture a new appearance at night through artificial light. A German style of architecture known as "Gläserne Kette" in particular interpreted the building as a crystalline, self-luminous creation. Utopian ideas of glass architecture, luminous cities dotted with light towers and magnificent glazed structures, à la Paul Scheerbart, were reflected in a number of equally visionary designs of sparkling crystals and shining domes. A little later, in the 1920s, a number of glass architecture concepts were created; large buildings such as industrial plants or department stores took on the appearance of self-illuminating structures after dark, their facades divided up via the interchange of dark wall sections and light glazed areas. In these cases, lighting design clearly went far beyond the mere creation of recommended illuminances. It addressed the structures of the lit architecture. And yet even this approach did not go far enough, because it regarded the building as a single entity, to be viewed from outside at night, and disregarded users of the building and their visual needs.

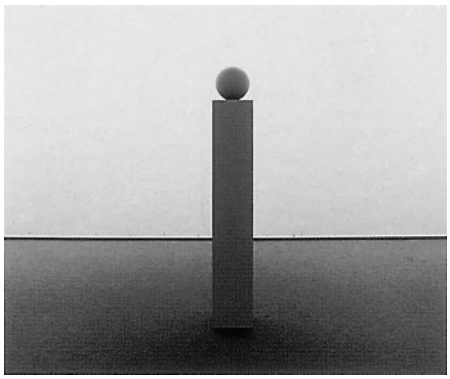
Buildings created up to the beginning of the second world war were therefore characterised by what is, in part, highly differentiated exterior lighting. All this, however, made little difference to the trend towards quantitative, unimaginative interior lighting, involving in the main standard louvred fittings.

Joachim Teichmüller.



Wassili Luckhardt (1889–1972): Crystal on the sphere. Cult building. Second version. Crayon, around 1920.

J. Brinkmann, L. C. van der Vlugt and Mart Stam: Van Nelle tobacco factory, Rotterdam 1926–30.



Ambient light.

In order to develop more far-reaching architectural lighting concepts, man had to become the third factor alongside architecture and light. Perceptual psychology provided the key. In contrast to physiological research, it was not simply a question of the quantitative limiting values for the perception of abstract "visual tasks". Man as a perceiving being was the focus of the research, the question of how reality perceived is reconstructed in the process of seeing. These investigations soon led to evidence that perception was not purely a process of reproducing images, not a photographing of our environment. Innumerable optical phenomena proved that perception involves a complex interpretation of surrounding stimuli, that eye and brain constructed rather than reproduced an image of the world around us.

In view of these findings lighting acquired a totally new meaning. Light was no longer just a physical quantity that provided sufficient illumination; it became a decisive factor in human perception. Lighting was not only there to render things and spaces around us visible, it determined the priority and the way individual objects in our visual environment were seen.

1.1.6.1 The influence of stage lighting

Lighting technology focussing on man as a perceptive being acquired a number of essential impulses from stage lighting. In the theatre, the question of illuminance levels and uniform lighting is of minor importance. The aim of stage lighting is not to render the stage or any of the technical equipment it comprises visible; what the audience has to perceive is changing scenes and moods – light alone can be applied on the same set to create the impression of different times of day, changes in the weather, frightening or romantic atmospheres.

Stage lighting goes much further in its intentions than architectural lighting does – it strives to create illusions, whereas architectural lighting is concerned with rendering real structures visible. Nevertheless stage lighting serves as an example for architectural lighting. It identifies methods of producing differentiated lighting effects and the instruments required to create these particular effects – both areas from which architectural lighting can benefit. It is therefore not surprising that stage lighting began to play a significant role in the development of lighting design and that a large number of well-known lighting designers have their roots in theatre lighting.

1.1.6.2 Qualitative lighting design

A new lighting philosophy that no longer confined itself exclusively to quantitative aspects began to develop in the USA after the second world war. One of the pioneers in the field is without doubt Richard Kelly, who integrated existing ideas from the field of perceptual psychology and stage lighting to create one uniform concept.

Kelly broke away from the idea of uniform illuminance as the paramount criterion of lighting design. He substituted the issue of quantity with the issue of different qualities of light, of a series of functions that lighting had to meet to serve the needs of the perceiver. Kelly differentiated between three basic functions: ambient light , focal glow and play of brilliance.

Ambient light corresponded to what had up to then been termed quantitative lighting. General lighting was provided that was sufficient for the perception of the given visual tasks; these might include the perception of objects and building structures, orientation within an environment or orientation while in motion.

Focal glow went beyond this general lighting and allowed for the needs of man as a perceptive being in the respective environment. Focal glow picked out relevant visual information against a background of ambient light; significant areas were accentuated and less relevant visual information took second place. In contrast to uniform lighting, the visual environment was structured and could be perceived quickly and easily. Moreover, the viewer's attention could be drawn towards individual objects, with the result that focal glow not only contributed towards orientation, but could also be used for the presentation of goods and aesthetic objects.

Play of brilliance took into account the fact that light does not only illuminate objects and express visual information, but that it could become an object of contemplation, a source of information, in itself. In this third function light could also enhance an environment in an aesthetic sense – play of brilliance from a simple candle flame to a chandelier could lend a prestigious space life and atmosphere.

These three basic lighting categories provided a simple, but effective and clearly structured range of possibilities that allowed lighting to address the architecture and the objects within an environment as well as the perceptual needs of the users of the space. Starting in the USA, lighting design began to change gradually from a purely technical discipline to an equally important and indispensible discipline in the architectural design process – the competent lighting designer became a recognised partner in the design team, at least in the case of large-scale, prestigious projects.