

The Ministry of Interfaces (Doors)

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Abstract. For those, who measure the length of their lives in numbers of experiences instead of years lived; for those, who strive to pack the knapsack of their lives optimally, maximizing its utility. Interfaces can help to go beyond the traditional trio of body, mind, and spirit serving as doors connecting them. These doors, however, could allow for an unauthorized entry and pose threat to our safety, if not designed or protected properly. This science fiction prototype allows the reader to peep through one of the doors, imprudently left opened by someone from the era of Halls – the era that followed the times of virtual reality, computer games, and the Internet.

Keywords. Interfaces, intelligent environments, embodiment, immersion, personal and social space, security, encryption

Introduction

How often do we break our head and fists knocking into a door to find an entrance or escape, eventually realizing it was a wall that would never open? How often do we waste our energy trying to explain to someone our ideas, discovering at the end that both parties were actually talking about similar things but in different terms? How much time do we spend on writing reports or product specifications getting annoyed about the (often pointless) process of “moving boxes around”? There are so many templates, so many ways to present and to interpret data. How many valuable thoughts and ideas were lost just because we had no facility to write them down at the moment they occurred to us? If only the environment within and around us could capture and translate our thoughts and intentions and disseminate them in the format and the way that others could understand according to their picture of the world. We would be happy to know that our messages reach the right people (destination), at the right time, and in the form that receivers can accept, digest, and understand correctly. We would benefit from having our personal space (the environment directly and closely surrounding us) that is able to support both our internal harmony and effective interaction with the heterogeneous, ever-changing external world. The personal space should learn, adapt, and develop along with its owner, foreseeing his intentions, preventing from blunders and facilitating personal growth. It also needs to be protected.

This paper discusses and proposes possible solutions for the above issues (section 1), based on the author’s current research (section 3). Section 2 serves as a bridge between the fiction and reality; it encourages the reader to reflect on the science fiction prototype and perhaps draw their own conclusions before going into its interpretation by the author. Section 4 summarizes the paper.

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1. The Story

1.1. Preface

A Chinese language that has no tenses, voices, and numbers might be more suitable for the story. English, however, also provides (sometimes) useful tricks, such as hiding genders for example – the attribute that clearly represents the culture. While linguists explore the extent to which a language first shapes and then represents a person, this story explores the means that could help people to understand themselves and the world around them with its diversity of natural phenomena, human personalities, and their production.

For those who do not have time to read, the time might not come yet. We *have* time, when the time *comes*. For those who believe they do their best to welcome it, just a reminder: there is always a way to *do your best better*.

1.2. The Samovar

I am a bird. The state of flight brings the feeling of peace, balance, lightness, and power. Can power be light?

The sight of skyscrapers' tops gave a painful feeling. Sometimes, I fail to understand the Master of Landscapes; his logic is too complicated to me. Why, for example, the concept of something such as great as a skyscraper should indicate the end? I landed on a sunny roof and gave the gorgeous view a final greedy panoramic glance.

– If you hadn't eaten enough, licking won't help! – Quite reasonably admitted the Master of History passing my desk. – The concept of skyscraper is not nice, my dear boor; you should start studying history! – Announced the Master turning his head to show the edifying face.

– Good morning to you too, the respectful Master of History! – I smiled in response, switching off the Landscape Hall.

Actually, I could only guess it was morning. I spend a lot of time in the Embodiment Interface exploring various Halls, and never know what the real time is, if there is such. "Good morning" is just a regular phrase I use to greet the Master of History as he goes to the Samovar to fill his mug with something hot. Stereotypes are difficult to get rid of. The Master of History is a living proof of that; his personal drink is always hot and smells the same. I guess the Samovar brews the same liquid for him every day – very typical for conventional people.

– I wonder if one day you decide (or are forced) to reflect on your state in the evening; would it change my routine as well?

– You are right, brewing your liquids depending on your current state is a horrible invention; telling fortunes by coffee grounds is not a magic any longer!

– I think the Samovar is a great invention; I wouldn't blame it for your bad habits.

As opposed to the Master of History, who only uses the machine's functionality to prepare a drink that would harmonize his system, I mostly use it to bring myself to a certain state as required by a situation: to become alert, friendly, enthusiastic, creative, talkative, silent, concentrated, critical, and so on.

– Any pattern or mark makes us predictable – I continued developing my thought about habitual behavior. – For example, I always know which member of my

family has just been to my room by their natural or (even worse) perfume scent they left.

– You don't know for sure though, you only guess. It may be different from what it may seem; you could be tricked. Guessing about the history doesn't always help in explaining the present or predicting future. I have been hanging out in the Stonehenge Hall for a while now; I feel the place and time with every single cell in my body, but still cannot solve their puzzle.

– You might be right, I should try. I'm not sure why I haven't got any enthusiasm to explore the Historical Halls so far. – The thought of participating in the Crusade made me shudder inside. – I guess I am just not that keen to experience an earthquake or any other disaster; it seems our history is full of nasty events. It has now become clear to me what the Master of History meant about the skyscrapers.

– Also, – I continued my arguments – whose experience would it be: mine, or historians', or the Master's of Embodiment, or maybe the characters from the past themselves? I am not even sure that the thoughts and words you hear right now are actually mine. The Embodiment Interface indeed allows for simulations, testing, tasting, experiencing, and reflection. I wouldn't treat the gained insights as an ultimate answer, however.

– Hmm, I agree with you, it is not perfect yet. I need to work on the Historical Halls further.

– How can the development help in getting objective experience?

– Well, imagine you listen to a recorded symphony or experience any other production made in the past. Not hearing the violin part at present, doesn't make the symphony incomplete; the violin was still playing at the time. It might be that your recorder fails to reproduce the higher pitch, or your auditory perception system doesn't discern the frequency of the sound, or you are not paying attention to that timbre, or you are standing in the wrong location. The world is there, and it is up to you how you tune your personal space to interact with it: what to hear, what to see, what to let in and what to give out. Instead of blaming the creator, you should try to fix your system first.

– Are you saying that constant development should be our primary target if we want to understand the origin? But how would we recognize the moment when we have understood the complete picture correctly? Also, how can we be sure we are developing in the right direction, towards understanding the origin? A signal can be distorted to make it unrecognizable. If I hear a violin while listening to your symphony, does it mean I have achieved the target when developing my perception system? Or perhaps there was no violin in the original, but the sound has been tweaked later to create the illusion of hearing the violin?

– You reminded me of the Creator of our Ministry; he made healthy diet options to smell and taste like those not that beneficial to our health but nevertheless preferred by many. Have you seen the interview with the Ministry's Creator, by the way?

– No – I answered honestly. – But I have heard the stories about him.

– It is always better to start from the original source if you have access to it, which you do in this case. Anyway, it is useful to remember that for any tweak there is an 'un-tweak'! Treat it as an encrypted system for which you need to find a decryption key. Lots of work to do: patching, upgrading, developing, simulating, testing... – mumbled the Master of History; his voice slowly began to vanish as he was getting deeper in his thoughts.

“Explore the history for a change; start by watching the originally recorded interview with the Ministry's Creator” – the Master of History left the message in my

Suggestion Box, summarizing our recent conversation. He is astonishingly correct; one would need to know the history in order to change the future. I wonder how long it will take me to understand the history, though. Learning just facts and dates might be pretty fast, but it doesn't help to understand and actually know the history – the only lesson I have learned from my History lessons in school. With the virtual halls it is different now. It has taken me a while, for example, to discover, experience, and get the feeling of all the countries that the Master of Travelling have managed to set up so far. I am amazed how precisely he has reproduced the spirit of each place. The collection is still poor, though. A remote, not trite, site somewhere in South America would be more interesting for me to explore compared to just staring at the Big Ben, for example. While waiting for the Master of Travelling to satisfy my recent (exotic as he says) requests, I have been just getting lost in the Landscape Halls recently; they seem to stabilize my system in the most effective way, especially when having the natural forests miles away. Nothing is perfect, however. Some of the Landscape Halls are still felt quite artificial; at least to my perception. I wish strawberries tasted like the ones from the garden of my Grandma and not like a plastic mixed with water; roses smelled like real flowers and not as the chemicals preserving them; water sounded like a stream running from the mountains and not leaking from a tap. Rather than getting used to bad standards because they are familiar, we should constantly seek for improvement instead, I think. “In addition to colors, want to be able to tune sound, smell, and tactile characteristics” – a message appeared on the screen of my Personal Space asking for confirmation to be dropped into the Suggestion Box of the Master of Landscapes. Yes, smart machine, you have got me right, - I pressed “Send” button completely satisfied with the summary that the Thought Interface has just generated. In many cases, the Thought Interface saves me a lot of time and effort indeed, as I often struggle to formulate things. But sometimes, it feels so nice to get lost in the wonders of my mind.

Talking about wonders and getting lost, it is only now that I have noticed a big metal key in my hand. Where have I got it from? Maybe it belongs to the Master of History? But I don't remember him leaving, dropping, or giving me the key. Or maybe I have brought it from my recent flight in the Landscape Hall? I often bring various objects from my straggles about the virtual Halls. For me, they serve as reminders of experiences, states, emotions, and thoughts; as bridges to right ideas through associations; as sources of energy arising positive emotions and bringing into a certain mood or state. There are cases when my findings don't make any sense at the time of gaining them, but serve as a clue to future situations. I normally leave those aside and let the time to find them a proper place. I guess I narrow the search space though, as I like to be a designer who tries various combinations of putting together separate pieces. It might be they are all parts of the same puzzle expecting me at the end of my journey. But while still on the way, I prefer to link my beads in chains or even more sophisticated structures – a great method of preservation to prevent their loss. This personal banking of resources is also a great way to cope with the stochastic nature of life. I have noticed that I have ideas, time, energy, enthusiasm, good mood and luck in excess sometimes, but definitely lacking these on other occasions. My life has become much more productive after I started the personal business of depositing, saving and taking in credit various resources. Scheduling my life's projects in energy units instead of time also seems to work more effectively for me.

“Run a simulation to investigate the environment for trading and taking energy loans” – my Thought Interface suggested as a job for my schedule. “What the nonsense!” – I cancelled the proposition. – “Only personal findings can serve as

resources; someone else's gains might be harmful or even fatal for me. You should know me better by now: I don't eat out and prefer to cook myself!". "Look at the Evolving and Adapting Mechanisms of my Personal Space; they seem to require some tuning and upgrading" – the suggestion for the Master of Karma has appeared on my screen. "This sounds more like the truth" – I pressed the "Send" button. The Master of Karma is responsible for evolving personal spaces. Despite every person is a collection of patterns (behavior, speech, movement etc), those patterns may change with time, in his opinion. The pattern of patterns' change varies from individual to individual and may change itself. Some people are rigid, and some are more flexible. This elasticity is very sensitive to the experiences one collects to date. That is why the Evolving and Adapting Mechanisms should be tuned regularly.

I wonder if my memory also requires some fixing, as I still cannot remember, when, where, and how I have got this key. After looking closer at it, I have noticed a number of strange symbols carved on its surface. What do they mean? Is the key, a key to them? Am I meant to open a door or make another kind of opening? Maybe it reinforces and is a reminder of the promise I have just made to the Master of History to enter his Halls. Where shall I look for the key to my key?

1.3. The Ministry of Interfaces

Many distress themselves at boxing and car racing rings. I prefer to use my energy on exploring things. I have been an electron lighting a bubble, a bee in the swarm feeding on nectar, blood running through the heart, and the heart itself. It is my job to test the Halls contributed to the Embodiment Interface by other Masters in the Ministry of Interfaces. I have been working in the Ministry since it was established. Can't remember the year now, as I never live by the clock, but I believe it was at the time when embedded and virtual reality systems became an integral part of peoples' lives. The legend says that the guy who set up the Ministry had first worked helping people who suffered from various addictions, and then as a coach for sport and business men and women helping them to achieve their goals. His first Hall of Embodied Future Experiences has become a prototype for all the Halls the Ministry develops at present. That first interface allowed users to simulate, experience, and feel future outcomes before implementing them in real. For example, a person who had the problem with alcohol could simulate the feeling of the state after drinking heavily, before starting actually drinking. That embodied experience usually overwrote the memory of pleasure from having a drink. The Ministry's Creator helped many overweight people and those with other health problems due to a poor diet by simulating a feeling of dizziness associated with the raised level of sugar or cholesterol. Business people also found his invention useful. Not only they could play various scenarios involving their partners, but also experience and feel the process and outcomes as real, testing and taking into account various human factors in that way. That was the problem at the time; machines were programmed to follow certain logic, whereas understanding and implementing human logic and precisely predicting their behavior was not yet possible.

"Watch the interview with the Ministry's Creator" – the reminder popped up on the screen of my Personal Space. I followed the advice.

– Working closely with various business people – the face and the voice belonging to the Ministry's Creator seemed to continue my story, – I realized how inefficiently their work and life was organized (for some strange reason, both being separated from one another). Lots of wasted time and energy on trying to communicate

their ideas to various stakeholders (who had different background, language, values etc), writing reports, paraphrasing their findings to fit yet another template, trying to recall where they had finished the day before and what was that brilliant idea concerning their new project that had visited them while jogging in the morning, fixing relationships after coming to a meeting in an inappropriate mood, and so on. There was the obvious need for separating content from its context, carrier, and media. I developed the Interface allowing for recording and storing ideas as they occurred (without the need to write, type or pronounce them), and then translating them into various representations depending on receiver's individual settings. That invention was first exploited at business meetings. Electronic sticky notes were generated automatically as ideas were coming up; then sorted, summarized in an optimal solution taking into account various requirements, expectations, and constraints; and finally put into personalized reports, for each attendee separately depending on their perceptions. Later however, the technology became a part of people's everyday life facilitating effective relationships and understanding.

The interview also reminded me about the remarkable epoch when bioenergetics learned how to visualize a human aura, and the existence of Personal Spaces along with the Social Space has been recognized and accepted globally. A lot of effort has been put into studying physical and biological characteristics of a Personal Space along with its relation to the Social Space. To represent the complex nature of Personal Spaces, scientists started to use colors to represent a person's mood and radius referring to his preferred distance when interacting with others. The rainbow colors were assigned similar to Indian coloring of the chakras: from the red meaning the person was preoccupied with the lower physiological processes (i.e. body), through green meaning feelings, to blue for mental activity, and deep purple referring to spiritual practices. Along with the weather forecast, social global maps were translated regularly representing the change in population's coloring and personal distances. Lots of research was dedicated to studying those changes: what were the causes, consequences, and other relationships. Scientists explored the extent to which the change was dependent on personal characteristics, social interaction, and external environment including geographical location, weather, political and economic situation, and so on. Despite the stochastic nature of many processes in Personal Spaces, various trends were also determined. Those having "down-times" in their lives for a long period were recommended to change their environment instead of blaming themselves, other people or referring to a bad fortune. Similar to the weather: people who didn't like their climate always had the option to change their geographical location.

– I established the Ministry of Interfaces to enhance the interaction between Personal Spaces and the Social Space – the Ministry's Creator corrected my earlier assumptions. – The Ministry started by developing interfaces for Personal Spaces in order to connect various aspects of humans' lives in a seamless way and organize them in the most effective way. Later, we launched the Halls production line. As opposed to commonly used virtual environments, the Halls allowed for embodied experiences. In other words, people could feel while in a simulation. For example, they could become aware of what their little finger was actually experiencing, not only what their brain had thought about that experience. In that way, the Halls provided in-depth understanding of various subjects, processes, and environments, and also helped to narrow the gap between a person's inner world and his external environment. People could have the right environment at the time they needed it, saving in this way a lot of time and energy they would normally waste on planning things, coping with pressures

of irrelevant events, and disappointments after setting wrong expectations. For example, their environment could stimulate their thoughts, help to focus on their work, or assist in communication when socializing. I also noticed that it was difficult for many to start projects, but the work went then fluently once tuned into it. To overcome that gap, we developed the Start-up Halls helping people to tune themselves for the required task.

It is clear from the interview that the Halls have changed people in many ways. They help many to understand that, often, what matters is the destination, not the transition. Using the Halls, people can recognize substitutions and alternatives to live effectively. For example, if one discovers which physical activities have similar effect on their body and mood, then they can choose the ones which would take less time and effort to arrange. In consumer terms, having a limited budget (of time, money, energy), people explore the market first (what is available and the utility of the alternatives) and then trade for things. Many have discovered that their hobbies are actually habits. Before refusing things they don't like, people have the option to explore the reason for their negative attitude first. If, for example, one hates math, it doesn't necessarily mean they are not capable for it; it might be that they have had a bad teacher or the subject has been introduced to them at the wrong time and in the wrong settings. With the Halls, people can constantly challenge their routines by asking what exactly it is about a particular activity they like and what it results in. For instance, there might be plenty of reasons for enjoying listening to Bach. As a professional musician, one could recognize a technical riff that makes them feel attached to the process. The sound may resonate with the listener's biological signals or enable a chemical reaction resulting in firing a certain feeling. The musical piece can also bring up memories. The Halls help to compare various scenarios and reflect on the experience.

– What is the secret of your ideas management? You have come up with so many inventions. Where do you get your ideas from and how do you realize them? – Was the next question of the interviewer to the Creator of the Ministry.

– I guess interaction and sharing would be the answer. People rarely work effectively when there is too much on their plate. I make sure I get rid of the outlived ideas. They get tough texture and heavy weight. I give them away for others to reuse and refresh their looking, preparing in that way my space for new subtle ideas. Freed ideas have better chances to survive compared to the caged ones. Also, cooking in own souse would neither enrich the flavor nor bring changes to it, I believe.

– Some people believe that personal development and growth is only possible on a solid ground of accumulated experiences. They seem to follow the opposite strategy to yours. They say when there is a lot on one's plate and their glass is full, they should change the plate and the glass for larger ones.

– Having a larger plate doesn't necessarily mean you should accumulate leftovers on it, though.

The Ideas Baskets emerged in my head as I was listening to this discussion. There are plenty of them installed around the Ministry so as everyone could throw their ideas in them whenever and wherever the ideas come up. The Ministry's environment provides lots of stimulus and the Masters have a constant need to release the processed outcome. Tasted, eaten, heard, seen, felt, and experienced stuff – all contributes to generating thoughts.

The Baskets are all part of one global Ideas Processor that constantly runs various algorithms on the ideas, mixing them, structuring, aggregating, transforming, comparing, classifying, extracting patterns, evolving, synthesizing, making predictions, hypothesis, and so on. The freshly cooked outcomes are available for everyone to taste

at any time. There is always someone around: testing, reflecting, seeking for inspiration, out of curiosity, or discussing with whoever is around. The leftovers are fed back into the Ideas Processor to try new recipes on the same ingredients or mix them with the newly formulated ideas.

– We set up the Ideas Processor at the time of Storage and Transmission Crisis – the Ministry's Creator reported. – There was so much data, information, and ideas generated and going around globally; it became obvious that the Internet, ruling at the time, was going to die. I personally thought that the majority of ideas were repeating each other in different locations and representations. Taking forward my earlier idea of separating content from its representation, we built the Ideas Processor that extracted and stored only the essence from any idea; it could then be shaped into any structure: for any document template or personal perception.

Sharing ideas has become a habit indeed, and is now stands along with any physiological routine. No need to note or move boxes around. Just generate. People are not afraid to be misinterpreted as the core of any idea would always go through the receiver's interface of his Personal Space. The problem of intellectual property has also disappeared, as it is always possible to back-track who the idea's contributor was.

1.4. The Key

The majority of Masters at the Ministry of Interfaces specialize in the areas they have passion for. As I couldn't identify mine and refused to accept the fact that there is such a thing as talent (the notion with which people normally label their habits), I was appointed as the Master of Translation, serving as the glue integrating our Masters into one solid team. By visiting various Halls I have gradually understood that we are actually eating the same cake but from different sides. The question is only how big is the cake and when we will all reach the same stone. It seems to me, the Masters develop similar things, just using different notations. Furthermore, they use the same concepts applying them in different contexts. The Masters who have changed their specializations are vivid examples supporting this proposition. Let's take the Master of Health, for instance. His first Interface helps people to design and achieve the body shape and various health targets they may have set. It allows for finding an optimal health solution providing the constraints of the biological system of a person. The Interface takes into account bodily processes and many personal features such as height, weight, level of metabolism, genetics, behavior etc. After developing his next Interface for immediate identification and treatment of physiological diseases and physical injuries, and integrating it into Personal Spaces of individuals, the Master of Health has completely moved from caring about a physical body into curing electronic processes occurring in Personal Spaces. He still studies viruses, bugs, parasites, evolution, and adaptation, but happening in the cyber-space. He now works closely together with the Master of Security who studies external attacks on Personal Spaces. Yet, both haven't gone far from dealing with the natural phenomena, I must admit; they use and contribute to many findings of other Masters, including the Master of Physics, Chemistry, Biology, Psychology, and so on. I have actually lost the track of how many eaters of the cake there are at the Ministry at present. The Master of Security, in his turn, consults with the Master of Karma, while developing his new encryption system. After discovering that biometrics and behavior patterns of people can be easily forged, he has decided that encryption keys should be generated dynamically based on individual and current features of a Personal Space's performance.

“The encryption key” – I saw the tip on the screen of my Personal Space. “Speak to the Master of Security about the recently found key” – the task was scheduled as I became aware and confirmed the spotted association.

– It has just come to me that you might be having an answer for my puzzle I have come across recently – I reported to the Master's of Security space.

– Please come in, my dear Master of Translation, I am waiting for you.

– What do you mean, waiting?

– I have just dropped a suggestion to your Personal Space proposing to have a chat. Knowing you are a polite person, I was anticipating your arrival.

– I thought that was my Personal Space suggesting me, not you. Why and how have you managed to hide your identity?

– This is exactly what I am working on at the moment and want to discuss with you. But first I want to tell you one case from my practice.

– Very interesting – I was really confused.

– There was an unusual increase of customers returning a product claiming that wasn't their intention to buy it. The product appeared to be from the same company. The company won the case at the time, as all transactions appeared to be correct; the customers actually purchased the product. Although the case was closed, I decided to further investigate the situation, as it felt strange that so many people went mad at the same time. Dropping the details, I found out that the company's owner was linked to a very powerful cyber-group. I knew the group; they often were a step in front of us. Our legal innovations are, in many cases, responses to their attacks. At that time, they found the way to attack Personal Spaces of vulnerable individuals. They wrote the script that generated suggestions masking them as normal thoughts of an individual. The company used that parasite program to generate a suggestion to buy their product, making the infected people to recognize it as their own intention. Of course we knew it was possible to reprogram one's personal space to take full control of it; our history is full of examples of such mass turbidity. That is why, as you know, we have developed the security infrastructure for the Personal Space that exploited unique properties of the person's behavior capable of identifying uncharacteristic patterns, preventing in that way the cases of tampering. With the invention of Halls, however, as the border between the virtual and physical worlds, dreams and reality, has become invisible and people's experiences have become diverse, it is now incredibly difficult to control their fantasies. That consumer case demonstrates that our security system has started to leak in places. You have just experienced it yourself, taking my suggestion as your personal intention. What is curious though, you didn't accept all the suggestions I had made so far. Moreover, your reactions vary.

– What do you mean by your suggestions? Are you saying this is not the only time you have invaded my Personal Space?

– Sorry, it's true. To test various hypotheses, I have started some experiments recently. Taking the advantage of having your consent to be a test subject for the Halls the Ministry develops, I have decided to involve you. My major finding so far is that you seem to develop several strategies dealing with my parasite scripts. Sometimes, you were dependent on them. Sometimes, you stayed neutral ignoring them or placed walls against their attacks. In most cases though, you made them to serve you. You were able to use the parasite code in pursuing your own goals. Instead of obeying its instructions, you studied its structure and used its constructs to design your own script. Do you have any explanation for this?

– It is difficult to think clearly after hearing your revelations. I guess it depends on how I set my mind before entering the Halls as I test them. Sometimes, I go opened for new experiences; I dissolve myself in the environment, welcoming anything that comes in. On other occasions, I lock myself in my own circle, thinking and reflecting, but not interacting. In many cases though, I formulate and visualize precisely what my testing criteria are and what I expect from the experience.

1.5. Personal Space

I deposited the key to my collection of resources as a reminder that any key should be properly encrypted. Not only the key can be found, but also replaced along with the door that could lead to the place one wouldn't expect.

I left the Master's of Security space wondering how many levels of hierarchy are out there. Even if the Ministry of Interfaces can ensure people are in control of their decisions and choices, who decides what the options are. Who decides what are the news we need to know, what are the events for us to attend, what is on our breakfast menu, where is a traffic jam, what are the job vacancies available, and so on?

"Future makes it available at present through various signs. Use those to train your Personal Space to recognize when you have entered someone else's kingdom or become a part of somebody else's game" – I saw a wise suggestion on the screen of my Personal Space.

2. Reflection

Understanding can help us to be in control.

For those brave and patient readers who managed (or at least tried) to get to the end of the story, it is time to reflect on your state now. How do you feel, what are your thoughts, what do you want to do? If you feel inspired – welcome to the Ministry of Interfaces; if you find it difficult to stay at one place – just stay there and first recognize which part of the story (i.e. side of the cake) appeals to you the most, and then start to nibble from there. If you have not understood a word – just leave it aside; it might be a piece that is not from your puzzle or maybe you will need this bit later. If you happen to fall asleep – it might be that your defensive system has identified an alien presence or you happen to have entered a strange kingdom and your security system has shut you down in order to protect you.

There are many doors on our way; we do not necessarily want, able or need to enter each one of them. We may have a key from some of the doors; others might be open for us if we knock; while others will remain shut. We can try to find a key for a closed door or open it using brute force, if we are not afraid to find what is behind the door. We always have the choice to go away, however.

3. Research behind the Story

Being interested in the origin of thoughts (which may be outside our heads and the neuroscience alone might not provide us with the complete answer) I study how people interact with the environment, how they express themselves to the external world, and

vice versa, how external environments influence them [1]. I base my research on various technologies that can assist in this discovery [2], currently focusing on brain-computer interfaces (in collaboration with [3]), sensors, and embedded systems (in collaboration with [4]). I also use the concepts of interchangeability and complementarity; in other words, how we can translate one notion into another and how various modalities can be used in different (unexpected) contexts [5]. Humans use various means to express themselves: we speak and blog in different languages, sing songs, compose and play music, dance, making pictures and videos, design clothing and adornments, experiment with perfumes and food, etc. By decomposing things (e.g., movement using Labanotation [6], music using notes, art using geometry and color pallet, writing using natural language processing, (bio)products using chemical elements, processes using mathematical function, and so on), we can study the link between us, our production, and the environment.

In this research, it is vital to understand not only the states (statics) and processes (dynamics) within and outside different systems (environments), but more importantly, what happens on their borders: on the borders of real and virtual environments, biological and electronic systems, physical and spiritual worlds etc. Using interfaces, we can connect various systems and support their communication via transmitting data between them. When developing such interfaces, along with the problem of various data representation we should also pay attention to the issues of safety, integrity, security, and privacy. The more we surround ourselves with various gadgets, the more we become dependable on them as well as vulnerable to their failures and unauthorized use. Can we trust our own thoughts having the recent achievements in brain-computer interfaces [3], [7], for example? The key word is not the brain or computer, but interfaces. While being assistive (a disabled person can manipulate a computer mouse [8], control a mobile robot such as a wheelchair [9] or compose music [10] by mental activity only), such interfaces could pose a threat to users' safety. The core of the problem lies in that brain-computer interfaces do not provide us with a means of direct "reading of our mind" but only translating one data (brain signal) into another (system commands). The translation mechanism is defined by the designer of the interface. Even if developed with the positive and lawful intention, the translation mechanism (interface, media) can be misused, broken or substituted leading to the whole system operating not as expected. Imagine a person grasping a glass of water and moving it towards his mouth. Our mirror-neurons system [11] will make us to predict that the person is going to drink from the glass. We might not be able to react fast however, if the person changes the direction of his hand movement unexpectedly pouring water into our face instead. Similar situation may happen to any electronic system; being designed to move right when the user imagines his right wrist movement, a wheel chair may turn left instead (due to a failure or hacking the program code, for example).

Tampering and malicious exploiting of electronic systems is a growing problem which needs to be addressed as the systems are developed. We need to be careful, selective, and critical, justifying any technical development, clearly describing, managing, and controlling the intended usage. Such monitoring and controlling system should be introduced on the global level rather than separate local governments as the cyber-space has no geographical borders. The system should be open, not only because no one likes any activity behind their backs, but also because no one is insured against making mistakes.

Along with the management system, more research should be done on developing the security infrastructure that is in the line with the current technological achievements

and trends. For example, the novel concept ICmetrics [4], developed to improve security of embedded systems based on the unique properties of their performance, can be further extended by including a human user with his unique behavior as part of the system. By studying (biological and electronic) systems inside (their properties, processes, and organization) and how they interact with one another, we would be able to develop the systems that we can trust and understand. In addition to their traditional function of protecting messages, encryption algorithms can also address the problem of diversity of users' behaviors and perceptions. By separating the content of a message from its representation (including context and the media), the properties of the later could be used to code and decode the message so it is understood by both the sender and receiver in the same way regardless their interpretation systems.

4. Summary

The paper was intended to draw the reader's attention to the trends in development of intelligent environments and the issues accompanying the processes, as well as to encourage a multidisciplinary approach to addressing these issues. In particular, the paper analyzed how people interact with their internal and external environments, and explored possible interfaces to connect various intelligent systems supporting heterogeneous kind of interaction. It suggested that as technology becomes inevitable part of humans' lives, people become dependable on it, as well as vulnerable to its failures and unauthorized use. Therefore, particular attention should be paid to the issues of safety, privacy, and security when developing intelligent environments.

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