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## Environmental perceptual analysis of high ranked campuses (California)

Work requiring intense direct attention is more efficient if the workplace is surrounded by certain restorative qualities of nature. This paper presents a relevant research background and a method for evaluating important outdoor environmental characteristics/ affordances: 1) “serene” – places where we can hear the sounds of nature; 2) “wild” – places where we can be fascinated by untouched nature; 3) “lush” – places where we can experience the variation in vegetation and animal life across the seasons; 4) “space” – places that allow us to enter into another world without sharp contours, disturbances or signals that demand attention; 5) “the common” – places where we can engage in common activities; 6) “the pleasure garden” – enclosed and secure places where we can enjoy; 7) “center/fest” – squares, meeting places and cafeterias/restaurants where we can visit with other people; 8) “culture” – places where we can experience traces of previous generations’ lives.

This paper summarize some research background of outdoor environmental perception of relevance for analyzing campus areas, and the implementation of this on Stanford, Berkeley and UCLA University campus plus Google-plex.

University life can be pleasant and joyful, but is at times characterized by pressure and stress.

### *Theories of recovery*

Naturally, competition and stress are important driving forces throughout human history. Humans have adapted to physical struggles, hunting and flight from danger through evolutionary processes, but are in our modern society more subtly adapted to cultural norms. However our physical reactions increased pulse rate and blood pressure, increased blood circulation to the skeletal muscles and decreased blood circulation to the skin and internal organs remain the same. The stress hormones cortisol and adrenalin are produced and activating the sympathetic nervous system during taxing situations. The parasympathetic nervous system works to counteract this – to calm us down, lower our pulse rate and blood pressure and activate our internal organ functions, e.g., the digestive process. We live in a constant state of alternation between action and rest.

When we engage in physical activity, e.g., walking, biking, doing sports or garden work, our muscles workout stress hormones. If our level of physical activity is not proportional to our level of stress, long-term tension can set in and perhaps lead to burnout. The parasympathetic nervous system is activated not only by physical work. Annerstedt (2012) showed that even exposure to greenery (e.g., experiencing a green area and hearing bird song) can have significant effects on the parasympathetic system by decreasing our blood pressure and pulse rate.

The Attention Restoration Theory (ART; Kaplan & Talbot 1983; Kaplan et al. 1998) explains why greenery is relaxing. According to ART, our brains require a great deal of energy to sort out necessary from unnecessary information. Long-term and intensive use of this brain function can lead to exhaustion. Such exhaustion can, in turn, lead to increased mistakes, reduced self-control, increased stress and irritation, weakened mental capacity regarding both thought and experience, as well as a diminished ability to focus.

Kaplan suggested that people in such a state can achieve recovery if they feel secure in a given environment. We have become used to natural environments during millions of years of evolution, which is why information from nature does not require a great deal of energy. When we are out in nature, there is less need for the energy-demanding direct attention that we use to sort and react to information in our everyday lives.

Kaplan pointed out several ways of recovering from stress:

1. To “get away from” our everyday environment.
2. To experience fascination with something that is interesting but does not require energy.
3. To feel scope and a space and context that allow engagement.
4. To experience compatibility in places where people can spend time together.

Another theory presented by Roger Ulrich (1993) is that stress is a reactive process triggered by taxing stimuli and that stress reduction occurs in innate and involuntary patterns that humans have acquired and maintain during evolution. Ulrich referred to Wilson (1984), who suggested in his Biophilia Hypothesis that this restorative response originated from prototypes for survival and security found during human evolution.

Ulrich explained psychological and affective reactions using his Affective Aesthetic Theory (AAT). According to him, recovery occurs in environments that are calm and pleasant, preferably with vegetation and water elements. It is often held that savanna-like environments are favorable in this regard with reference to their importance during the early phases of human evolution. This notion is also used to explain why large expanses of grass with occasional solitary trees is one of the ideals for park design today.

Searls (1960) categorized some natural elements as “non-demanding” (in ascending order of “demandingness”): water, stones, soil, sticks, branches, greenery and animals.

One pair of concepts in this context is “refuge” and “prospect.” We prefer sitting in a protected and secure place (refuge), like in a pleasure garden, but also to have a view of the surroundings, prospect, to monitor what is happening there.

### *Empathy, willingness to cooperate*

A comparative studies of preschool playgrounds found that our empathic capacity can be impaired under situations of excessive stress. Children who played on playgrounds rich in nature elements was found to develop better in various mental/social traits, including concentration ability (greater), impulsivity (lower), lack of consideration (lower) and dangerous behavior (lower), i.e., they showed a higher degree of empathy. Also of interest in these studies were the differences between the staff. Staff working at the preschool with a playground rich in nature “assigned meaning to the outdoor environment. They were clearly proud of their work and their playground.” In contrast, the staff at the preschool with a playground lacking in nature elements “gave no impression that the outdoor environment was of any emotional significance”. Furthermore, the staff at the latter preschool was more likely to report “burdensome working conditions,” “unruly days filled with conflict” and “feeling relief when leaving the work environment after work”. (Grahm 2007)

One study of staff at various workplaces (lottrup et al. 2013) showed that good access to greenery at the workplace was important: Staff was happier at work and their stress levels were lower. The study also showed that having a view of greenery through a window was important, but that being able to go out into the green area during breaks was even more important.

### *How, then, should we design knowledge-based environments?*

Modern society is becoming less and less dependent on permanent workplaces made up of fixed offices and conference rooms. Instead, a great deal of the innovative thinking, creativity and production are taking place in looser constellations within and between companies, universities,

individual entrepreneurs and researchers. Such constellations require freer forms in which to have meetings, exchange ideas and be creative, e.g., cafés, bars and restaurants, and meeting rooms. But in addition to these places meant for intensive interaction, where our sympathetic nervous system is stimulated, our parasympathetic nervous system also needs places where we can relax.



Places for indoor meetings allowing contact with greenery (Harvard)



The greenery sends in soft information of nature that requires little energy (Princeton)

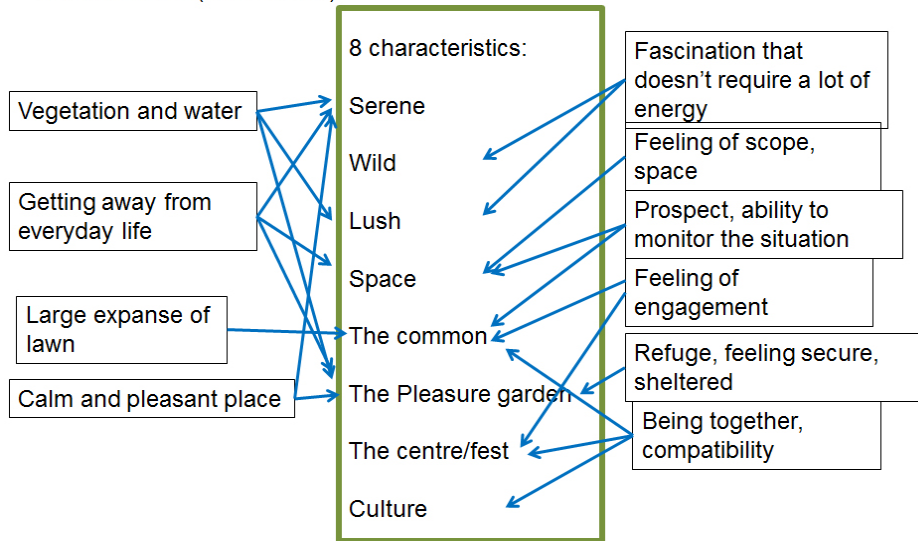
### ***Eight characteristics of the outdoor environment that meet people's needs***

The environmental psychology research being done at, among other places, SLU Alnarp in Sweden (Grahn, Stigsdotter, Berggren-Bårring 2005; Grahn & Stigsdotter 2010) has caused scholars there to conclude that there are eight characteristics of the outdoor environment that meet the basic needs we all have. These characteristics are: 1) “serene” – places where we can hear the sounds of nature; 2) “wild” – places where we can be fascinated by untouched nature; 3) “lush” – places where we can experience the variation in vegetation and animal life across the seasons; 4) “space” – places that allow us to enter into another world without sharp contours, disturbances or signals that demand attention; 5) “the common” – places where we can engage in common activities; 6) “the pleasure garden” – enclosed and secure places where we can let children play and enjoy ourselves; 7) “center/fest” – squares, meeting places and cafeterias/restaurants where we can visit with other people; 8) “culture” – places where we can experience traces of previous generations’ lives.

Characteristics 5 thru 8 largely correspond to social needs (e.g., meeting places), while characteristics 1 thru 4 are preferably experienced while one is alone. The figure below shows how Kaplan’s and Ulrich’s theories of recovery from stress can be related to the eight characteristics of outdoor environments defined by Grahn et al.



Figure 1. Qualities for restoration (Ulrich, left; Kaplan, right) in relation to the 8 characteristics (Grahn et al.)



*Some examples of the characteristics corresponding to valuable affordances at workplaces*



A calm, "savanna-like" and relaxing environment (UCLA), a common with prospect



Popular meeting place (Stanford)



Do views of greenery outside provide the calm necessary for concentration? (Berkeley.)



Impression of wilderness in Berkeley



The Common (Google plex)



Culture and space at the same time at UCLA

### *How to apply this knowledge in practice*

A project has started in Sweden in cooperation between construction and real estate industries, consulting experts and academy to develop methodic, criteria and standards to make work places more restorative and innovation supportive. Expected effects are better economic outcome at the improved workplaces. The aim is a higher degree of implementation in the practice design measures at workplaces based on current research evidence for outdoor green qualities' effect on mental restoration, health and wellbeing. Our brains receive information from the nature that takes very little mental energy. Restorative effects are measurable already after few minutes of "green exposure". Short time memory and concentration ability increase after a short while in a park. As a pre study we have analyzed famous and high ranked workplaces in California Stanford, Berkeley, UCLA and Googleplex from the "Eight characteristic model" (Skärbäck et al. 2014; the poster for NAEP 2015).

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<sup>1</sup>Summary: It is a largely accepted fact that creative individuals are products of their social environment. This book takes the concept further and builds upon the hypothesis that in most cases a creative individual is the result of not just one, but several environments. Using the time-geographical method it studies how individuals passing through different environments are shaped into future Nobel Prize laureates.