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Unveiling biophilia in children using active silence training: an experimental approach

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Abstract. Biophilia – the innate tendency of human beings to focus on and to affiliate with natural life emotionally – occurs spontaneously in school children. In this study we hypothesized that the development of biophilia is facilitated by an active silence training (AST). In AST silent observation is used as a means to achieve self-knowledge, while games are used as a way of evoking fascination, i.e. to help directed attention to rest and to be restored. Therefore an experimental protocol was set up with aim of assessing how effective the AST would be in restoring the attention of 120 children of a primary school in Aosta (Italy). The results show that the experimental group's performance on the attention test improved as a result of the AST, without affecting either systolic or diastolic blood pressure. Hence, AST seems to be a good way to restore children's attentional capacity.
Keywords: biophilia; active silence; direct attention; fascination.

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***Perspective**: Educational vision*

***Fields**: Earth life support systems*

***Issues**: Educational processes – Affective Ecology*

1. Biophilia

On the basis of different experimental and empirical observations, some authors claim that an intimate relationship with nature is essential for harmonious personal growth (Kellert, 1997; Kahn, 1999; Camino, 2005; Louv 2005). Indeed, the loss of contact with the natural world that is typical of the industrialised era we live in, can cause serious damage to children's mental and physical development, impoverishing their sensory capacity, making thought less effective and rendering their spirituality more barren (Vegetti Finzi, 2006). However, it would seem that, during our species' long evolutional path, we have acquired an instinct that facilitates the recovery of psychophysical balance simply through contact with the natural world. This instinct – or, more specifically, this set of phylogenetically adaptive rules of learning – is termed biophilia (Wilson, 1984; 1993). Biophilia was recently described as "the innate tendency to focus upon life and lifelike forms, and in some instances to affiliate with them emotionally" (Wilson, 2002, p. 134). Biophilia would appear to be present even in school children and could constitute a fundamental resource for the development of a profound ecological culture.

According to Edward O. Wilson, *attention*, i.e. the ability to be *fascinated* by natural stimuli, together with *empathy*, i.e. the ability to affiliate emotionally with various life forms, or, more specifically, to participate in their condition in a differentiated manner (Silvia Bonino, personal communication), are the two most important mental faculties characterising the human instinct to love and care for nature and should, therefore, be nurtured.

Attention concerns a variety of psychological phenomena. In particular, *direct* attention can be defined, in short, as the ability to inhibit or block distractions (competing stimuli) when performing an activity (Kaplan, 1995). Direct or *voluntary* attention (James, 1892) is employed when something is not, in itself, interesting/*fascinating*, but must be taken into consideration because it is necessary. William James (1892) stressed the central role of effort in this type of attention that, if subject to intense, prolonged requests, becomes saturated, leading to *mental fatigue*. Mental fatigue presents itself with a concomitant increase in distractability, tension and the presence of hostile and impulsive behaviour. Attentive efficiency can be recovered after a period of rest and regeneration, obtained through the activation of *involuntary* attention (James, 1892), or *fascination*, i.e. the type of attention that, according to Attention Restoration Theory (ART), does not require any effort on our part and is fatigue-resistant (Kaplan, 1995). Fascination can be derived from a process, such as playing, listening-telling stories, resolving problems, etc., or in the presence of people, animals, vegetation, etc. Exposure to fascinating stimuli allows direct attention to rest and regenerate after a state of mental fatigue (Berto, 2005).

Empathy, considered herein as the ability to feel, understand and share the thoughts and emotions of another person, evolves together with the child's mental development. Around the age of 3 or 4 years, children experience the first forms of empathy, that accompany them throughout childhood, through participatory sharing. During adolescence, with the development of an increasingly sophisticated cognitive ability, the ability to feel and share the thoughts and feelings of others is extended to the understanding of whole social groups (empathy for general conditions; Bonino, 1998). In a translated form, this ability is also extended to participating in the "emotions" and expressivity of animals and the sacred nature of plant life (Hill, 2000) and certain natural places (Naess, 1976; Snyder, 1990). Empathy is therefore transformed into *differentiated participation* in the various forms of life and natural objects (Barbiero, 2007).

Our hypothesis is that *fascination*, or involuntary attention, and *differentiated participation* can be favoured and sustained by mindfulness meditation (Segal, 2002; Kabat Zinn, 2005). In its basic form, mindfulness is an

active silence practice that offers the chance to experience moments of suspension from the many audio and visual stimuli and to establish a relationship with one's inner space. These were the premises on which we developed an experimental approach to teaching for primary school children aimed at stimulating biophilia, i.e. the child's inborn tendency to concentrate attention on forms of life and their surroundings, through the regeneration of attention and development of empathy. In this exploratory study, we present the trial protocol used to assess the efficacy of active silence training in the regeneration of direct attention in children.

2. A teaching approach for revealing biophilia in primary school children

2.1 Training attention: the "Room for silence" teaching module.

"Room for silence" is a teaching module that aims to introduce children and teachers into the dimension of silence through a specific type of *Active Silence Training* (AST; Freire, 2007). The module consists of six meetings held at school, with the following distribution:

- two preliminary meetings with class teachers;
- three meetings with the children;
- a final meeting with the teachers and the children's parents.

We will now take a more detailed look at these meetings.

2.1.1 Preliminary meetings with the teachers: "The practice of active silence in primary school teaching"

Teachers are invited to share a space in order to sit in silence and perform a creative activity - bodily expression, drawing or creative writing - guided by an instructor, a person considered to be an expert in mindfulness meditation (D.D.F., in our case), as well as a space in which to discuss the difficulties and the positive aspects that children and teachers could encounter when practising active silence. For the medium- and long-term success of the programme, the instructor gives the teachers a *specific* active silence training, in order to allow them to continue the activity unaided, by experimenting it on themselves and helping the children to achieve an aware and relaxed presence through a silent and conscious sitting posture that focuses on their breathing.

2.1.2 Meetings with the children

The preparatory teachers' meetings are followed by three meetings with the children. In the first meeting, titled "Breathing in silence", the children learn how to practice active silence, described in section 2.1.2.1; in the second "Learning from animals", they learn to develop the practice of active silence, described in section 2.1.2.2, and lastly, in the third session "Slow and gentle", they are introduced to the topic of "mental presence" or "tranquil mindful attitude", by becoming aware of their own breathing, as described in section 2.1.2.3. The teaching of active silence is performed compatibly with the children's times and needs.

2.1.2.1 First meeting: "Breathing in silence"

During the first meeting, the children are taught to simply listen to their breathing by trying to find the best posture for being able to hear it. Teachers and pupils learn to share a period of silence, even of just a few minutes, in a natural way, without trying to achieve any particular result. Indeed, this silence is not imposed on the children as usually happens at school, rather it is an experience shared in silence. By playing non-verbal games in which they perform breathing exercises in certain postures together, the teachers and children learn to release tension and the environment, intended as the place in which the active silence is practised, therefore becomes more tranquil and less demanding. This is, perhaps, one of the most moving parts of the whole experience, when adults and children feel the collective, rather than individual ability to grasp and share the

inner emotional states of the other human beings present.

2.1.2.2. Second meeting: "Learning from animals"

The second meeting, which takes place about a week after the first, involves an acting exercise. The children are invited to take part in a game in which they imitate animals. Each child is free to choose an animal and, in silence, to imitate its postures and gestures: looking for food and water, finding or building shelter, looking after itself and its young, resting, waking up, listening to the calls of other animals and so on. It is an elementary emotive contagion experience. Through motor mimicry, children tend to produce an emotive state similar to that which according to their own imagination is (or should be) that of the animal mimicked in that given context. During the exercise, the children are also asked to "listen" with their whole body: they learn from the animals they imitate to perform one action at a time (animals concentrate totally on what they are doing), not to waste (animals only eat or drink what they need, nothing more), to consciously observe the environment they live in even when they do not have anything else to do (animals do not get bored) and so on. Using the game as a basis, conversations and reflections on topics such as respect for nature, the environment and all the living beings that belong to it are developed with the children.

2.1.2.3 Third meeting: "Slow and gentle"

The third meeting takes place about one month after the second and focuses on the topic of slowness and gentleness. After some preliminary active silence exercises, the children are invited to pretend that they are clouds that peacefully overcome any obstacle, with no friction. The sense of lightness that the children feel whilst pretending they are clouds helps to create a positive emotive state in the children towards the other people or objects present in the space they are in, and that they interact with and touch when performing the exercise. After this game, the children are invited to think about the bond each of us has with nature, in order to develop an approach that can be lighter, more gentle and, ultimately, more naturally respectful. During this meeting, all those present (children, teachers and leaders) can share their comments and observations on this and the previous meetings.

2.1.3 Final meeting with teachers and parents

The final meeting involves the teachers and parents and starts with a moment of active silence, followed by the presentation of the instructor's observations. The aim is to establish an exchange between the experience of the instructor and the experience of the teachers and parents as witnesses of what the children express about the experience outside of school.

2.2 Educating empathy: the "I and others" teaching module

The "I and others" teaching module was developed specifically for this study. It was presented to the teachers and children in the weeks leading up to the active silence experience in order to prepare them gradually to grasp unconventional "ways" of conducting the day at school. The "I and others" teaching module is conducted by an expert in cooperative games for primary school children (M.F., in this case) and consists of two sessions following those with the teachers and before the "Room for silence" teaching module.

The teaching aim is to introduce the children to the empirical approach on different levels (Bonino, 1987; Loos, 1989; Novara, 1990; Jelfs, 1998). The game not only favours empathy, it is also a source of fascination (Kaplan, 1995), i.e. it attracts the child's attention spontaneously. Fascination is necessary for direct/voluntary attention, namely the attention that requires effort and is used by children during lesson time, to regenerate. The games in the "I and others" module (Bello, 2002) are designed to favour the involvement of the child's involuntary attention (James, 1892) by presenting fascinating stimuli, stimuli the child

pays attention to consciously but effortlessly. It is precisely the involvement of involuntary attention that allows direct attention to rest and, above all, regenerate (Kaplan, 1995; Berto, 2005).

3. The research hypothesis and experimental protocol

In order to assess whether the "Room for silence" module favours the regeneration of direct attention, an experimental protocol was designed involving 120 primary school children. The protocol involved the measurement of certain basic physiological parameters and the administration of a "sustained attention" test before, during and after AST for the entire trial cohort, consisting of children in the 1st, 3rd and 5th year of primary school. Pupils in the 2nd and 4th year, constituting a control group that did not participate in the AST experience, underwent parameter measurements and were administered attention tests. If AST favours attention regeneration, children in the experimental group would be expected to have better "sustained attention" test results than those in the control group. Specifically, it is supposed that the peaceful state induced by the silence practice and the possibility to allow direct attention to rest thanks to the game, make children in the experimental group more attentive when performing the attention test.

3.1 Measuring basic physiological parameters

In the month preceding the start of the study, information was collected on the gender, age, height and weight of each child. A digital automatic measuring device (Omron M6 Comfort, Omron Healthcare Co, Ltd, Kyoto, Japan) was used to record the heart rate and the maximum and minimum blood pressure values for each one. These physiological parameters were measured at three different time-points: before, during and after the AST. The measurements were performed simultaneously on children in both the trial and control groups. This made it possible to perform within subject and between subject analyses.

3.2 Measuring direct attention

The children's attention capacity was measured using the Continuous Performance Test (CPT), (Cornoldi, 1996). The CPT measures sustained-direct attention and the inhibition capacity and consists in searching for groups of three letters. The CPT includes three tests (CP1, CP2 and CP3), in which the order of the letters in the groups, the size of the letters and the spaces between the characters differ. The CPT measures 4 variables: the number of right answers, the number of wrong answers, the number of omissions and the time taken to complete the test. As with the measurement of the physiological parameters, the CPT was administered to children in both the experimental and control groups, before, during and after AST. Within subject and between subject analysis was also performed for the CPT.

4. Results

The data collected (physiological parameters and CPT performance) underwent *within*-subject analysis, i.e. making comparisons between the physiological parameters and CPT scores within each group (experimental and control), and between *between*-subject, i.e. by comparing the two groups with one another (experimental vs. control). Within group analysis on the CPT variables (correct answers, mistakes, omissions and completion time) showed that mean performance improved significantly between the first and third assessment ($p<.001$) for both groups: with an increase in the number of right answers and a reduction in both the omissions and completion times. Gender appeared to have an effect in the experimental group only ($p<.001$): girls in the experimental group performed better than both boys in the same group and the girls and boys in the control group. There was also a significant difference in test completion times between the

two groups: the experimental group was significantly faster than the control group. As far as the physiological parameters are concerned, the children who participated in the AST were not seen to have significant blood pressure variations (both systolic and diastolic) ($p > .05$), but they did have significant heart rate variations, with a mean reduction of 5% in all three classes taking part in the training. AST would therefore seem to slow the children's heart rate, without affecting their blood pressure. There was no significant change in the control group. The results therefore showed that girls were more receptive than boys to AST and that, regardless of gender, participation in the AST made the children calmer, but, above all, regenerated, in terms of a faster attention test completion time than the control group. According to our hypothesis, the regeneration of attention capacity is due to the fascination exerted by the "Room for silence" module, which is thought to allow direct-voluntary attention to rest momentarily, by capturing involuntary attention. i.e. fascination. According to ART, the only way to regenerate from mental fatigue is to allow one's fascination to "wander", so that direct attention rests and is regenerated and can be used again efficaciously (Kaplan, 1995).

5. Discussion

Active Silence Training (AST) is a form of mindfulness meditation, adapted to suit school children. As stated in the introduction, mindfulness is an active silence practice that arises as a desire for an inner space in which physical and mental "noise" is suspended. According to Stephen Kaplan (2001), mindfulness maintains and regenerates direct attention. Although mindfulness meditation is not directly intended to fulfil this purpose, it shares one fundamental point with Attention Restoration Theory (ART): to avoid using direct attention when it is not necessary by eliminating voluntary participation in thought flows.

This point of contact between mindfulness and ART would appear to be particularly interesting, as the mechanism that makes inner dialogue possible is specifically *direct attention* (Kaplan, 2001; Kabat Zinn, 2005). Therefore, were mindfulness confirmed as being able to regenerate children's attention capacity, it could constitute the first part of a teaching programme intended to awaken children's biophilia and to develop their naturalist intelligence in a new and efficacious way (Gardner, 1999). Indeed, if biophilia truly depends on the mental faculties of attention and empathy, the practice of active silence could be supplemented with a corresponding educational activity to favour the emergence of the faculty of empathy and compassion (Boella, 2004).

Our current hypothesis is that the biophilia potential of each child has a better likelihood of being realised if accompanied by an educational programme involving active silence and interpersonal and interspecific relations, i.e. those between human beings and other species, aimed at favouring the maturation of an ecological awareness (Barbiero, 2009). A programme that, by analogy with others developed previously in other sectors (Kabat Zinn, 1990; Segal, 2002), we suggest calling *Mindfulness-Based Affective Ecology*.

Mindfulness-Based Affective Ecology could represent an important research-action tool in the context of what could be termed *affective ecology*, i.e. the sector of ecology that deals with the establishment, growth and maturation of genetically determined and evolutionarily adaptive cognitive and affective relationships between human beings and other living organisms (Barbiero, 2011). Affective ecology is an essential part of the affective appraisal process of environments, namely the attribution of affective qualities to environments that is closely connected to environmental preference. Affective appraisal is also one of the components of environmental schemas (cognitive, behavioural, affective and appraisal component) i.e. the knowledge structures that organise environmental information deriving from perception and that guide behaviour (Berto, 2002), thereby contributing to the process of familiarising with the environment.

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References

Barbiero, G. (2007) Una mente silenziosa immersa nella natura. In G. Barbiero, A. Benessia, E. Bianco, E. Camino, M. Ferrando, D.D. Freire & R. Vittori *Di silenzio in silenzio*. Cesena, IT: Anima Mundi, 23-56.

Barbiero, G. (2009) Revealing children's biophilia. In D. Gray, L. Colucci Gray and E. Camino (eds). *Science, society and sustainability: education and empowerment for an uncertain world*. Milton Park, UK: Routledge, 181-184.

Barbiero, G. (2011) Biophilia and Gaia. Two Hypothesis for an Affective Ecology. *Journal of Bio-Urbanism*, **1**: 11-27. Available from: http://www.journalofbiourbanism.org/2012/barbiero/

Bello, D., Bo, M., Ferrando M. (2002), *Lezioni per star bene a scuola. Percorsi di educazione alla consapevolezza di sé, alle differenze, all'ambiente*. Milano, IT: Elmedi Paravia Bruno Mondadori.

Berto, R. (2002) Codifica e caratteristiche del paesaggio che ne influenzano il ricordo. In C. Gallo Barbisio, L. Lettini e D. Maffei (a cura di), *La narrazione del paesaggio*, Torino, IT: Tirrenia Stampatori, 186-192.

Berto, R. (2005) Exposure to restorative environments helps restore attentional capacity. *Journal of Environmental Psychology* 25: 249-259.

Boella, L. (2004), *Grammatica del sentire*. Milano, IT: CUEM.

Bonino, S. (1987), *Bambini e nonviolenza*. Torino, IT: Edizioni Gruppo Abele.

Bonino, S., Lo Coco, A., Tani, F. (1998), *Empatia*. Firenze, IT: Giunti.

Camino, E., Barbiero, G. (2005) Connessioni, reti da svelare, trame da tessere per un cammino verso la sostenibilità. In Falchetti E. e Caravita S. (a cura di), *Per una ecologia dell'educazione ambientale*. Torino, IT: Edizioni Scholé Futuro, pp. 101-112.

Cornoldi, C., Gardinale, M., Masi, A., Pettinò L. (1996), *Impulsività e autocontrollo*, Gardolo, IT: Erickson.

Freire, D.D. (2007) Spazio al Silenzio . In G. Barbiero, A. Benessia, E. Bianco, E. Camino, M. Ferrando, D.D. Freire, R. Vittori *Di silenzio in silenzio*. Cesena, IT: Anima Mundi, 105-120.

Gardner, H. (1999) *Intelligence reframed*. New York, NY: Basic Books.

Hill, J. (2000) *The Legacy of Luna*. New York, NY: Harper & Collins.

James, W. (1892) *Psychology: The briefer Course*. New York, NY: Holt.

Jelfs, M. (1998) *Tecniche di animazione*. Torino, IT: Leumann, LDC.

Kabat-Zinn, J. (1990) *Full Catastrophe Living*. New York, NY: The Bantam Dell Publishing Group.

Kabat-Zinn, J. (2005) *Coming to our senses*. New York, NY: Hyperion.

Kahn, P.H. (1999) *The Human Relationship with Nature*. Cambridge, MA: MIT Press.

Kaplan, S. (1995) The restorative effects of nature: Toward an integrative framework. *Journal of Environmental Psychology* 15: 169-182.

Kaplan, S. (2001) Meditation, restoration and the management of mental fatigue. *Environment and Behaviour* 33 (4): 480-506.

Kellert, S.R. (1997) *Kinship to Mastery*. Washington D.C.: Island Press.

Loos, S. (1989) *99 giochi cooperativi*. Torino, IT: Edizioni Gruppo Abele.

Louv, R. (2005) *Last Child in the Wood*. Chaspel Hill, NC: Algoquin Books.

Naess, A. (1976) *Okology, samfunn og livsstill*. Oslo, NO: Universitetsforlaget.

Novara, D. (1990), *Educazione ai rapporti*. Torino, IT: Edizioni Gruppo Abele.

Segal, Z.V., Williams, J.M.G., Teasdale, J.D. (2002) *Mindfulness-Based Cognitive Therapy for Depression*. New York, NY: The Guilford Press.

Snyder, G. (1990) *The Practice of Wild*. Berley; CA: North Point Press.

Vegetti Finzi, S. (2006) Prefazione al libro R. Louv, *L'ultimo bambino nei boschi*. Milano, IT: Rizzoli.

Wilson, E.O. (1984) *Biophilia*. Cambridge, MA: Harvard University Press.

Wilson, E.O. (1993) Biophilia and the Conservation Ethic. In S.R. Kellert and E.O. Wilson (eds.), *The Biophilia Hypothesis*. Washington DC: Island Press.

Wilson, E.O. (2002) *The Future of Life*. New York: Alfred A. Knopf.