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Our wellbeing in modern built environments is rooted in our evolutionary history. Are we aware of this?

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Dear Readers,
Today, to create the places in which individuals dwell, work, learn, have fun, recover from illnesses, etc., basically where they live, and to achieve the aesthetics, functionality and comfort they desire, is not only a demanding quest for architects, planners and designers, but also – and above all - for those experts addressing the individual's psychological, physiological, emotional and cognitive sustainability needs. This concern pertains specifically to Environmental Psychology, a discipline which falls in between the procedure, practices and techniques of a builder and the experience and talent of an architect. Though having a lot in common, the dialogue between environmental psychology and architecture has so far been limited. Architecture is the profession of designing built environments, while environmental psychology asks how individuals make their way through the environment, how one makes sense of, copes and gets along in those environments (natural and built) planned by architects. The editors of *Visions for Sustainability*, Giuseppe Barbiero and Martin Dodman, conceived of this special issue as a way of investigating what environmental psychologists and architects share, maybe without knowing it. In order to face this challenge, they asked an environmental psychologist (myself) and an architect (Cristian Suau) to be guest editors of an issue dedicated to "Wellbeing in daily built environments". Words like "wellbeing" and "stress" are currently much in vogue and the editors were wondering exactly about how architects and environmental psychologists address these "popular" concepts from a scientific point of view. This editorial is an endeavour to outline what they discover.

We can start by saying that environmental psychology and architecture are closer than expected since there is a link between individual's internal state and external environments. In fact, just as we affect the world around us, in turn, the world affects our behavior, thoughts, emotions, and actions; accordingly urbanization is the most important "behavioral influence on the environment" (Gallagher, 1993). A place that is "good" for us is neither boring, nor agitating, but rather promotes the right level of arousal for the ongoing task. While this kind of setting attracts us and makes us feel physiologically and psychologically comfortable, those spots we tend to avoid are likely to have problems with their quantity and/or quality of environmental information (Figure 1).

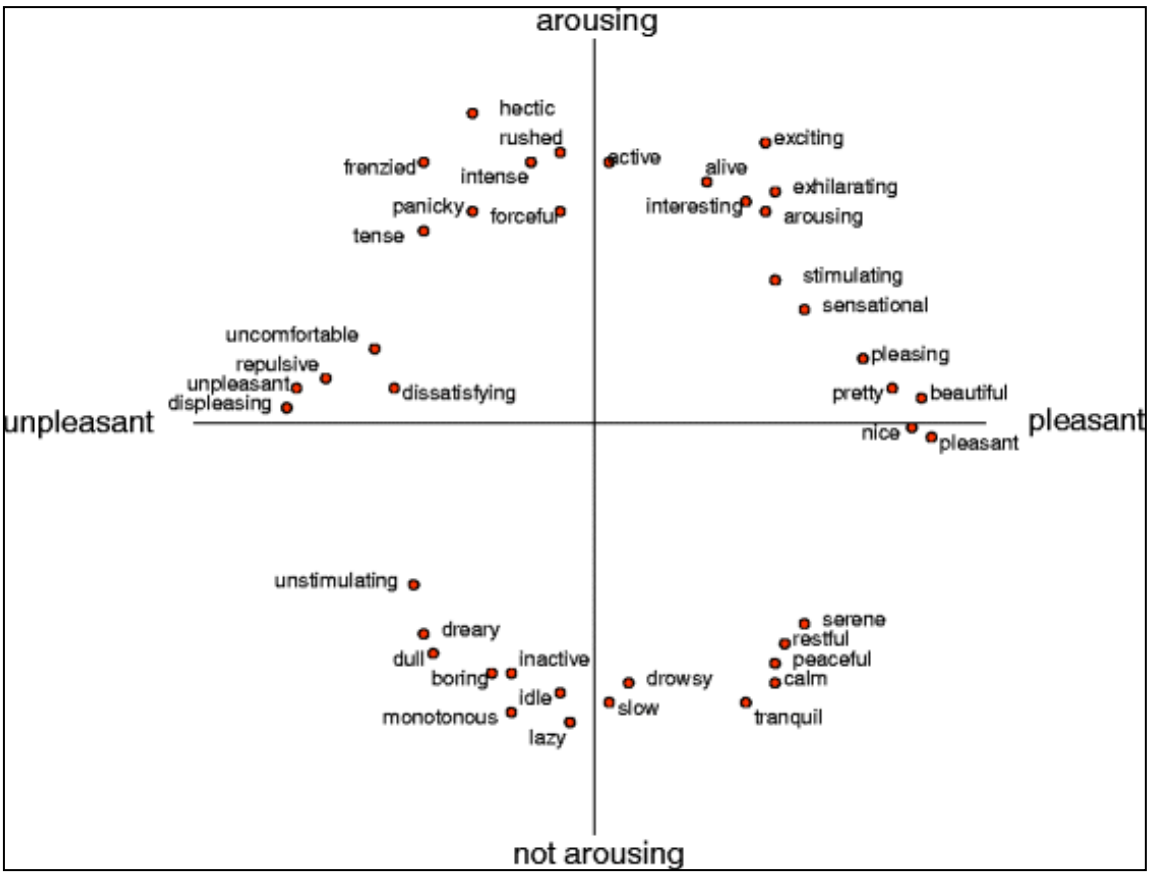

Figure 1. The model shows that when individuals describe an environment they use various adjectives to indicate the level of pleasure (X-axis) and arousal (Y-axis) of their experience (Russell & Lanius, 1984).

Though increasing numbers of architects and designers are attempting to balance the level of environmental information in artificial-urbanized settings, they still neglect how the kind of places and objects we find intriguing and we gravitate towards are rooted in our evolutionary history (Kaplan & Kaplan, 1982). Humans are profoundly influenced by their evolution, have endured danger and difficulty and certainly are a product of those hardships. Experience can affect all aspects of human behavior, even experiences that happened a very long time ago. What is inherited here is not behavior, but structure (Figure 2); those experiences have left some trace on the relationships between human needs and the patterns of stimulation provided by the environment (Kaplan, 1972).

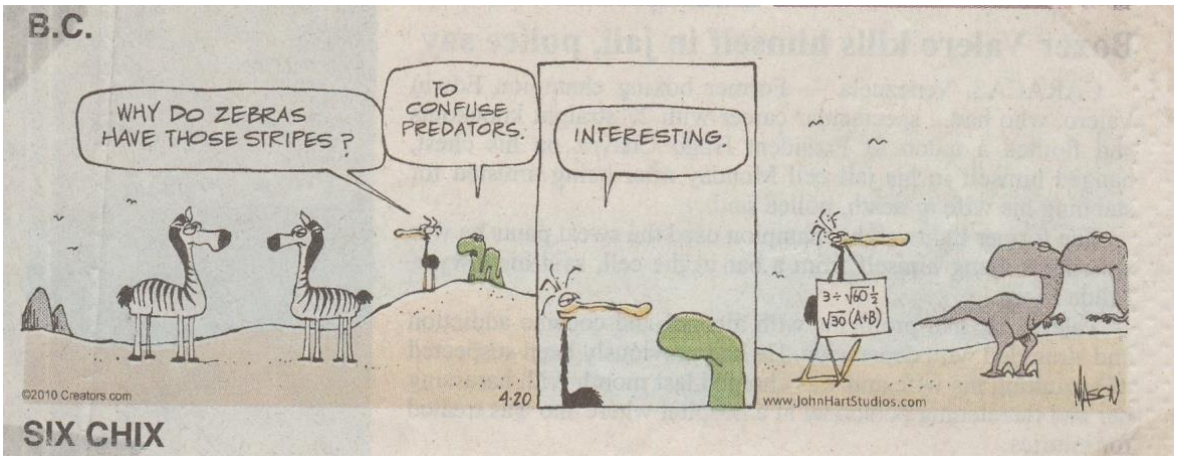

Figure 2. Source: "Las Vegas Review-Journal".

From the evolutionary point of view, humans' predisposition to recognize the aesthetic qualities of a certain habitat reflects the adaptations designed by natural selection aimed to help us to choose the place where to live (Kaplan, 1992; Orians & Heerwagen, 1992). Unfortunately, this choice is not that simple nowadays; quoting Gallagher (1993, p. 19): "The technological and social changes associated with this unprecedented worldwide development mean that *before* (my emphasis) we superficially adjust to a new, lower status quo, our ever-adaptable species must understand what a good environment really is, in a community as well as forest, in an office and school as well as home". Humans are programmed by evolution and experience to handle a wide range of challenging environments, but this has its limits in terms of the psycho-physiological resources that need to be recovered in a way or another. As individuals have increased their capacity to influence the environment, they have also increased their capacity to make it incomprehensible and stressful. Accordingly, individuals are in desperate need of places that support the biological needs of making sense and exploring (Kaplan & Kaplan, 1989) which, in turn, sustain environmental preference and perceived restoration. Since our ancestors lived in a Nature-filled environment, when we are exposed to natural environments we feel more comfortable, more relaxed, more "like home"; in this respect, Nature's ability to restore human attention, to recover from stress and to enhance positive feelings and emotions has been supported by a wide range of studies (for a review see Berto, 2014).

In *The Stones of Venice* (1851-1853) John Ruskin pointed out three virtues of a built environment, in that: 1) it acts well, 2) it looks well and 3) it speaks well. Points one and two are relatively easy to achieve. In the first place, a built environment "acts well" when it fulfills the human need to find a refuge. Secondly, it "looks well" when it meets human aesthetic requirements. For Ruskin Nature is the model for beauty and he relied so heavily on the design seen in Nature that to him lines and shapes in architecture should stem from the natural environment. But what did Ruskin mean with "it speaks well"? For me, a built-artificial environment "speaks well" to us when it fosters our *emotional attachment* to it. Emotional attachment appears to be an emergent property of individuals interacting with environments that are pleasing both aesthetically and functionally because they present some properties of the environment in which humans evolved. This attachment facilitates the vision of an interaction between "form" and "function", which in turn stimulates progressively-stronger positive emotions towards the environment itself (see Figure 3).

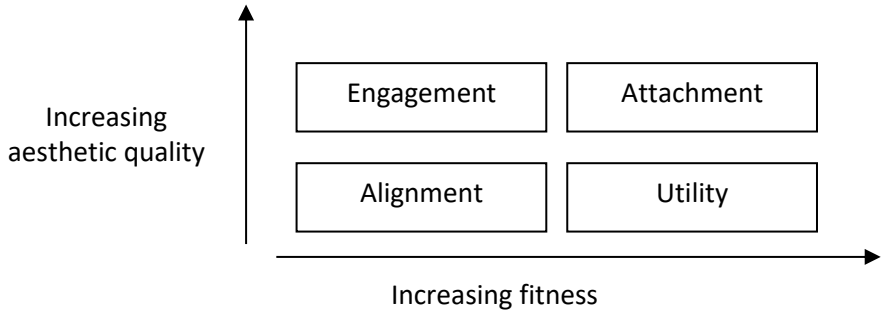

Figure 3. Petrich's attachment matrix (2015).

As one becomes increasingly attached to the aesthetic properties of an environment one can be said to be engaged with it. While becoming increasingly pleased with an environment's functional fitness, one experiences the satisfaction of the environment's emotional utility and becomes attached to it (Petrich, 2015). It is not necessarily the case that we are aware of the reasons for our attachment, but we undoubtedly become effortlessly and unconsciously attached to environments that support our informational needs (making sense, exploring solutions for adaptation) and steered towards psychological benefits (stress recovery and attentional restoration). Despite our individual differences, we share a similar mental model that recognizes in the natural environment the most supportive and adaptive among the environmental contexts. This strengthens the Biophilia hypothesis according to which in our evolutionary history we have developed a complex of learning rules that can be teased apart and analyzed individually (Wilson, 1993, p. 31). From this perspective, people's ability to perceive the restorative value of an environment could be traced back to our genetic predisposition to recognize in the natural environment "the" environment that allows a fast and deep psycho-physiological restoration (Barbiero, 2011; 2014; Berto et al., 2018). For this reason architecture should draw inspiration from both Nature's *content* and *process* and the Man-Nature evolutionary relationship in planning built-artificial environments in order to promote wellbeing.

Barbiero and Dodman's concern originated from wondering about the effect pro-environment solutions

have on individual's wellbeing: Are sustainable buildings, blocks, cities but also pieces of furniture, illumination systems, etc. enough to guarantee an individual's wellbeing? Wellbeing is a *subjective* condition more often than not associated with projects striving towards environmental sustainability and energy saving, as the architect Sears Barrett states (2010, p.69): "Soon we will measure design quality with new criteria. A home's lightness, energy consumption, and sustainability will redefine the concept of beauty in architecture". However environmental sustainability doesn't cover the individual's need for cognitive clarity (Berto, 2011) and psycho-physiological restoration (Berto & Barbiero, 2017); sustainable solutions do not foster *tout court* positive feelings and emotions or functional behaviors and do not lead to appreciation of and satisfaction for the physical environment. On the contrary, individual wellbeing can find a meaningful operationalization in perceived restoration and in restorative design (Barbiero & Berto, 2018; Figure 4).

Figure 4. Pictures show the renovation of a regular classroom (rated low on the *Biophilic Quality Index*, BQI; Berto & Barbiero, 2017) into a "restorative classroom" (rated high on the BQI). The "restorative schoolroom" is the explorative work in progress of Barbiero et al. (2017) at the primary school at Gressoney-La-Trinité, Italy. Barbiero's project is aimed to highlight the role of the physical environment in sustaining environmental education. Specifically, the picture on the left depicts "the refuge" corner of the schoolroom where children can individually or in a small group benefit from a micro-restorative experience (Tennessen & Cimprich, 1995). The immersion experience is helped by the "wave like" bookshelf, the presence of a green cushion on the floor and of a cork-oak wall. The picture on the right depicts "the prospect corner", here children standing or sitting down on steps can benefit from a different perspective of the schoolroom (Appleton, 1975); to foster in children the experience of observing the schoolroom from the "outside", walls are covered by cork-oak where at the center a green insert smelling of real grass is present (Photos: Nicola Maculan). Source: Barbiero & Berto (2018).

Today, it is not difficult to single out physical characteristics of the environment causing the unpleasant *stress response* (e.g. an unsafe and deteriorated block, poorly illuminated schoolrooms, office spaces lacking in acoustic and/or visual privacy, an apartment overlooking an industrial area, etc.), and in parallel fashion *wellbeing* is associated with projects covering environmental sustainability. It is typical to say: if building quality is certified then individual's wellbeing is guaranteed. *Wellbeing*, *cognitive sustainability* and *aesthetics* are difficult goals to achieve in building certification protocols which neglect the Man-Nature evolutionary relationship and the central role of environmental affordances in the Man-Environment *daily* relationship. *Affordance* is the term coined by James J. Gibson (1979) to explain what the environment offers the individuals; the individual perceives the world not only in terms of object shapes and spatial relationships but also in term of object possibilities for action. Gibson developed an interactionist view of perception and action that focused on information available in the environment, where perception drives action. Too much technology, extreme design (becoming an end to itself) and an idea of sustainability which is blind to the individual's needs may alienate people; a "wrong" perception leads to negative feelings (no emotional attachment) and appraisal (low environmental preference) and compromises environmental cognition and functional behavior (no vision of an interaction between form and function). Design too often challenges human's primary needs of making sense and exploring the environment because it doesn't offer the right affordances (Figure 5). This gap can be filled by restorative design which enhances the individual's biophilic bond with Nature, sustains cognitive processes and covers the need for psycho-physiological restoration. According to restorative environment design, human evolution is central to an understanding of modern human relation with the environment (Berto & Barbiero, 2017).

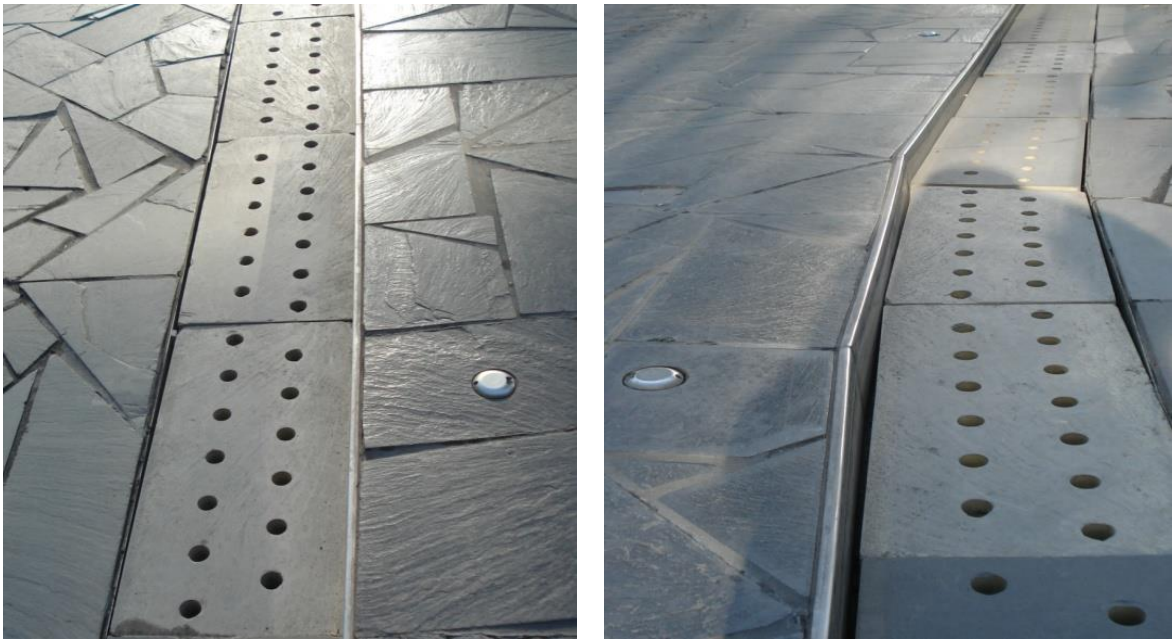

Figure 5. because of the absence of an evident perceptual cue this pavement doesn't immediately offer the "step" affordance; detail of Gae Aulenti Square, Milano –Italy. Photo: Rita Berto.

These are the questions raised by Barbiero and Dodman in launching their call for this special issue. The authors of the published papers have replied in various ways. For Kotradyova, Petruskeviciute and Bilotta et al., an individual's wellbeing originates from social community. Kotradyova highlights the importance of maintaining local identity –meant as the DNA of a society- within the typology, morphology and semiotics of crafted products (buildings, interiors, landscape). Petruskeviciute explains a method which, through integrated decision making and bottom-up governance, can improve urban sustainability and create healthy outdoor environments. In this way, Bilotta et al. describe a model that local municipal administrators could easily apply to encompass multi-risk contexts and perceived insecurity in order to improve inhabitants' quality of life. On the other hand, Marchetti offers an intimate insight into the Man-Environment relationship by taking it back to the home, as both the start and the arrival place to foster individual's wellbeing, proposing fresh reflections on a topic lately neglected in environmental psychology. Neilson et al. reconsider the theory behind restorative design and the authors question whether the leading theory in this area of research is really useful to enhance individual's wellbeing in the field. On the contrary, Brondino et al. give an excellent example of how experimental research can serve the understanding of human behavior in real environments using virtual reality simulations; their method can be used to gauge arousal and pleasantness in a dynamic situation before implementing a given design. Finally, in their extended abstract, Curtis et al. analyze the relationship between self-reported frequency of exposure to Nature and wellbeing measured in terms of emotional physiological and cognitive variables.

I deeply thank the authors – environmental psychologists and architects – who have contributed to this issue. Each paper gives a specific and interesting insight into the Man-Environment relationship. At the same time, each paper addresses the wellbeing issue "rigorously" from its standpoint, leaving little room for cross-disciplinary forays and evolutionary insights, which could, however, be further developed in the future. Special thanks also to the editors of *Visions for Sustainability* that host this special issue. I imagine they will conclude that environmental psychologists and architects need more time and to encounter more situations in order to really understand they are working on a common ground and thereby build cross-disciplinary bridges that will help enhance the individual's wellbeing in daily built environments. The hope is that the time required does not go beyond that of our evolution ...

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