

Dance & self-confidence

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Abstract

This paper proposes a living and interactive application that improves one's body language and dancing techniques. The work is the result of a close collaboration between designers, dancers and technicians. It shows how design can create a dance experience using new technologies in a constructionist approach (Figure 1). The interaction with this application is both physical and emotional. The system is a dance tool that therapeutizes the dancer; it cures his lack of confidence and his inner fears about dancing. The protagonist spends an enjoyable moment during the interaction with this application; he learns to dance and to better understand his body.

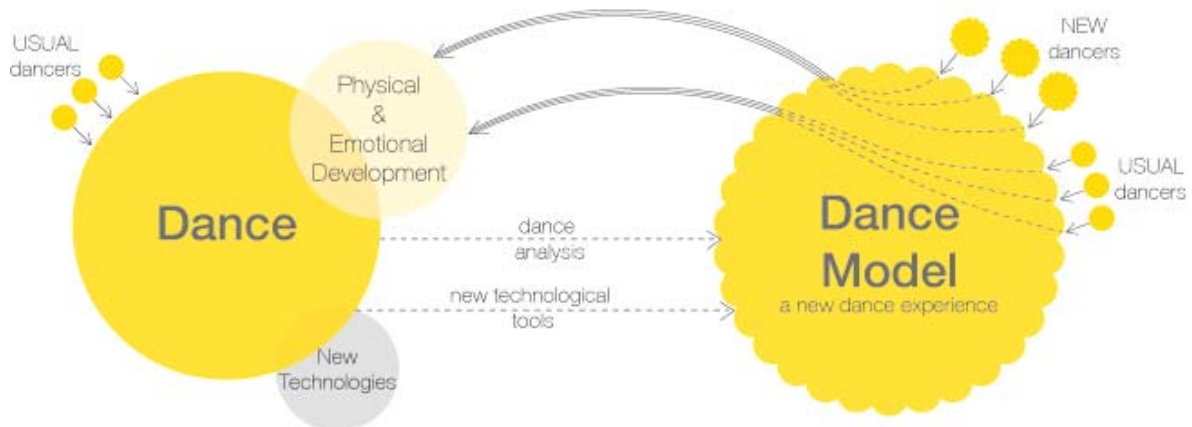


Figure 1. Project scheme

The core of this dance model is a shadow that is projected on the wall. It is this constructionist tool that the paper proposes. This silhouette has the user's body and once it is on the wall, it teaches him how to dance. Besides its role as a teacher, the system proposes other functionalities and characters for the shadow in order to create a close complicity with the protagonist. Words, music, images and movement are used in this interactive system to permit the protagonist to understand the dance practice and to develop himself, both physically as emotionally, leaving behind his fears and complexes about dancing.

The collaboration between dance and new technology reveals new tools that allow dance to be learned and understood differently. This system presented in this paper uses such tools in a constructionist manner. It proposes a new model for dance learning; it creates a subtle environment for a physical and emotional development and it creates even an extension of the dancer's physical body to new virtual dimensions.

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Keywords

Dance and new technologies; interaction design; experience design; body representations; interactive shadow; dance teaching; dance complex and dance fear.

Understanding the context

From September 2008 to December 2009, I attended the Masters Program of Industrial Design and Innovation Management from Strate Collège Designers (www.stratecollege.fr). The year spent in this school made me realize the importance, the force and the responsibility of design in our everyday life. The academic cycle of this master's program was composed from three parts. The first part consisted in attending intensive courses on design methods, design thinking. I also learned different design expression tools like drawing, painting, preliminary sculpture and 3D modelling. The second part involved active participation in several design projects with industrial partners like Microsoft Surface (www.microsoft.com/surface) and IRI Centre Pompidou (www.iri.centrepompidou.fr). The last step of this education program was a final project on a personal topic. I chose my research field, I found a problematic question and, as a design thinker, I answered this question.

Project motivation

Impassioned by dance, the choice of my research field was almost instinctive: dance and new technologies. Dance is an activity that I have practiced from 5 years old. From ballet to ball dancing and from flamenco to step dance, this activity had a major role in my personal development and my social life. I considered that my project was an opportunity to write about my passion, to go deeply in the history of dance and to find out its importance in the history of humanity. I centred my research in a technological context. I questioned myself about the influence of the technology on dance and the benefits of this collaboration in our everyday life. Dance lost its major importance in humans' life. From animals dance to ancient civilisations, dance was considered a vector of life, a bond with the gods and an activity that connected body and mind. I decided to investigate how the technology development could help the dance to re-become a central activity. What is the new model to be created using the collaboration tools between dance and new technologies in order to reintroduce dance in human life? How the constructionist approach could help in generating this model and in bringing balance to a new equation where dance is a major parameter?

First step - The mémoire

The first six months were spent for documentation and research on the chosen subject. The result of this work was synthesized in a report named *Dance and new technologies*. This memoire presents the history of dance, its evolution and development within the new technological environment. The purpose of this report is to underline the importance of dance in human life and to analyse the benefits of this practise in a technological context.

Matos (1998) describes the challenges of the collaboration dance-technology: "Science and Technology stress the marvellous capacities of man, and their appropriation supposes the risks due to their power and presence, but also the risk of displacing their utilitarian codes in order to explore the constraints and freedoms they represent." How to use the power of the technology in order to strengthen dance and what are the results of this collaboration? "We need a connection with technology. There is no better art than dance in which to bring this about. Jean-Marc Matos, you are doing an important work" is written in the same journal, Matos (1998), by John Cage.

From Loïe Fuller to the birth of the cinema, and the early stages of the video, from the creation of the theremin passing by the beginnings of the interactivity, dance development reaches new dimensions. The creation of technological tools like Merce Cunningham's Liforms - that proposes a new way for transmitting and learning dance, the use of sensor systems - that permits the mapping between music and dance, and the creation of other systems of body perception, commit an important change of dance pillars, the body, the music and the

environment. The virtual dancer, the hybrid bodies and the creation of environments where the artificial and the real dance come together are new ways of exploring dance.

Being a dancer that uses technology means exploring all these new tools and working with different specialists, in an interdisciplinary team. The time of the Laboratories has come. Lahunta (1997) explains this fact in one of his interviews with Jean-Marc Matos: “for the 21st century, the skills we have developed as homeless survivors may turn out to be just the tools needed to create a niche at the center of a future interdisciplinary, high-tech and body-centered project for researching, teaching and creating.” But how to use these skills and what could we imagine, create and improve?

For the moment these technological tools are used only by artists. In our everyday life, there are only timid collaborations between dance and technology. Dance is nowadays either a personal hobby or an activity practiced for time to time at special occasions. The collaboration dance-technology is materialised by products that come mostly from the game industry (Dance Dance Revolution, Wii). However, the existence of special events like concerts or art exhibitions shows to the grand-public some of the possibilities of the technological tools applied to dance universe.

Taking into consideration all these factors, a final question rose from my report: **How dance, using new technologies, could reaffirm the human being both physically and emotionally?** What kind of new model could be imagined in order to explore dance therapeutic capacities? A new dance dimension could be created that would give a simple, instinctive and fresh access to both the inner and outer world of the protagonist. And such model and dance extension belong to the constructionism philosophy.

Second step - The target analysis

The future dancer

How dance, using new technologies, could reaffirm the human being both physically and emotionally? To answer this question I had to understand who is going to be my target, my future dancer. Some of the people do not dance, do not want to know how to dance and are happy with it. However there are others that would like to know how to dance but, for various reasons, they fail to practice. After interviewing twenty persons, several problems related to dance practice were found. Sometimes, the dance vanishes from our lives with a simple sentence like “I have no time for this”, or it represents something that brings in fear and complexes. After all the interviews I succeed in determining two groups of people, with different concerns about dancing (Figure 2).

I called the target “**The discouraged**”. They like dance but they are afraid to practice it; they are too shy and don’t like seeing themselves dancing. They usually say: “We move but we do not dance; seeing others dancing feels better then trying to enter into the rhythm”.

The second group was called “**The got no time**”. These people are snowed under jobs, tasks and responsibilities. They say that they do not have the time and the perfect occasion to dance, even if they really enjoy this activity. They also do not like the dancing atmosphere from dancing-clubs or they do not know were to go in order to exercise this practice.

These persons lost their intimacy with dance; they lost their self-confidence with their bodies. They fear to put their bodies in movement and being seen by others perturbs them physically and emotionally. When they find themselves in a dancing situation, they may transform this fear into a total repulsion toward dance. And maybe by loosing dance, people lose a degree of intimacy with themselves. They lose a way of knowing and expressing themselves. They lose a language. How to get these back? How to re-create one’s personal dance? How could the constructionism and the design put hand in hand to create the perfect dance environment which

easily allows the user to learn how to dance, to understand the capabilities of human body, to spend a pleasure moment and to gain self-confidence?

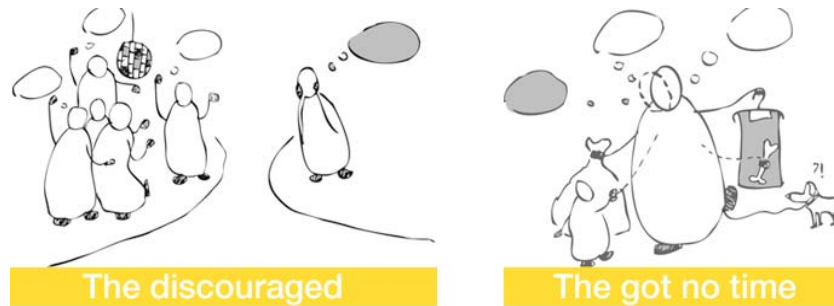


Figure 2. The target representation

Deeper into the dancer's mind: How do we see ourselves while dancing?

What fascinates us while dancing? What scares us? In order to generate a perfect environment for the chosen target, one has to answer these questions. "Man has always been fascinated by his own image and has attempted to reproduce his double, to extend and perfect that image", tells us Jean-Marc Matos, Matos (1997). And maybe by studying the way a dancer sees himself while dancing, by understanding the factors that perturbs the dance, one could imagine a new model that takes into consideration all these parameters and creates a new dance experience.

Supposing that the self-representation of the dancer is an important parameter of this model, how does this image transform one's feelings, behaviour and personality? I tried to understand how the dancer's body and its movements are projected into his own mind. For this I divided dance into three fields: individual dance, dance with a partner and group dance. This typology could be considered as related to the degree of intimacy of the dancer with himself and with his environment.

Individual dance: During the individual dance, the person has no sense of shame or fear; he is not limited by the eyes of the others. The movements are free. People express what they feel for themselves and with no restraints. Dancing alone means communicating with oneself, strengthening the bond between body and mind.

Even if we dance alone, we are dealing with different representation of ourselves. For example, the physical presence of our body makes a difference. Let's imagine a person who is dancing in front of a mirror. When a dancer sees himself in the mirror, he compares himself with an imaginary perfect body. Sometimes the fact of seeing your body moving and dancing is disturbing; it brings in fear and complicated feelings; it dissolves the enjoyment and the pleasure of dancing. On occasion the dancer in front of a mirror finds himself in a situation where he wants to impress himself. For professional dancers, the mirror is correlated to the idea of improvement and thus its use is extremely important.

On the other hand when we dance alone and without seeing ourselves, the self representation is completely changed. Usually the idea of improvement disappears when there is nothing around us that reflexes our body. Thus more pleasure is gained and we imagine ourselves dancing the perfect waltz. We are what we image. The fact that we do not see our body makes us free; we gain a degree of liberty. We do not consider ourselves ridiculous and imperfect. We just dance.

The dance with a partner: A question rises in this case. Does the other accept your individual dance? And do you perform your individual dance when someone is around you? If the individual dance shows your inner feelings, performing it shows the other who you are. That is why the relationship between the two bodies while dancing is the expression of the degree of

intimacy of the two persons. In addition dancing with the other has its own magic: the communication between partners. Yet this communication is reduced by our fear, panic, and emotional complexes. That is why we choose to move and not to dance. We chose to reproduce some movements that we know by heart and not to communicate.

Group dance: During this type dance, all the protagonists share the same space. Each dancer sees himself in the eyes of the others. It is difficult to de-correlate oneself from the regards of the others, when they watch and judge. During this dance there are used societal rules that spawn complicated fears. Dance is influenced by the degree of intimacy between each participant. However the spontaneity and the intimacy of the dance are vanishing. Too many rules? Too many fears? Is this a cultural or a social problem?

What interested me most in these typologies, were the dancer's feelings during his dance. And also the fact that these feelings are correlated with the representation from the dancer's mind and with the environment that surrounds him. It is a two side factor, one from inside and the other from outside. They are combined in a very complex way. That is why I asked myself if I could find a suitable tangible representation of the dancer's body, a new constructionist model that could improve his self-confidence and teach him how to dance. This model could make the dancer's fears disappear and free his body by using the new tools of the collaboration dance – new technology.

The CONCEPT

The suitable representation

I had a QUESTION (“How dance, using new technologies, could reaffirm the human being both physically and emotionally?”), a TARGET (“The discouraged” and “Got no time”), and I chose to work on INDIVIDUAL DANCE. Thus the context of the application was established. In order to improve the protagonist's dancing techniques and increase his self-confidence, I decided to search for a suitable external model, for a tangible tool, that would incite the protagonist into his individual dance. Constructionists build mental models to understand the world around them; in the same perspective I was looking for something that would help the dancer understand his body, teach him different rhythms and stimulate repetitive practice.

In the first time, I was trying to find a perfect external image that would represent lightness, freedom, an unconstrained dance. I was inspired by the world of plants, by the dance of the dandelion seeds. I imagined an interactive application with this plant. A dandelion is projected on a wall and it is sensible to the user's gestures. At the beginning just a seed, the development of this plant depends on the user's movements. The body of the dandelion and its seeds copy the movements of the dancer's body. The purpose of this application is to make the person in front of the application forget about his inner-fears and complexes and feel the dandelion lightness. Trying to make the dandelion dance, the protagonist will make himself dance. Thus without noticing, the user frees his body and starts to dance.

In order to create a daily motivation, the dandelion is growing everyday. Each day it is different from the day before. Its physical development (number of the seeds, height) is influenced by the intensity, the speed and the amplitude of our actions. The person's lack of movement destroys the plant.

But what are the advantages and the disadvantages of such an application in relation with my first question? This application incites the user to move his body in order to keep the plant alive. The plant is the constructionist tool and by its interaction the person imagines himself differently, light and free. However there is not any choreography related to these free movements of the protagonist. The dandelion represents the dancer's body in a poetical way but it does not teach him any dance techniques or music rhythm. That is why the dandelion image did not respond

entirety to all my requests; it is an insufficient model that does not take into consideration all the dance parameters.



Figure 3. The dandelion waltz - concept representation

I searched further for another representation that could better translate the user's body and his movements; something that would be also an extension of the dancer body. An idea came when I thought about my childhood and how I was training myself at the age of 10 years old. I did not use a mirror but I was putting a light on a wall and I was creating my shadow. I was dancing with my shadow for hours. The image of the shadow came in front of my eyes. That was the constructionist tool I was searching for. That could perfectly create my model! A pure body, an elegant movement, a perfect surface... But what is the magic of the dance with the shadow? My shadow is myself but it has something else. She is perfect. It could be taller than me, slimmer than me, but in the same time it represents me perfectly. What if this shadow teaches me how to dance? What if this body, which I recognize as my self image, becomes a part of my life, it dissolves my fears while dancing and it creates from dance a pleasant moment?

From all these memories, I imagined the application *Dance with me* (Figure 4). The dancer's shadow is projected on the wall. Once this silhouette comes alive it becomes another entity. The user interacts with his shadow, who is a teacher, a choreographer, a dancer, a partner and even a friend at the same time. Therefore dancing with this shadow means dancing alone, but also dancing with the other. It combines almost all the dance typologies presented earlier in a mystical way. This shadow will teach how to dance. It is a pure and elegant representation of the dancer's body. It is the constructionist tool that creates a new environment where the protagonist sees himself differently, feels differently and acts differently. The dancer sees his shadow, moving like a feather, so easily, so gracefully and this opens new doors for him, it takes him on a journey with new access to his inner and outer self; it gives the dancer the courage to free his body, follow the music, deliver himself from his fear and complex and spend a enjoyable dance time. But how could this model work? And how could it interact with the user both physically and emotionally? The next section will present a scenario of the interaction with this virtual environment.

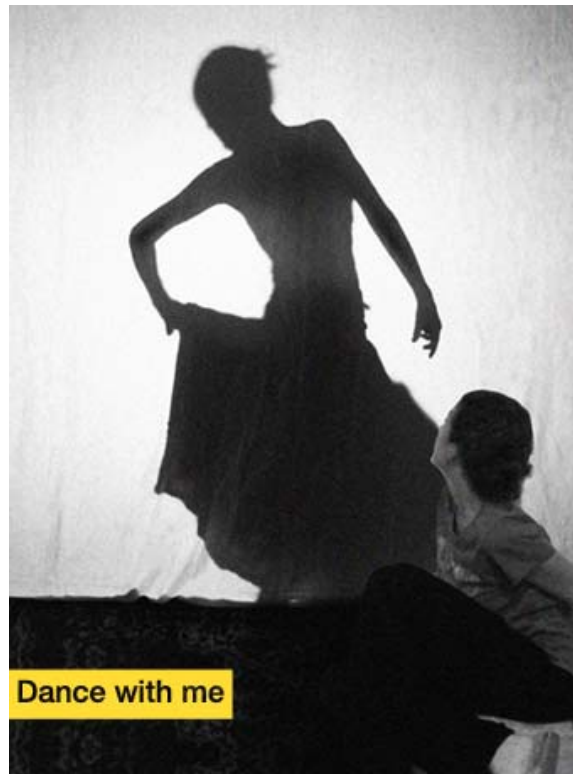


Figure 4. Dance with me - concept representation

A living creature with different characters

Dance with me is an interactive application that one could use at home. Either on our screens or by a projection on the wall, the system copies the human body and it represents it in the form of a shadow. A strip of light connects the protagonist with his shadow.

The shadow plays different roles in the user's life. Firstly, in order to start the application, the person has to call his shadow. This step is named "The waking up". By a gestures tracking unit, the system detects the intention of the protagonist while he touches the wall. The person waves his hand towards the place where the shadow will appear. Once the shadow comes into view, it recognises the face of the person or if this is the first time the person uses the application, the system registers new data (Figure 5).

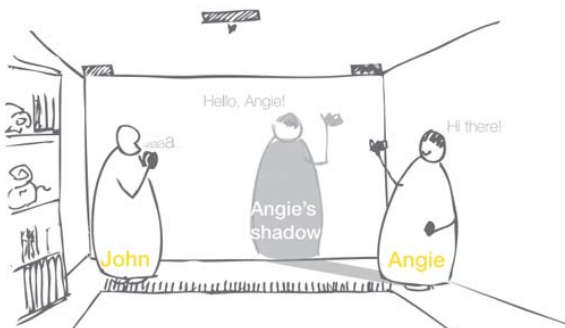


Figure 5. The waking up

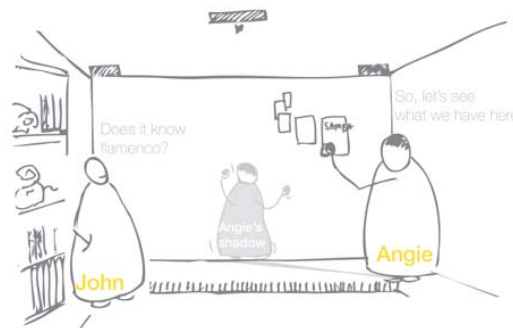


Figure 6. The dance lesson

Once this registration step is over, the shadow starts a short dialog with the user in order to find out the dance that suits him best at that moment. The use of an artificial intelligent program

permits a fluent discussion and objective data analyses. The shadow proposes different dances; the protagonist chooses one proposal and “The dance lesson” begins (Figure 6).

The lesson starts with a short history on the chosen dance. This story introduces the person in the dance appropriate atmosphere. The next step is the warming-up. “Never dance without warming-up” explains the shadow. It proposes a personalised warm-up program, proper for the chosen dance. Thus the shadow starts to move on the wall and encourages the person to participate and follow its movements (Figure7).



Figure 7. The warming-up

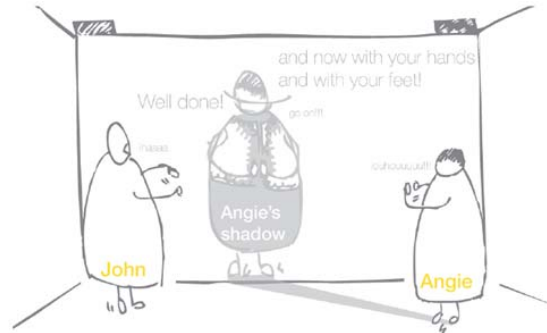


Figure 8. The dance

Once these preparations are finished, the dance lesson begins. First the shadow presents the music, its rhythm and step by step it shows simple moves of the hands, of the feet and then of all the body. It always encourages the user and it stimulates him to understand the music and the dance movements (Figure 8).

The lesson evolves depending on the energy and the interest of the protagonist. During the dance, the system detects the dancer’s motivation, his signs of enthusiasm, disappointment or fatigue. If a crises situation appears, the “Encouragements program” begins. The application proposes different supporting programs to surpass the difficult moments. Sometimes it shows the dancer’s progress from his first lesson or re-explains the basics steps. Other times it underlines the music rhythm and increases the volume. On occasion it uses images, objects or attitudes in order to explain a complicated dance move (Figure 9).

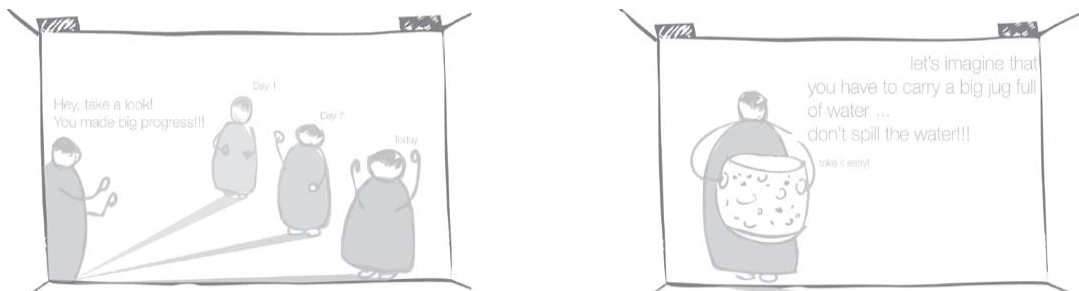


Figure 9. Encouragements program

Another stage of interaction is called “The real shadow”. The user has the possibility to add on the wall his real shadow next to the teacher shadow. This way the dancer could see his moves like in a mirror (Figure 10). However if this second image disturbs the user, he can immediately close his real shadow.

But above all, the shadow has a responsibility. It has to create from dance a pleasant moment and a frequent activity. What happens if the person, by commodity or by the lack of time and energy, does not practise for a long time? In this case the shadow suggests that a dance lessons should commence. In order not to disturb the person from his activities, a gentle ray of light will connect the feet of this one to the wall where his shadow is waiting for him. This way the real body and his virtual shadow are connected and the dancing lesson can begin (Figure 11).

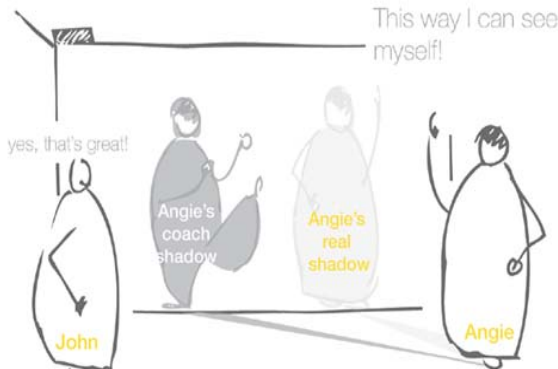


Figure 10. The real shadow

Besides all these features, there is another interaction stage named “The free dance”. If the person turns on some music and starts to dance near the application, the system detects his action and acts differently. The shadow appears; it detects the music and the dancer’s movements; it recognises the rhythm and it also starts to dance. It will not be a dancing lesson but a pleasant dancing moment. Sometimes the silhouette copies the person’s movements and it stretches them to the extreme (Figure 12). It detects the energy of the dancer’s bodies, the contractions of his muscles and it extends his actions. Seeing the shadow performing such impressive movements the protagonist is seeing himself improved.

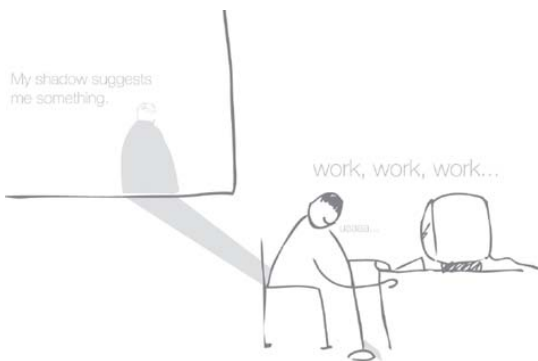


Figure 11. The responsibility

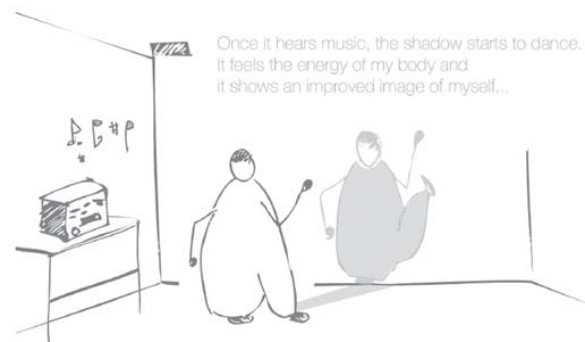


Figure 12. The free dance

The application offers as well the possibility to represent many dancers, each of them having their own shadow. The case of two persons in front of this application was imagined. Each protagonist calls its own shadow and a ray of light connects the users to their shadows. Both shadows start to talk and after this introduction step, they begin to dance. The persons watch their shadows dancing on the wall (Figure 13). They see their silhouettes waltzing. The invitation was made, the ball was opened. Maybe this way the persons will also start to dance. Maybe this

way the imaginary barriers that exist between the two persons, their fear and shame, would be dissolved (Figure 14).

What is the impact of seeing your shadow dancing with another shadow? And how this representation would interfere with the human intimacy while dancing? Does such a representation facilitate the dance with a partner?

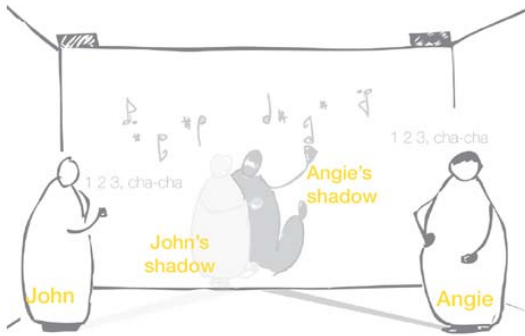


Figure 13. The dance of the shadows

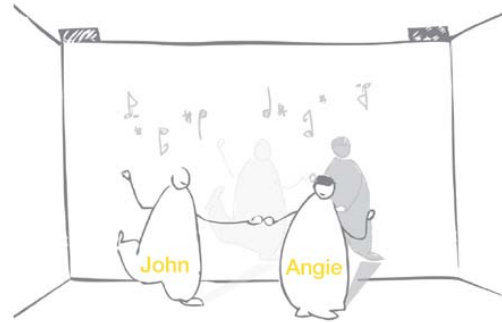


Figure 14. The double - waltz

Further on, the concept could be extended to the group dance. Such an application would be well suited in a dance class. In this case the real teacher would have a virtual assistant, a virtual help that would detect the students' motivation and their difficulties. What could be the impact of such interactive walls in schools, where children could discover their body, understand the rhythm of the music and learn how to dance? What kind of new activities could be developed in order to explore the human body's capacities? The development of body tracking systems, the amazing progress of artificial intelligence, the dancers' expertise and the designers' imagination give us a gleam over the force and utility of such applications. Once the tools are invented, the environment settled, the interaction with such an application could get bigger with any new scenario imagined. And as constructionist models are tools for exploration, they are never finished and always under construction. As for the presented model, it is hoped that a physical prototype would validate its scenarios and create others (Figure15).

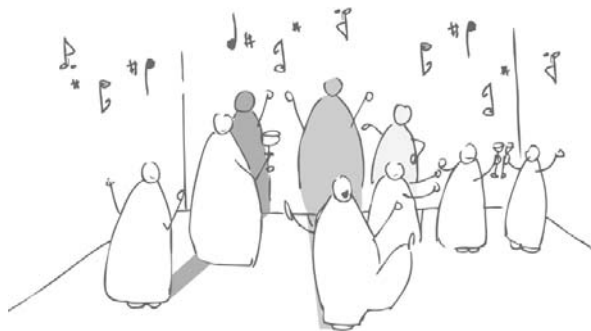


Figure15. Future scenarios – social event

Comments and analysis

Application analysis

When I started this project I had only the passion for dance and my personal experience. However in order to create the application *Dance with me* I met different people. Dance teachers, technicians, dancers and teachers helped me to find out the value of my concept and its utility. The first constructionist features were also underlined by discussions with these persons and by the end of this project I understood the major characteristics of this theory: the creation of a dance model accessible to a large group of people, a model that cures dance's fear and complex and that offers physical and emotional development while the dance practice.

My first report *Dance and new technology*, and the information that I gathered while writing it, was also very useful. It gave me a background, a technological context and the most important thing, it gave me a challenge: to make the real world dance with the virtual world and to extract the benefits of the collaboration between dance and technology.

The application *Dance with me* proposes an integration of the new technologies in our home environment. It is an application that we can use in our everyday life. It is a living and interactive application. Its main purpose is to make the user run over his frustrations and complicated fears about dance, to free his body and to spend a pleasant moment. In order to achieve this purpose, technology shows its possibilities: artificial intelligence, system projection, system gestures recognition. Every physical unit of this application has a vital role. The artificial intelligence makes the real and the virtual talk to each other, creates their complicity. The system projection captures the form of the user's body and projects it on the wall. Once it is projected, this silhouette is matched to a basic framework in order to create an independent entity. This way the movements of the silhouette on the wall, that has the same body as the protagonist but do not depend of the user's movements. It is a teacher, a choreographer, a dancer and even a friend for the user. Lastly, in order to see the person's motivation, a gestures recognition system was also included in this application. Thus the system captures the motivation of the user, his fatigue and satisfaction while dancing and adapts the dance program to his capacities and rhythm. All these tools are used in a constructionist aim, as constructionism encourages design that illustrates how technology can aid to learning, thinking and education; in this case it is imagined a new way of learning dance and an interaction both physical as emotional with the dancer for a self rediscovery. Going further, a constructionist system has the capacity to use the technological tools in an invisible way in order to live a life experience, to learn and to develop yourself. That is one of the important goals of this application.

In the game industry, the technology required in such application already exists or are the ready to be commercialize. For example Microsoft Project Natal proposes a similar the technology like the *Dance with me* application. Project Natal enables users to control and interact with the Xbox 360 without the need to touch a game controller through a natural user interface using gestures, spoken commands or presented objects and images. It is scheduled to be released during the summer of 2010.

Besides the game technology, in artistic world different laboratories experiment the results of the meeting between dance and technology. Their systems and solutions represent new opportunities for applications like *Dance with me*. Such a project is *Electric Shadow*, created by Naziha Mestaoui, architect, and Yacine Ait Kaci, multimedia creator. "With Electronic Shadow, architecture becomes a reality expansible to infinity, a support for interactive projection in which the interface or focal centre remains the inhabitant or the visitor...", Mestaoui and Kaci (2000).

Shadow, shadow on the wall, who in the land is fairest of all?

One could ask if the shadow is the suitable tool representation for a dance lesson. This silhouette may hide some details and it may introduce some uncertainties in the dance lesson.

But these details and the dance technique perfection is not the goal here. The technology permits to project on the wall a 3D body for the perfect comprehension of dance movements. However the shadow was chosen for the impact of its image, for its representation in human mind. This pure form induces new values over the user's body like lightness, freedom, easiness. In the constructionist approach this representation is the tangible object that sustains the model; it is the object that connects the real to the virtual and that triggers the self discovery: it shows the protagonist the physical capacities of this body and gives a mental equilibrium while dance practice.

Beside the benefits of its appearance, this silhouette plays different roles in the mind of the protagonist. Sometimes it is an entity that teaches dance, somebody different from the user. It has his body but the dancer will not identify himself with this image (Figure16a).

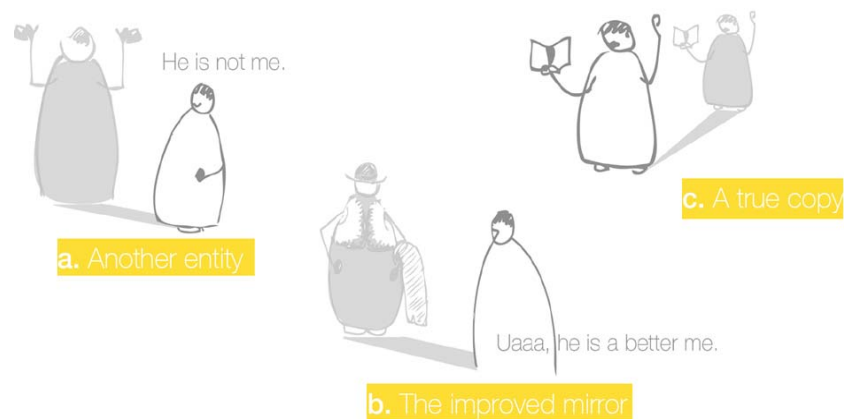


Figure 16. The shadow - another entity, the improved mirror, a true copy

Other time the shadow is an improved image of the dancer. The user could identify himself with what he sees on the wall (Figure16b) even if his action are different from the action of his shadow. And finally, in order to create a tight relationship and complicity with the person, the shadow copies everyday scenes of his life. In this case it is a true copy of the user (Figure16c).

By these different characters the application creates a close collaboration between real – virtual and a perfect integration of dance and technology in the user's everyday life. An important point to underline about the projection of shadow is the fact that it is a digital data. Everybody could have a personal shadow and this data could be registered, exchanged, modified and even stolen. What is the impact of these personal representations on our network? This form opens up the doors of the digital words and plugs us into the virtual realm: "a territory – or a state – that should no longer be opposed to reality, but considered as a natural and enriched extension of it", Hémery (2010).

Conclusions

Dance with me application imagines a constructionist model for a new way of experiencing dance learning. The model proposed here is an interactive and intelligent environment whose principal tool is the user's representation, his shadow. This silhouette interacts with the user both physically as emotionally, in a magical relationship bathed in the complicity between real and virtual. While interacting with this application the protagonist surpasses his fear and complex regarding the dance; he improves his self-confidence by learning how to communicate with his body, by understanding the connection between body and mind and by spending an enjoyable moment. This system reduces one's inhibition which now is replaced by enchantment.

This virtual environment makes use of the technology in a subtle way. The system uses technological tools in order to strengthen the relationship of the user with this application; it

proposes a personalized practice for each protagonist and acts depending on the user's motivation. From the physical point of view, the system offers dance benefits such as equilibrium, flexibility and stature. It rests however on an educative application for emotional and physical improvement. Moreover, *Dance with me* is home incorporable and adaptable for a large public due to its playful and practical qualities. Furthermore, this model could be also used in schools during dance classes as a tool for discovering the capacities of human body and for taking dance comprehension to another level.

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