The Body-as-Interface:
A possibility to merge mind spaces with hybrids of physical and virtual worlds

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Abstract

This paper proposes a set of ideas behind physical interfaces that provide us with the ability to express abstract concepts in the hybrid of virtual and physical worlds. It considers the types of communication that may arise as a result from the linking of body and mind, and it debates the use of stimulus in the communication with other people and our surroundings. By referring to the habituation process that happened, when people adapted to technology in the industrialized countries, this paper demands that technology now needs to adapt to us, so that we can expand the idea of how technology is used as a tool of expression and mediation. Here experience from other cultures, where physical expression is part of the everyday dialogue, is seen as a valuable source of inspiration. The main idea presented, is that wearable technology can give people the option to simultaneously express ideas and thoughts through an ensemble type of dialogue. It also suggests that it is possible to communicate with each other simultaneously in the co-creation of an experience. Finally, the ideas presented are linked to a specific attempt to address the topics discussed: The Vacuole Robes interface is described as an example of a wearable interface that offers the opportunity for simultaneous physical speech and co-creation of an experience.

Introduction

Upon having entered the 21st century, it is clear that we have a choice to integrate our body in a close relationship with technology in our everyday communication forms. This reverses the idea that our body is obsolete in the use of technology. Wearable technology fosters new forms of physical and non-verbal communication that challenge the dominating verbal language. New levels of communication with each other and our surroundings are possible, because the content-based digital media can be linked to postures and gestures that express stored-, projected- and meta-layers of meaning and thinking. So far, two parallel scenes inside digital media have developed alongside with each other. They have also benefited from each other while learning from mutual experiences. The first scene, which was prominent in the 90's is the scene of virtual reality, where people are "immersed" in the medium. The realization of a "platonic" world scenario, where story telling, imaginative landscapes and avatars arise from 3D miniature projected worlds gains popularity in *Second Life*, *EVE* and other 3D computer games. Since this scene of fantastic imagery can not be experienced physically, it has been important to simulate real natural forces to reach the feeling of gravity and momentum that we use to orient ourselves to and navigate in the real world. The virtual reality scene represents an inherent paradox: First it claims that it immerses people in phenomena that are not possible in the real world, but at the same time, it is necessary to simulate the real world till such a degree that the virtual world can provide the immersive experience that it promises. The other scene that has developed in parallel with the virtual reality scene was the physical computing scene. A part of the physical computing inventions are used as tools in virtual reality worlds to obtain a sense of visceral connection with the elements of the virtual world. Physical computing technology has provided us with innovative tools of navigation and expression. By integrating all possible body movements and signals, sensor devices merge the body with the medium - mind and thought does no longer have to be separate. We can reach the bodily experience of an imagined and abstract world. Enactive environments consisting of multi-variable real-time graphics, sounds and perhaps even physical materials are mapped to multi-modal interface structures that we can physically inhabit. The body has become a premise for experiencing non-substantial content as if it was substantial. The idea of body-as-interface has finally become an extensive research area.

This changes the our percepion of interacting with each other, because now, we are able to ascribe new meaning to physical movement. The dismissal of the body as-interface would be to regress to single point and click navigation. We are no longer consumers of a medium that offers us a narrow selection of possible routes to follow. We now have the opportunity to use interfaces that allow us to manipulate content as if it was a piece of clay. We can choose to challenge our role as a passive audience and actively participate in a non-verbal conversation - become virtuosos within the ranges of expression that media artists, designers architects and engineers challenge us to explore through interfaces that address our physical engagement. We have the opportunity to let our body become a resonating organ of our surroundings and other peo-

ple's inner worlds. We have the tools to establish a visceral connection to our mind, and if we manage, we can share this amongst each other at the speed of movement and touch.

The "Slush-Condition" - a Risky Moment of Transformation

A "risky" moment of adaptation between technology and body is currently introduced and debated by the media art world. The adaptation is "risky", because limitations of resolution and speed and the size and amount of sensor equipment can "slow down" the way we express ourselves. It may limit us and seem primitive compared to the speed with which we communicate with words. But there are already limitations inside the traditional media based communication forms, where static graphical icons and the written and spoken word cannot be experienced in any visceral sense. Furthermore, the word is single-threaded and temporal, while physical communication is multi-threaded. [1]

By positioning ourselves in a concentrated test area that will provide a cocoon-like shelter for our bodily transformation into an ultra sensory multi-modal interconnected and expressive unit, we can address aspects of how technology becomes symbiont with our needs to physically express and experience the abstract process of thinking. The way we perceive the different types of media, when they are closely connected to physical activity needs to be studied along with the speed and intensity of gestures and postures! A new discourse inside physical computing design and new media art can for example involve several thousand years of erudite human experience with the linking of body and mind. This profound knowledge can provide the theoretical background for physical interface experimentation. This will include physical exercises in the shape of ritual behaviors that are perhaps not symbolic, but used as tools to obtain mental experiences through specific physical performance. It will include processes of habituation with the various types of interfaces, so that mental activity can be transferred into precise and meaningful physical activity. This experimentation extends beyond the creation of physical exercise programs, where the goal is to entertain the user during the time of an exercise, and where the physical movement by itself does not provide any meaning. The goal of the current experimentation with physical interfaces could be to stimulate the physical communication of the user as a speaking person. Currently, experiments inside contemporary dance performance have established an interesting explorative connection between dancer and medium, where modules of artificial intelligence notice, and in some cases respond to the dancer's movements. (Here I will mention research groups like Soniacillari, The Open Ended Group, Proyecto Bipopus, Troika Ranch and Palindrome).

Our bodies cannot and will not adapt to the current array of electronic communication tools that are designed to reach the lowest denominator and often homogenize our ways of expressing ourselves. We need to be aware of the limitations of these interfaces in terms of their conceptual design, resolution and modality. Furthermore, the commercial requirements of mainstream product quality need to be addressed and we need to impress upon the product industry that wearable technology can be integrated with individual and personal needs to a much higher degree. If the interface was able to grow with a person's newly obtained bodily knowledge and skills, it could possibly diverge from the stasis condition that most technology products encounter, when designed to satisfy a limited amount of functions. If body interfaces were physical platforms for software that address complex human conditions, the same physical interface would become multi-functional and open to newly discovered ways of using it. This will support the development of a completely new vocabulary for physical speech.

Physical versus Mental?

There are several connotations related to the dichotomy between "physical" and "mental". The most dominant connotation is that physical action is "primitive", and mental activity is "sophisticated". Humans have developed through the activity of building tools that connect our body to our surroundings in a functional, complex and sophisticated relationship. The tool making process is based on layers upon layers of physical experience, where we have learned through a combination of conscious and unconscious, mental and subliminal organization of physical actions and reactions. Even though we have removed ourselves from the bare physical action of "labor", we are still in contact with the surrounding world, however, through several levels of abstraction. The problem with the current abstraction level is that it appears to be removed from the premises of the body. Instead of controlling things while being physically active in the situation, we "play back" a set of selective actions that have been pre-composed and presented in front of us. As an observer, we activate a set of subtasks through switches labeled with icons. In this position, we are so far removed from the action situation, that we have difficulties inventing new tools that address the situation as such. The labeling of actions also extends to the labeling of what we call users into target groups, where interaction strategies are developed according to the user's demographical relationships, education, access to technology, life style etc. These are artificial labels that perpetuate inequities. Instead the user's situation, when encountering the physical interface, could be analyzed according to actor-defined purposes and action strategies. [2] If today's wearable technology is positioned in a synergetic relationship with our body, it will adapt to the way we experience a situa-

tion, as it follows the bodily perception and adjustment of the surrounding world. Here, the two seemingly disparate processes of being physical and mental converge.

Does technology disconnect bodily features?

Throughout the industrial age, machines have been developed to efficiently replace labor. In order to reach the freedom of communication over a distance, and the release of time consuming action, technology has become a surrogate for actions that we find "unnecessary" to perform. The only physical act that we have not labeled "unnecessary" is the sexual performance. This brings us to the point, where any physical activity can possibly be related to the sexual act. The restrained body language in many industrialized (Western) cultures shows that the body is no longer used as a tool of communication. Unless we are trained sportsmen, musicians, actors or dancers, our body's ability to make complex physical movements has become unfamiliar to us. What is left is the decoration of our body, where fashion styles carry references to other cultures, where physical communication is still part of the everyday dialogue. This type of decoration carries static symbols of how physical action used to provide a special level of communication. Static symbols are as 'compressed' layers of meaning difficult to unwrap and explore and sometimes we have even lost contact with the original meaning of the symbols that we refer to.

When information is compressed in static symbols and icons (like the ones we navigate with on the computer screens), we need to be professional in order to "perform", in order to be able to unpack and reconstruct icons of action, so that we can communicate impulsively, intuitively and creatively. Personal trainers, spindoctors and technology help us with that. In talent shows people obtain their own individual professionalism, and they are finally 'allowed' to act according to their desires. But their performance is still limited by a strict set of theatrical guidelines that do not change their iconic appearance. Their individual performance in front of an audience does not give them the opportunity to share their professionalism with anyone directly. A physical interface that goes beyond pointclick navigation of pre-selected professionalized actions presented as icons makes it possible for us to learn and express ourselves simultaneously, as we practice towards becoming virtuosos. If the medium is provided as a material that can be shaped, instead of being a collection of static symbols, we can construct our own dramatic and meaningful language through physical behavior. An entire new diversity of languages can enter the sphere of communication, and these languages can be learned through experiencing processes rather than memorizing icons and functions. Currently, the majority of electronic gadgets help us to

select and share pre-composed material that we can collect and "modify" according to our own individual needs. The mass-produced spectacle of pre-composed expressions helps us relate to the part of the mainstream community that we find pleasing. This requires some degree of engagement, but these collect-and-combine-interfaces quickly become dusty libraries of media material, as collections get bigger. It is difficult to navigate in the huge amount of static material that is available. As an action situation passes by, it may be cumbersome to select and activate the right kind of material for the right kind of action. But when technology merges with our body, transformational media types can evolve naturally with the action flow. Because we start to carry mobile pieces of intelligence that can be communicated through physical activity, we include the features of our body and are now able to not just play back an action, but to express it with a flexible and dynamic medium. The D.I.Y. community explores the possibilities of "handmade electronics' that challenge physical skills: First in relation to musical performance tools, where gesture is essential, but also in relation to people's sphere of social connections, where the physical signaling of desires and needs has become an innovative, sometimes provocative form of communication. The genre of design noir takes into account that the body has an infinite amount of expression features that electronic devices can help "legalize" the use if in social situations. [3] A concrete example of this is Maywa Denki's tools and gadgets that are quirky, imperfect pieces of technology that have been developed from the desire of acting physically upon desires and needs. The custom made electronic devices behave with their own personality, when operated by a human. [4]

The Body-As-Interface - a Tool of Sensation and Expression

The body-as-interface consists of three key concepts that are digitally advanced mutations of features that our body already contains: The body as an enhanced multi-sensorial organ, the body as a physical converter of abstracted meaning, and the body as an interconnected unit that immediately transfers sensed and experienced material to other bodies. These enhanced features encourage active contribution to a physically mediated community of people, who make their ideas and thoughts manifest through visceral and physioaesthetic experiences. When digital information is deployed through physical gestures, there are possibilities of a multi-level transfer of information. This adds another dimension to the understanding of the message sent, because meta-levels of meaning exist between the bands of expression that are made possible with a multimodal interface. New movement- and action-based memes will start to populate the sphere of language, as we currently know it. The concepts of transmission and reception will be focused on a process, where information permeates our body before

it reaches our brain, and the idea of the body as a resonating organ will be further elaborated. Interfacing possibilities will be far more holistic in their nature. Co-culturing with plant and animal life will be prominent, when we can learn physically from their ecological structures and transfer our experiences to robotic systems. The idea of the person as a user and consumer of a product will disappear, when technology merge with body-related features and is adapted by us as organs that interface us with other people. We will become participators of a social and physical situation and (re-)discover the possibilities of being able to co-invent a story, an environment, or space of information as it unfolds through the ensemble of actions.

Interconnected Body Tools - Sensations as Transfer of Knowledge

Tools of communication that are attached to our body and perhaps even embedded in it make us able to communicate through actual actions. Here an action does not need to be re-formulated and interpreted through words and texts, before another person understands and can respond. Body interfaces hold people in the experience of the situation. The physically expressed medium that contains thoughts and ideas is immediately transferred. This means that instead of collaborating about reaching a goal that is first set through a verbal conversation, people can co-construct the goal with a multi-threaded action-based conversation. In addition to this, the body related interfaces could even provide visceral stimulus, so that information can be immediately transferred from one person to the other. It does however require a person to adapt to the interface so that s/he can learn what the sensations mean. But when learned, the stimulus based information transfer can be multi-threaded, versus the language based information transfer that is single-threaded. People can acquire knowledge by harvesting sensations from others in a space. When directly interfaced with other people, animals, plants and materials, bits of information can freely traverse the space of a situation and be manipulated by the actions performed in that space.

Body Interface Speciation

The question is: How many physical information transfers can our body handle? Is there a risk that "mind space" will overwhelm and replace the physical inputs we get from the unmediated world? Imagine an interface that helps you "switch off" basic human sensations such as pain. What if you cannot differ between the pain that comes from the physical environment and the pain that a physical information transfer is programmed to provide you? A group of people can agree on developing an immunity system that operates against the basic sensations that help us navigate in the world. If thoughts are mediated, so that they affect our body radically, wearable technology can be used as tools with limitation and control purposes. Ethical

discussions need to follow along with technology that is developed to either invade or enhance the body and discuss the fact that people can tinker with each other's bodies and hack features that their body has been given. We need to discuss how sub-cultures can design their own custom made devices and modify the body, and in the most radical sense form sub-species that differ by life style, social connections and physical languages. This is not unlike what we see in local communities, where cohorts of people develop special skills, language and a common sphere of understanding. Like we customize our clothes and electronic devices, we customize the way we communicate with our body. By mastering customized body tools, various groups will diverge towards the specific kinds of communication that they share in public and private spheres. A person, who wants to communicate with different sub-communities, must then develop a versatile array of modes and skills that can be attached and deployed as needed.

Communities of Performers

As groupings of physical communication methods arise, a person may be forced to acquire skills in order to transgress private, perhaps even esoteric language systems that have arisen within a community. A dominating language like English homogenizes communication and makes it easier to communicate across borders of understanding. However, it does require that you learn how to speak the language. How difficult would it be to learn non-verbal languages that are expressed through physical gestures and corresponding media forms? In a community of performers that act together in an ensemble type of constellation, the person, who is foreign to the media situation generated, would need to understand the physio-aesthetic language that is shared among the people, who participate in a non-verbal conversation. The question is, if these language forms share some universal characteristics? Would there for example be a basic platform, a scene, or an interface that is embedded in the architecture of a "conversational space" that gives people the possibility to tune in to each other? Or what if the body-related interfaces share some common features and differ on others, so that the medium will be transformed along its trajectory through people's actions? In contemporary dance performance, where media is part of the choreography, there has been an interesting integration process between body and media. The performance aspect can make it easier for a person to decode what is being said. Movement is in general an overt activity. As soon as a newcomer starts to participate in the physical dialogue, the elements of improvisation and performance may require practice, but since the newcomer's movements are immediately visible to other people, a mutual adjustment process could be a natural and intuitive result of the newcomer's attempt to engage. Furthermore, physical movement can be done simultaneously and still be compre-

hensible. To lighten the burden of having to practice several physical languages, the sensor devices and the media that is generated as a result of physical movement can for example be designed in a modular fashion, so that there is room for an integration process among different conversation groups. Common key nodes in possible forms of expressions could be embedded in the physical interfaces that people use as conversation tools. The idea of a utility fog envisioned by John Storrs Hall could in this case be realized as media units that contain introductory modes of expression that automatically connect to other people's media units, so that a common language is possible. [5] In general, I think there may be a peculiar concurrence between sensation and expression when the expressed medium resonates in a newcomer's body.

The Vacuole Robes - a Body Interface that allows Simultaneous Contribution to a Nonverbal Conversation

The *Vacuole Robe* interface is an attempt to reach a stage, where two people can transfer ideas and thoughts with simultaneous physical movements. The situation that this type of interface aspires to reach is the moment, where ideas and thoughts are transferred from one person to another through the establishment of a common condition - a type of condition that requires simultaneous contribution of all the participators. This form of conversation differs from the verbal conversation, where an idea can only be transferred in small portions over time and cannot be felt simultaneously in a commonly experienced condition. The cocoon-like design of the *Vacuole Robes* puts the people, who use them into the "slush-condition" of being physically engaged with technology till a degree, where their movements can form meaning in the shape of a medium. However simple the technology in the robe interface may be, it proposes a form of physical interface design that involves the entire body seen as a speaking unit. The condition that the interface immerses people into, establishes a common ground for a specific type of mutually generated speech. Each Vacuole Robe surrounds a person till such a degree that a person is forced to experience the surrounding

world through medium generation. The robe blinds the person, who is inside it in order to draw attention to the co-invention of the sound medium that the two people generate. Through the delimiting character that the interface has, it is the idea that the feeling of being enclosed in a concentrated space can evolve a sense of connectedness.

The sculptural aspect of the *Vacuole Robes* proposes an interface that connects with other species and it suggests speciation through special interface features. When veiled by the robe, a person's anonymous appearance puts his/her movements in a different light, where person changes identity and becomes a plant or an animal. Several people that wear this interface would form a sub-culture, a forest of sculptures that both communicate and perform in an ensemble type of unit. The *Vacuole Robes* is one interface among many others to come, where people start to interface themselves physically with each other and their surroundings. It is an attempt to demonstrate a set of ideas regarding the linking of body and mind. These ideas can be explored even further, so that new interfaces help people to act in the situation they are presented to in the real and the virtual world. I hope that the invention of new tools will address people's life situations and life conditions in hybrid spaces and reach much more profound levels of communication!

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