Does the human brain really like ICT tools and being outdoors? A brief overview of the cognitive neuroscience perspective of the CyberParks concept

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Abstract – *The paper presents an overview of the latest studies on cognitive neuroscience that can help evaluate concepts that promote technologically-enhanced outdoor activities, such as CyberParks. The following questions are asked in the paper: does the human brain really like ICT tools? Does the human brain really like being outdoors? And finally: does the human brain really like technologically-enhanced outdoor activities? The results of the studies presented show that the human brain does not like ICT tools yet, it likes being outdoors very much. At the same time, it was shown that outdoors activities may be encouraged by ICT tools, yet outdoors activities themselves should be free from ICT tools. Using ICT tools and physical activity at the same time is a dual task, a type of activity that leads to cognitive and physical processes being destabilised, which leads to weakened effects of both cognitive and physical tasks. From the perspective of cognitive neuroscience, CyberParks are not a solution that the human brain really likes. Another issue is also discussed, namely: do technologically-enhanced outdoor activities—such as in CyberParks—really increase the quality of life?*

Keywords—quality of life, ICT tools, outdoor activities, technologically-enhanced outdoor activities, human brain, cognitive neuroscience

I. INTRODUCTION: FROM CLASSROOMS WITH LINKED COMPUTER TERMINALS TO CYBERPARKS

It is commonly assumed that information and communication technology tools (ICT tools) have a great impact on the quality of life. In the debate on the relationship between ICT tools and the quality of life, the topic of education is extensively covered. As many researchers claim ([1], [2], [3], [4], [5]), ICT tools not only enrich teaching and learning activities, but also condition the quality of today's education. Salehi, Shojaee and Sattar [6] even assume that the introduction of ICT tools to education is absolutely necessary for living in the contemporary world. ICT tools ensure twenty-first century skills ([7], [8]) and "create a bridge between students' needs and expectations and labour market demands" [9].

Without doubt, the growth of ICT tools has dramatically reshaped education [9]. The process of these transformations started as early as the beginning of the 20th century when the first video films (starting in the 1900s) and Pressey's mechanical teaching machines (starting in the 1920s) were introduced at schools. However, it was not until the year 1960 that a true breakthrough happened and the era of ICT tools in education started. It is when researchers at the University of Illinois created the first classroom system based on linked computer terminals. The same year saw Suppes and Atkinson conduct experiments on the influence of working with a computer on the process of reading and learning math by children in California. Three years later Luskin installed the first computer in a community college. In the years 1970s-80s Turoff and Hiltz developed computer-based learning programmes at the New Jersey Institute of Technology. In 1976 Luskin—using the KOCE-TV television station as a vehicle—launched the Coastline Community College as a "college without walls". In the mid 1980s, distance learning courses using computer networking started to emerge, as well as ideas such as computer-based training (CBT), computer-based learning (CBL), or even e-learning systems in an embryonic form based on computer supported collaborative learning (CSCL). In 1990, the process of using the World Wide Web to create fully autonomous learning and teaching environments started, and as early as in 1994—barely 34 years after the first classroom system based in linked computer terminals was created—the first online school was founded [11].

The beginning of the 21st century is a period of the global full bloom of the strategy for educational applications of ICT tools, which is exemplified by the incredible development of e-learning, m-learning and u-learning. What is considered to be the most advanced stage of changing education through new ICT tools, however, is currently smart education ([12], [13], [14], [15], [16], [17]), a concept of resting education on ICT tools to the maximum ([18], [19], [20]), particularly on: mobile computing ([18], [20], [21]), digital textbooks ([14], [15], [22]) and cloud computing ([14], [15], [19], [23], [24], [25], [26]).

CyberParks are supposed to be one of the innovative instances of smart education, understood as open public spaces (i.e. a park, garden square, plaza, etc., or a natural space inserted in an urban setting, or an urban forest, a protected landscape, etc.) with an augmented digital dimension. CyberParks strive to transform public spaces into interactive and immersive learning environments (outside curriculum or extended school studying) capable of increasing social, communicative, and possibly collaborative skills. In simple words, CyberParks are meant to be a space for technologically-enhanced outdoor activities ([27], [28]). What is more, CyberParks are considered a technological response for new standards in education (that are at the same time an element of cultural trends in improving the quality of life) such as: nature-based and whole-body learning or learning experiences in an outdoor setting [29].

However, do CyberParks as spaces for technologically-enhanced outdoor activities indeed become a concept for improving the quality of life of the contemporary human? In COST Action TU 1306[1], over 80 researchers from 30 countries make an attempt at providing an

[1] European Cooperation in Science and Technology Action: *Fostering knowledge about the relationship between Information and Communication Technologies and Public Spaces supported by strategies to improve their use and attractiveness (*CYBERPARKS) (TUD COST Action TU1306): http://www.cost.eu/COST_Actions/tud/TU1306; http://cyberparks-project.eu.

answer to this question by conducting interdisciplinary analyses of the social, academic and educational sense of the CyberParks concept. This paper shall present one of the perspectives of these analyses: the cognitive neuroscience perspective. Developing this perspective seems very important, because in spite of a large inflation of publications on brain-based learning and brain-based education ([30], [31]) a gap between neuroscience and educational practice still exists, which is confirmed by numerous studies [32]. Thus, this paper shall attempt to answer the following questions: does the human brain really like ICT tools? Does the human brain really like being outdoors? And finally: does the human brain really like technologically-enhanced outdoor activities? The attempt shall be based on the review of the latest literature resources on cognitive neuroscience [33]. Presenting the cognitive neuroscience perspective of technologically-enhanced and outdoor activities may become an interesting point of reference for further works related to the development of the CyberParks concept and encourage a debate on the crucial issue: do technologically-enhanced outdoor activities, such as CyberParks, really increase the quality of life?

II. DOES THE HUMAN BRAIN REALLY LIKE ICT TOOLS?

The socialisation influence of ICT tools on the contemporary human is of such common and global character that ICT tools are more and more frequently introduced in human development models as one of its key determinants. It would seem that the most evident example of this type of change is the new version of one of the most important human development models, i.e. Bronfenbrenner's model of the ecological systems theory (this model assumes that human development occurs in four overlapping ecosystems: microsystem, mesosystem, exosystem and macrosystem). It was built by Johnson and Puplampu by creating a new dimension of the microsystem (according to Bronfenbrenner, a microsystem covers individual experiences gathered in the closest environment): the ecological techno-subsystem [34]. The ecological techno-subsystem includes a person's "interaction with both living (e.g. peers) and non-living (e.g. hardware) elements of communication, information, and recreation technologies in immediate or direct environments" [35] (see figure 1).

Many studies are conducted that aim at defining the effects of creating techno-subsystems [36]. One of the scopes of these studies encompasses neural effects of ICT tools use, and is thus linked to research on the changes caused by ICT tools in the human brain. This field, however, is not particularly popular in cognitive neuroscience; as a consequence we still know very little about the neural effects of ICT tools use (quite contrary to what we know about the neural correlates and neural effects of non-ICT tools use, as this field boasts very reliable knowledge ([37], [38], [39], [40], [41]). Nevertheless, cognitive neuroscience does formulate some stipulations that cast some light on the issue.

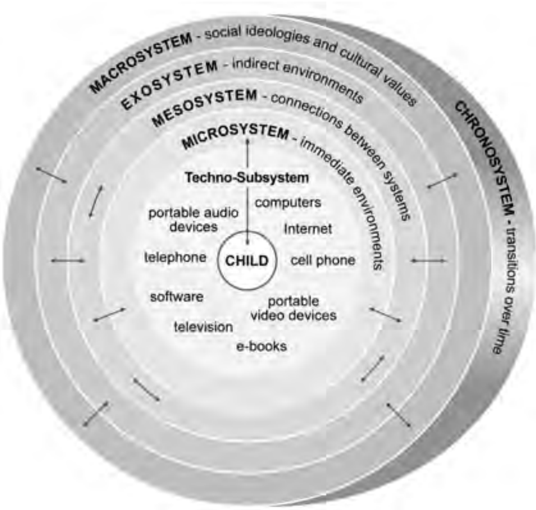

Fig. 1. Johnson and Puplampu found a new dimension of the Bronfenbrenner's model of the ecological systems theory. This model assumes that human development occurs in four overlapping ecosystems: microsystem, mesosystem, exosystem and macrosystem. According to Johnson and Puplampu (2008), in contemporary times the microsystem should be expanded with the ecological techno-subsystem. This subsystem includes ICT tools and shows how strong and common its socialisation influence on the contemporary human is. Source: G.M. Johnson, and K.P. Puplampu, "Internet use during childhood and the ecological techno-subsystem," Canadian Journal of Learning and Technology, vol. 34, no. 1, 2008. Under the terms of the Creative Commons Attribution License.

For instance, researchers ([42], [43], [44], [45]) quite agree that ICT tools use changes the way of thinking or even leads to the creation of a new structure of thinking, or, simply, that ICT tools change in a sense the human brain. What does that mean? According to de Kerckhove [46], under the influence of ICT tools people acquire the ability to quickly search through reality and learn through cooperation, yet they also lose the habit of linear (quiet and ordered) thinking and begin to think in a quick and careless, even chaotic, way, as if they were clicking links on a website without any plan.

De Kerckhove's thesis is confirmed by the results of several studies. For example, Hadar et al. [47] studied cognitive changes and brain activity changes associated with smartphone usage. The participants of this study were 38 healthy adults lacking any previous experience with smartphones (nonusers) and 17 healthy adults classified as extensive smartphone users. It turned out that extensive smartphone users obtained significantly lower accuracy rates than nonusers in the information processing task. Further analyses with the use of electroencephalography (EEG) and transcranial magnetic stimulation (TMS) indicate lower prefrontal long-interval cortical inhibition (LICI) in extensive smartphone users group as compared with nonusers. What is more, in the second part of the study the researchers divided nonusers into two groups: an experimental group, that started using smartphones, and a control group (that continued not to use smartphones). After three months it was found that the participants from the experimental group experienced a significant decrease in information processing capacity (whereas the effect did not occur in the control group).

On the other hand, Loh and Kanai [48] found that media multitasking, i.e. simultaneous use of many ICT tools (e.g. computer and TV) and simultaneous use of ICT tools and carrying out other activities (e.g. using a smartphone while walking) negatively affects the human brain. Researchers calculated the Media Multitasking Index (MMI) of 70 volunteers (healthy adults) and then examined them with the functional magnetic resonance imaging (fMRI) method. It turned out that participants with a higher MMI had smaller gray matter density in the anterior cingulate cortex (ACC) (see figure 2). ACC serves as a crucial nexus of information processing pathways in the human brain, thus smaller gray matter volumes in the ACC may cause poorer cognitive control performance and worse effects of learning.

It is worth adding that several studies ([49], [50]) show that using ICT tools may still have a positive influence on the improvement of cognitive skills such as memory and attention in older adults. What is more, other studies show that ICT tools may also positively influence brain functioning in people with brain dysfunctions [51].

Gindrat et al. [52] found that the very use of a smartphone understood as a touchscreen phone and consisting in clicking on a flat screen with fingers irrespective of the type of the task carried out changes the human brain. These researchers used the electroencephalography (EEG) method to examine 37 right-handed volunteers, 26 of whom used touchscreen phones and 11 of whom used old-technology mobile phones (with a standard keypad). They measured the cortical potentials in response to mechanical touch on the thumb, index, and middle fingertips. It turned out that the participants who used smartphones processed tactile stimuli in a completely different way than old-technology mobile phones users. A detailed analysis of the EEG record shows that touchscreen phone use reorganised the representation of the fingertips in the somatosensory cortex. It is thus another interesting piece of evidence for the plasticity of the somatosensory cortex, one that can, however, cause considerable anxiety. Indeed, the plasticity of the somatosensory cortex is thus associated with the development of chronic pain, and as several studies uncovered there is a correlation between excessive phone use and motor dysfunctions and pain. For instance, Berolo, Wells and Amick [53] found significant associations included the total time spent using a mobile device and pain in the right shoulder and neck. It is thus probable that the reorganisation of the somatosensory cortex caused by intensive touchscreen phone use correlates with the development of chronic pain (for example in the right shoulder and neck).

It is worth adding, however, that the study conducted by Kretzschmar et al. [54] with the use of the electroencephalography (EEG) method and eye tracking shows that in the context of processing a written text there is no difference in what reading devices we use (a paper page, an e-reader or a tablet computer). These researchers therefore suggest that the overwhelming public opinion that digital reading media, though convenient, change the processing of a text is a cultural rather than a cognitive phenomenon. As Asakawa et al. [55] found, a similar state of affairs occurs in the context of photographs, i.e. irrespective of whether they are printed out or displayed on the screen of an electronic device, they cause analogous changes of emotions. The negative influence of ICT tools on the human brain applies not so much to the use of ICT tools itself, but rather to the type and intensity of an activity. Thus, using ICT tools for activities such as reading and browsing through photos should not be correlated to negative changes in the human brain.

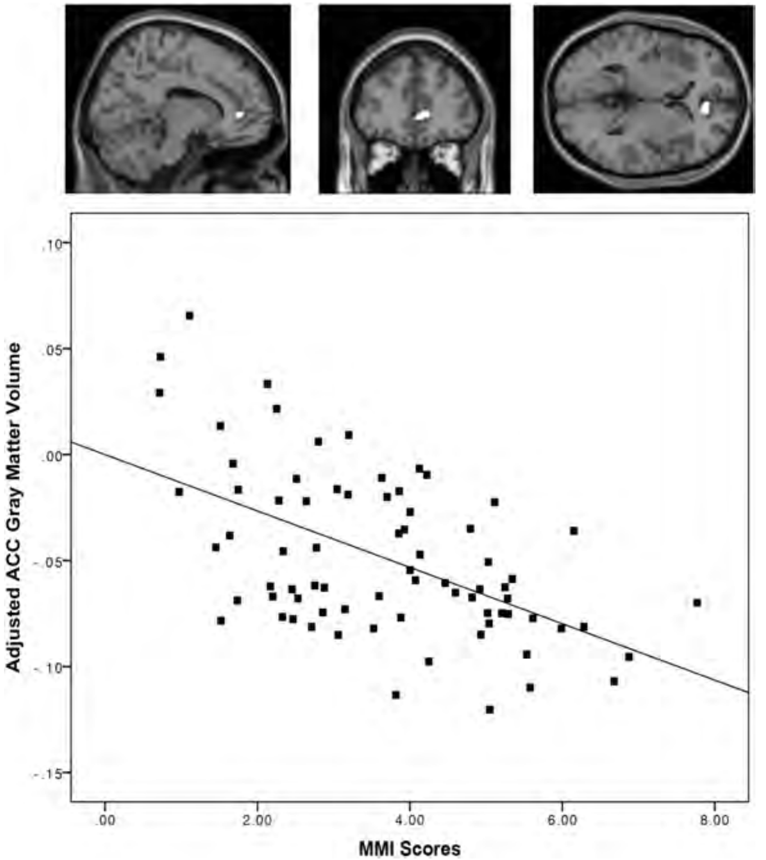

Fig. 2. Loh and Kanai found that media multitasking negatively affects the human brain. Participants with a higher Media Multitasking Index (MMI) had smaller gray matter density in the anterior cingulate cortex (ACC). MMI scores are thus significantly associated with gray matter density in the ACC. Source: K.K. Loh, and R. Kanai, "Higher Media Multi-Tasking Activity Is Associated with Smaller Gray-Matter Density in the Anterior Cingulate Cortex," PLoS ONE, vol. 9, no. 9, pp. 1-7, 2014, doi: 10.1371/journal.pone.0106698. Figure 1 doi:10.1371/journal.pone.0106698.g001. Under the terms of the Creative Commons Attribution License.

At the same time, many researchers claim that the human brain "likes" ICT tools. Why is that? Most frequently, without reference to reliable results of experimental studies, they underline that people learn most efficiently through novel stimulus and challenges, and ICT tools provide them with ceaseless novelties and challenges [30]. The latest studies ([56], [57], [58]) do not, however, confirm this observation. It is because ICT tools become an attractive tool for learning only for those individuals who are cognitively playful, i.e. for people for whom most tools available have cognitive potential.

As the results of the latest studies in cognitive neuroscience suggest, ICT tools may negatively affect the human brain. Furthermore, the commonly accepted statement that all students and young people develop better when they use ICT tools seems untrue. It would thus seem that the human brain not always (or even: very seldom) really likes ICT tools.

III. DOES THE HUMAN BRAIN REALLY LIKE BEING OUTDOORS?

ICT tools are often perceived as a kind of panacea for all the maladies of education. Many problems occurring at schools around the world are attempted to be solved through investments in ICT tools. To a large extent, modern curriculum designs describe the best learning environments as technology-based classroom learning environments ([59], [60]). However, studies do not confirm any positive correlation between students' progress and the level of implementation of ICT tools in education. Quite the contrary, many studies show that changing a technology-based learning environment to an outdoor (nature-based, authentic, experiences etc.) learning environment, considerably stimulates the effectiveness of learning (for a brief review of this problem, see: [59]).

Outdoor learning is also perceived as a brain-friendly learning environment. It is assumed that being outdoors stimulates the most effective forms of learning such as learning through physical and multisensory activity [30], and at the same time supports maintaining mental health [61]. For example, studies indicate that the more time children spend outdoors, the more physically active they are (1 hour outdoors equals to approximately 27 minutes more of physical activity) and that the closer children live to an area with more natural surroundings, the less psychological distress they feel [62], as well as that, moving the classroom to forest at least once a week improves pupils' mental health considerably [63].

Being outdoors also stimulates attention, improves cognitive processes and encourages learning. The open space does not, however, lead to an excessive use of the brain's energy that would otherwise create cognitive fatigue, but actually encourages a sense of cognitive clarity and removes confusion ([29], [64]).

Volta et al. [65] found that during physical activity in the open space, greater activation occurs in the human brain, as compared to a narrow space. The researchers used the methods of functional magnetic resonance imaging (fMRI) and rolling cylinder. Laying down in an fMRI scanner, 17 participants took a walk (through a rolling cylinder) watching two films: an open-space video clip that showed a countryside view, and a narrow-space video clip that showed a narrow corridor. It turned out that greater activation in the primary visual cortex (see figure 3) occurs while processing the open space as compared to the narrow one. The open space includes more different elements (grass, road, houses, street lamp, mountains, and so on) than the narrow space, thus processing this space stimulates cognitive activity more ([66], [67]). In short, physical activity outdoors has a considerably higher potential for cognitive processes than indoor physical activity.

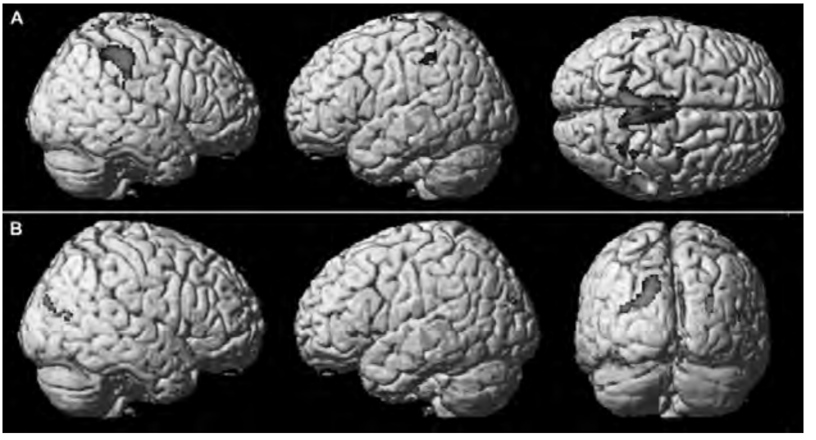

Fig. 3. Volta et al. found that (A) while processing the open space greater activation in the primary visual cortex occurs (B) as compared to the narrow one. The open space includes more different elements (grass, road, houses, street lamp, mountains, and so on) than the narrow space, thus processing this space stimulates cognitive activity more. Source: R.D Volta, F. Fasano, A. Cerasa, G. Mangone, A. Quattrone, and G. Buccino, "Walking indoors, walking outdoors: an fMRI study," Frontiers in Psychology, vol. 6, 2015, doi:10.3389/fpsyg.2015.01502. Under the terms of the Creative Commons Attribution License.

Shin et al. [68] found, however, that not every type of open space stimulates cognitive processes positively. The researchers analysed the cognitive effects of a walk through a pine forest versus downtown streets. One day, participants took a 50-minute walk in a forest, and another day a walk of the same length in a city. Before and after each walk they underwent cognitive and mood assessments. It turned out that the walks in the forest caused much better mood improvement than the city walks. What is more, only after walks in the forest participants' cognition was observed to improve. Similar results were obtained by Weinstein, Przybylski, and Ryan [69]. They also indicate that immersion in natural environments correlates positively with the fulfilment of psychological needs. On the other hand, Nisbet and Zelenski [70] found that outdoor walks in nearby nature increase the feeling of happiness.

In a meta-analytic study, Cassarino and Setti [71] show, however, that in some studies the city activity's positive influence on cognitive processes was noticed, e.g. on the ability to focus attention. Yet, this positive increase is always positively correlated with the cognitive load and many disturbances in the process of scanning the environment.

As suggested by the results of the latest studies in cognitive neuroscience, being outdoors, close to nature, may influence the human brain positively. It seems therefore that the human brain almost always really likes being outdoors.

IV. DOES THE HUMAN BRAIN REALLY LIKE TECHNOLOGICALLY-ENHANCED OUTDOOR ACTIVITIES?

Knowing about the beneficial influence of physical activity on our health—physical and mental—attempts are made at creating ICT tools that will encourage physical activity [72]. Many studies show that indeed ICT tools may stimulate activities. For example, Lubans et al. [73] found that a smartphone application called ActiveTeen Leaders Avoiding Screen-time (ATLAS) may promote physical activity and—interestingly—reduce screen-time behaviours. What is more, Stuckey, Kiviniemi and Petrella [74] prove that applications of the mHealth type implemented for smartphones can stimulate activities in a way that improves heart rate variability (HRV) by increasing and decreasing high and low frequency powers in normalised units, respectively, which may be incredibly meaningful in the context of diabetes and prevention of cardiovascular diseases. Attempts at combining ICT tools and physical activity can also be exemplified by the already common active video games (AVG) and technologies of the Microsoft Kinect and Nintendo Wii type [75].

There are also several ideas about how to include ICT tools in outdoor activities. Apart from the CyberParks concept discussed in this work, projects that fit the trend of technology-enhanced outdoor learning experiences can be enumerated, for example: Adventure Learning at Taylor Wilderness Research Station, Adventure Learning at Main Salmon River, CreekPlace Summer Camp, Adventure Learning at MOSS (AL@MOSS), YoTeach!: Adventure Learning in a Higher Education Setting (for a brief review of these projects, see: [76]). Nevertheless, it has to be stressed that numerous opposite projects are also created as far as the idea for including ICT tools in outdoor activities which are based on the assumption that for the good of our physical, mental and cognitive health outdoor activities should be freed from ICT tools [29].

Studies in cognitive neuroscience confirm that the above assumption makes sense. For instance, Uhls et al. [77] found that outdoor activities without screens improved preteen skills with nonverbal emotion cues. The researchers organised a 5-day nature camp for 51 preteens. During the camp the preteens were not allowed to use TV, computers and mobile phones. Before and after the nature camp preteens underwent a test that required participants to infer emotional states from photographs of facial expressions (the second edition of the Diagnostic Analysis of Nonverbal Behaviour—DANVA2—was used for this purpose) and videotaped scenes with verbal cues removed (The Child and Adolescent Social Perception Measure—CASP—was used for this purpose). Their results were compared with the results of a control group comprised of 54 preteens who used ICT tools normally. It turned out that the experimental group's recognition of nonverbal emotion cues improved significantly more than that of the control group for both facial expressions and videotaped scenes (see figure 4).

Outdoor activities without ICT tools are thus something of a mental break [29] and improve a human's understanding of nonverbal emotional cues [77]. What is more, cognitive neuroscience calls outdoor activities with ICT tools, such as a smartphone used while walking, dual tasks, which require an appropriate allocation of cognitive and physical resources to each task. A dual task, i.e. cognitive-motor interference, leads to an overload of central resources, and thus to destabilisation of the course of cognitive and physical processes, whose consequence is the weakening of both cognitive and physical tasks. This is why using ICT tools while outdoor activities increases the risk of a fall and disrupts the processing of the open space. This effect is called dual-task cost in cognitive neuroscience [78].

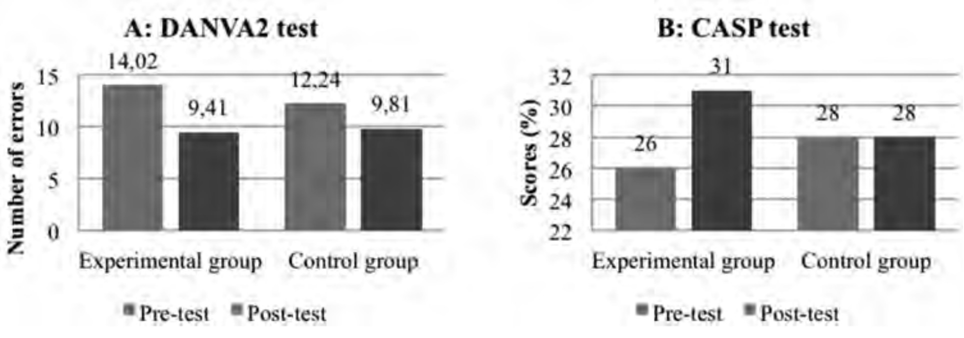

Fig. 4. Uhls et al. found that a nature camp without screens (such as TV, computers and mobile phones) improves preteen skills with nonverbal emotion cues. (A) In the experimental group (that took part in the nature camp), a significantly bigger error reduction occurred from pre-test to post-test in assessing emotions on DANVA2 faces than in the control group (that did not take part in the nature camp). (B) The same effect was observed using CASP: ability to correctly identify emotions of actors was significantly greater for experimental group than for the control group. Source: own work based on: Y.T. Uhls, M. Michikyan, J. Morris, D. Garcia, G.W. Small, E. Zgourou, and P.M. Greenfield, "Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues," Computers in Human Behavior, vol. 39, pp. 387-392, 2014, doi:10.1016/j.chb.2014.05.036.

As the results of the latest studies mentioned above suggest, ICT tools may positively influence the level of outdoor activities and encourage those types of physical activity that have a positive impact on our physical, mental and cognitive health. Using ICT tools during outdoor activities may, however, negatively affect the human brain, and destabilise cognitive, emotional and physical processes. Outdoor activities can thus be stimulated or brought about by ICT tools, yet it is more recommendable for them to occur without ICT tools, as the human brain rather dislikes technologically-enhanced outdoor activities.

V. DISCUSSION: DO TECHNOLOGICALLY-ENHANCED OUTDOOR ACTIVITIES REALLY INCREASE THE QUALITY OF LIFE?

The studies presented show that the human brain rather dislikes ICT tools. Intensive use of ICT tools negatively affects the information processing capacity and reorganises the human brain in a negative way, the consequence of which can be, for example, the development of chronic pain. Media multi-tasking has a particularly negative impact on the human brain. What is more, the cognitive neuroscience perspective shows that ICT tools can be an attractive learning tool only for a narrow group of people who are cognitively playful.

Being outdoors is a completely different story. The human brain likes being outdoors very much. Being outdoors activates the human brain, improves cognitive processes and is a context for maximally optimum learning. The best form of outdoor activity for the human brain is activity in nearby nature. Immersion in natural environments stimulates the human brain, improves one's mood, improves cognition and increases the feeling of happiness.

ICT tools may encourage outdoor activities, yet they should be free from ICT tools. The simultaneous use of ICT tools and physical activity is a form of dual task, a type of activity that leads to the destabilisation of the course of cognitive and physical processes, which leads to the weakening of the effects of both cognitive and physical tasks.

From cognitive neuroscience's point of view, CyberParks, which are supposed to be a space for technologically-enhanced outdoor activities, are thus not a solution the human brain really likes. Certainly, it is only one of many possible perspectives. It is also worth adding that cognitive neuroscience includes projects directed at the strong development of ICT tools, thus at variance with the results of the studies presented. For example, smartphone applications are created to monitor physical activity [79], smartphones are used in experiments (e.g. in laterality research) ([80], [81]) and called pocketable labs for mobile brain imaging and neurofeedback [82] or portable real-time neuroimaging systems [83]. It is even said that the smartphone technology "presents exciting opportunities for cognitive science as a medium for rapid, large-scale experimentation and data collection" [84]. Furthermore, visions for transforming smartphones into cognitivephones are created where they would monitor and stimulate a human's physical, cognitive and mental health, as well as modify their behaviour or even control their brain [85].

Outdoor activities in nearby nature, for example in a park or forest, seem to be one of the few activities that can still be carried out without ICT tools. What is more, while outdoors in nearby nature the human brain can function optimally and relax from the overburden resulting from the use of ICT tools. Thus, should the attempt at combining technology tools and nature be supported? Do technologically-enhanced outdoor activities increase the quality of life? To answer this question—and as a means to conclude this paper—it is worth recalling the message of the famous essay written in 1928 by Benjamin and titled *To the Planetarium*.

At the beginning of the essay [86], Benjamin remarks: "Nothing distinguishes the ancient from the modern man so much as the former's absorption in a cosmic experience scarcely known to later periods". What Benjamin resonates about is that the cosmos was enacted for the first time on a planetary scale, through the spirit of technology during the First World War, whereas "the ancients' intercourse with the cosmos had been different: the ecstatic trance". The modern man's lust for power, and misreading of technology, that is, technology as the mastery of nature—just like the "imperialist teach", claims the philosopher —led technology to "betray man, turning the bridal bed into a bloodbath". The revolutionary character of modern technology, and the cosmic experience, was only attained by the destructive powers of modern warfare. Here, the emancipatory potential of technology thus turned into its very opposite. The important proposition to be grasped is that technology does not mean the mastery of nature but the mastery of the relation between the man and nature. Benjamin continues: "Men as a species completed their development thousands of years ago; but mankind as a species is just beginning his". "In technology, a physis, is being organized". Therefore, technology cannot be regarded as an instrumental medium, but rather a way to reach the cosmic experience, as it renders possible the relation between individuals and nature. Nevertheless, only communally can humans ecstatically connect with the cosmos, and the organisation of this collective body requires both nature and technology. As technology, a pure mediation between mankind and cosmos, plays the role of a connector, the Planetarium (the theatre of projection) is the allegorical figure for this global constellation. Hence modern technology is the way to the Planetarium, which will bring a productive, harmonious interplay between humans and nature. This short essay bears Benjamin's political considerations at the outset of the 1930s. Technology can be seen here as a fetish of doom when regarded as a means of domination, but particularly as a key to happiness when it connects with nature on a global scale through a connection mediated with technological communication tools.

Within this scenario, a CyberPark can be seen as the mechanism through which the collective (humankind) can begin to take its own technological potential to foster the joyful connection between humans and nature. The German philosopher wisely identifies the biased reception of technology in the twentieth century: technology produces not only new objects but also new relations and new subjects. Therefore, instead of generating wars, Benjamin claims that politics should concentrate exclusively on bringing forth the organisation of a happy human community, where ultimately technology must subserve the constitution of this global park. This does not mean any cybernetically enhanced humanity, but rather a means to human self-overcoming.

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AUTHOR CONTRIBUTIONS

This project was conceptualised by MK. Resources on the cognitive neuroscience perspective of CyberParks were collected and analysed by MK. The Benjamin's perspective of CyberParks was conceptualised and analysed by CP. The manuscript was written by MK and CP.

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