Ecology and the Aesthetics of Heat

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Abstract. *The sense of heat does not even register as one of our five senses. Yet, this paper proposes that an aesthetics of heat is critical to the ecological understanding of ambiance. It begins with a recent argument that the key human advantage in evolution is our ability to maintain a constant temperature, or homeostasis. Cultural markers of human civilization like fire, food, clothing and buildings are seen as further refinements of this. The sense of heat is important because it is a measure of our energetic balance with the environment. If we do not maintain this balance, getting too cold or too hot for too long, we die. Recent studies in everyday aesthetics have opened the door to a broader definition of aesthetics and this has allowed the introduction of a new field of study – the aesthetics of heat.*

Keywords: evolution, ecology, homeostasis, Rembrandt, thermal aesthetics

Introduction

The argument presented here may be divided into three parts: firstly, that thermal experience is ecological, secondly, that thermal experience is aesthetic and finally, that we should pay more attention to thermal aesthetics because of both these connections.

Heat and Ecology

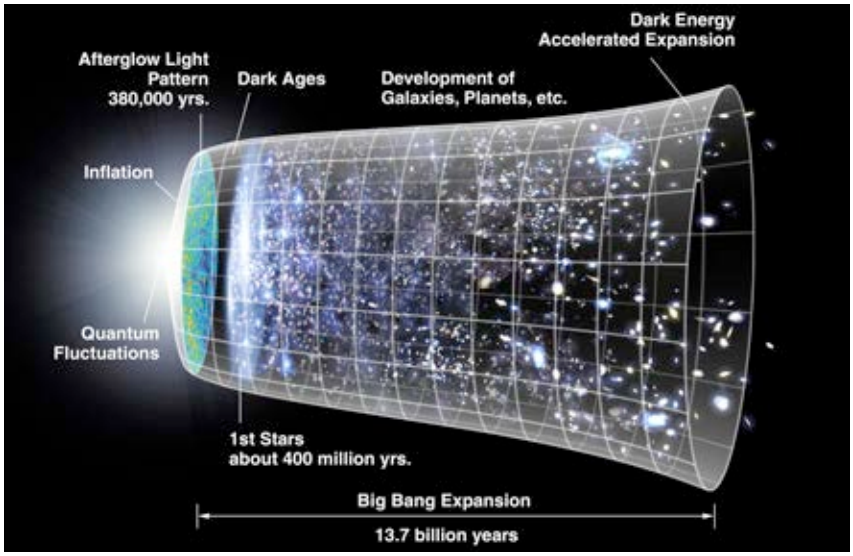

Figure 1 : The Big Bang as visualised by NASA/WMAP Science Team (Source : Wikipedia)

Heat is THE key factor in the scientific explanation of the universe. The origin of the universe is described entirely, and only, in terms of temperature (Turner, 2009). The laws of thermodynamics underpin all energy relations in science. Life on earth is enabled because of the precise distance between our planet and its sun so that we might bathe in its warmth and be neither burnt up nor frozen cold. As a result of this distance[1], there is a wide range of climates across the surface of the earth and a consequent range and variety of ecosystems.

These climates determine the range and character of plant and animal species that can thrive in each location. Heat is the determining factor in the survival of all living things. To stay alive, all living things have to actively maintain thermal balance. In some species, this ability is refined to an ability to maintain a constant internal temperature. Such an ability requires complex mechanisms to increase and reduce heat loss. This ability is called homeostatis. Ian McHarg (McHarg, 1969) elaborates by describing energy as the currency of ecology (p196):
«...the currency is energy. There is an inventory of matter, life forms, apperceptive powers, roles, fitness, adaptations, symbioses and genetic potential. Consumption optimally involves the employment of energy in the raising of levels of matter. Matter is not consumed but merely cycled. When not employed in the cycle, it assumes the role of a reserve. Given a uniform source of energy, the period of entrapment is essential for the increase in creativity - coal represents long-term entrapment, fresh vegetables only short-term. Moreover, the entrapped energy must be transferred through successive levels of organisms, each level sustaining higher levels. The biosphere does not consist of a pyramid of organisms but of ecosystems in which many creatures coexist in interdependence, each with its own process, apperception, roles, fitness, adaptations and symbioses. This system has an energy source as its currency, an inventory of matter, life forms and ecosystems, and reserves in the inventory - the cycles of matter, genetic and cultural potential. Energy is degraded but is replaced; some energy is arrested on its path to entropy and this increases the inventory and enhances the creative capacity of the biosphere.»

Homeostasis is so important, it is thought to be the key evolutionary advantage of human beings (Jablonski, 2006). The evidence is our naked skin, the most prominent visible difference between us and other animals. A naked skin is essential for us to maximize the effectiveness of evaporative cooling. The amount of heat used to evaporate sweat is more than 5 times that required to raise the temperature of the same amount of water from freezing to boiling. Bipedalism exposes more of our bodies to prevailing winds and increases evaporation even in still air. This excessive capability to cool down in turn enables the development of our large brains – the size of which requires a very efficient cooling system.

The major human developments that made human civilization possible and distinguished human society from animal communities – fire, food, clothing and buildings – are also instruments of thermal and energy balance. Food, clothing and buildings further distinguish human societies from one another. They not only protect us from the heat and cold of the weather, they are aesthetic expressions of who we are and how we are different from other groups of people.

The ecological function of heat is reflected in classical medicine in many cultures. In Western society, the classical theory of humors is based on heat and humidity. The four combinations of heat/humidity (warm/moist, warm/dry, cold/dry and cold/moist) are linked to the four climatic seasons and result in four personality traits – sanguine, choleric, melancholic and

[1] *There are of course other extenuating factors such as the orbit of the earth around the sun, the revolution of the earth around its axis, the angle of its tilt and the earth's atmosphere.*

phlegmatic. We continue to understand ourselves today every much still along these lines – not only are we hot tempered or have a cool and calm personality, we warm up to people we like and are cool to those we don't. Attractive people are hot while cruel people are cold.

Heat and Aesthetics

Figure 2 : Rembrandt's Philosopher in Meditation (Source : Wikipedia)

Perhaps more than any other sense, heat imparts an emotional if not aesthetic overlay on perception. Colors can be hot, warm, cool or cold. Other senses like smell, sound, taste and touch are also often similarly described in adjectives of heat. The aesthetic enjoyment of food, in particular, is enhanced when consumed at the right temperature. Not only does food taste different at different temperatures, heat is critical in drawing out its appetizing smells. Music, dance, poetry and other art forms as well are viewed in terms of heat – tango is hot, jazz is cool, poetry warms the heart.

Consider this painting by Rembrandt (Figure 2). On the one hand, we can describe its aesthetic in terms of light (Quiroga and Pedreira, 2011) :
« …the black background on the left hand side increases the contrast of the white/yellow color of the window, thus giving a formidable reinforcement to the brightness of the sunlight coming through. The high contrast used by Rembrandt drives the attention to the figure of the philosopher and the rest of the scene remains somehow in the dark. This produces an extraordinary effect in the painting, as the character in the bottom right appears to be relegated to a secondary role and the spiral stair seems to be leading to a mysterious dark room upstairs. »

Contrast this against a more thermal description (Hurll, 2006 (1899)):
« Our philosopher is well taken care of; for while his thoughts are on higher things and eternal truths, an old woman is busy at the fire in the corner. Evidently she looks after the material and temporal things of life. She kneels on the hearth and hangs a kettle over the cheerful blaze. The firelight glows on her face and gleams here and there on the brasses hanging in the chimney-piece above. Here is promise of something good to come, and when the philosopher is roused from his musings there will be a hot supper ready for him. »

Of the two, I sugggest that the latter more strongly evokes the aesthetic *ambiance* conveyed by the painting. Let me elaborate. We have here two kinds of aesthetic analysis (*and* experience). The first is visual and analytical. It deconstructs the painting and hypothesizes on the formal aspects of the painting that make it beautiful. The second seeks to evoke an aesthetic empathy in the reader. This is achieved through describing the *ambiance* of the picture – the light from above imparts to the philosopher thoughts on « *higher things and eternal truths* », while the light of the hearth is of « *the material and temporal things of life* ». Throughout, there is the undercurrent and premise of heat – the food for the mind is counterbalanced against the food for the body. This aesthetic experience is what I mean when I suggest that the aesthetics of *ambiance* is in fact an ecological phenomenon best understood in terms of the heat. The power of Rembrandt's painting comes into its own when we locate it within the argument presented here – that heat is the currency of ecology and that life is enacted through the dynamics of heat.

Heat and Sustainability

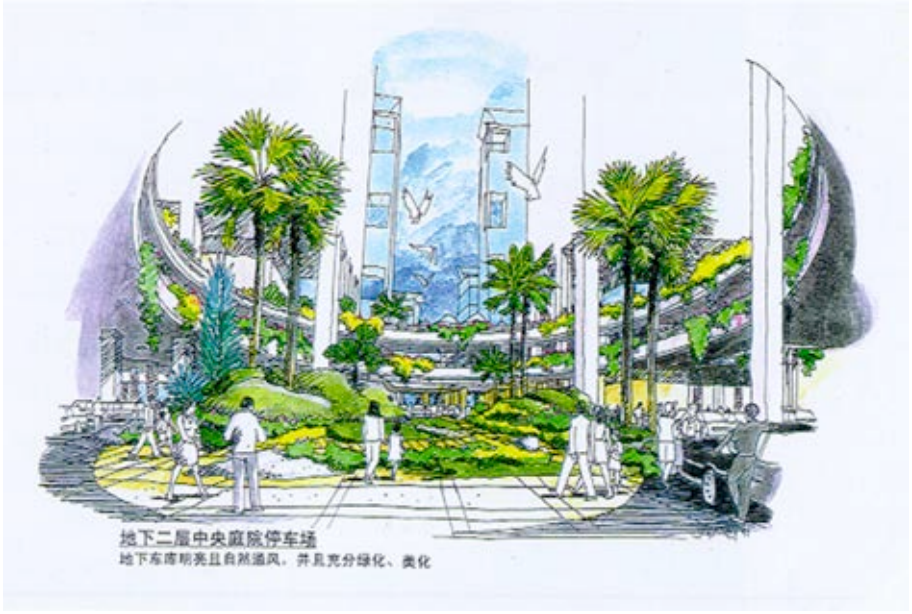

Figure 3 : Thermal aesthetics in design – a proposal for an underground carpark open to the sky allowing light to stream into the basement and enabling natural cross-ventilation (Source: Author)

It is conventional wisdom that vernacular architecture responds to local climate. This response is modified by available material, building technology, site, economics and even reli-

gion (Rapoport, 1969). While these other factors – available materials, existing technology, religion, etc. – are more commonly regarded as external to climate, it is also possible to argue that in fact, these factors of technology, construction, religion and so on contribute to what we may call *human ecology*.

Modern architecture since the early 20th century is particularly important in this context. The International Style (Hitchcock and Johnson, 1966) in architecture evolved primarily because of the development of air-conditioning technology which allowed buildings to take *any* form because thermally comfortable environments can be provided using mechanical and electrical systems. Raymond Arsenault (Arsenault, 1984) bemoaned the death of Southern culture in America as a result of air-conditioning and noted (p610):
« In 1951 the inexpensive, efficient window unit finally hit the market, and sales skyrocketed, especially in the South. Within a year the Carrier Corporation had set up model tract houses in Louisiana, Texas, and Virginia in an effort to convince consumers that the air conditioner had made porches, basements, attics, and movable windows obsolete. »

The ubiquitous glass box of the International Style is possible only because we developed the technology to create thermal environments of our preference in total disregard to the environment outside. In fact, most of the carbon footprint of any modern building is engaged in creating this artificial thermal environment. Thermal comfort is the primary concern of architectural services in modern buildings and more research and money is spent in this field than in any other research field in architecture[2]. In response to this, colleagues in this field have argued for an *adaptive* model for thermal comfort, one that is better attuned to the environment outside. Nick Baker (Baker, 1994) notes that such a model will not only result in greater energy savings but is a model that recognises the cultural and social adaptations that have evolved in human societies in response to different locations.

Understanding how the environment works thermally allows us to design better buildings that are more energy efficient as well as healthier for its human occupants. Figure 3 shows a proposal for an basement carpark for a New Town design in Shenzhen, China. The carpark is three basements deep but instead of mechanical ventilation, large openings are proposed which will allow natural cross-ventilation. These large openings let in sunlight and allow planted landscaping. As a result, not only is energy consumption reduced using natural ventilation but users are able to find their way around the carpark by heading towards these areas of light and greenery. Lift lobbies are in this instance integrated into these basement landscapes so that wayfinding is natural and aesthetically pleasing as the same time.

Closing Remarks

Modern aesthetics has been dominated by the principle of *disinterestedness* – where aesthetic considerations must be isolated from other considerations in order to be truly aesthetic (Guyer, 2004). This isolation has made it difficult to discuss aesthetics in a subjectively meaningful way. Climate change and natural calamities in recent years have lent weight to the argument that we need to be more concerned with the environment we live in. Translated into aesthetics, this concern with the environment is an aesthetic of *ambiance*. The proposal presented here is that an understanding of *ambiance aesthetics* is best characterized in terms of an ecology of heat. Thermal aesthetics is not simply a matter of temperature but an understanding of the energetics of heat. Or, put in another way, heat is the sensual manifestation of energy.

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[2] *Including, I suspect, even research in architectural history.*

It is not a feckless argument. From an entirely scientific and engineering viewpoint, getting the right approach to thermal comfort will result in significant savings in the energy consumption of buildings. There is also research that suggest that access to the external climate results in better health and less abrupt adaptation and lower stress (Park et al., 2011, Stoops, 2006). The success of vernacular architecture is because it is both a socio-cultural as well as technological response to climate. The dominance of visual aesthetics has objectified architecture and given us a distanced experience of ambiance. Embracing the aesthetics of heat will regain for us an architecture that is re-humanized.

Acknowledgments

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