E-SPARKS

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ABSTRACT
E-Sparks is a creative exploration of an artificial society that autonomously creates the own *cultural structure*, through the interaction with the human beings. In the installation, *unidentified artificial entities* move inside an hybrid world where the visitors can interact through gestures and voice. These *entities* can learn the words of the visitors and produce vocalizes. Interacting with the visitors, they become progressively a mirror of the visitors using the phrases and relation network learned from the interaction. The *cultural growth*, emerges through the participatory interaction with thousands of visitors.

Author Keywords
Interactive art, alife art, artificial life, evolutionary language.

ARTIST STATEMENT: THE ART OF EMERGENCE
The research of the Plancton art group is involved in the framework of the *art-of-emergence* paradigm where the point of view is focused in the *meta-design* of the creative processes. The *artwork* is a dynamic generative context of shapes and relations that appear as *emergent qualities* in evolving environments. This choice is related with the impressive creation power that pervade the context of living and self-organizing biological systems. In this approach, the creative process is a dialectical interference between the artist, the artwork and the people *interacting* with the artwork itself. The idea is to translate the artist-artwork-observers system in a continuous co-evolution process able to generate metaphors for the mind, for the society and for the communication dynamics (www.plancton.com).

To realize evolving artworks we use digital technologies working on the border between art and science. One of the most intriguing art/science borders is the context of the *artificial life*. Robots, technological ghosts, cyber-humans have always represented nightmares and fashion for our imaginary. Our fears seems related to the dark primordial side of the human mind which is continuously reflected in the *technological being*. New technologies are often viewed as *aliens*. Looking for science-fiction (and real wars !) it seems that the human being is becoming more and more similar to the *alien-androids* of our nightmares. This inhuman relation with the technology, reflects our difficulties to have relation with the unknown, starting from the dark side which is present in our mind. At the contrary the fashion for the *artificial life* is related to the creative exploration of unknown territories, wish of knowledge of intimate secrets of the life and evolution and finally a naturally evolved empathy for the *life* and life reproduction.

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THE E-SPARKS CONCEPT
The basic idea of *E-Sparks* is the creation of an environment where *unidentified artificial entities* develop behavior and absorb *language* from the people visiting the installation. The focus is a sort of participatory play of the visitors to interact with an *intelligent environment* characterized by a degree of autonomy and ability to share symbols with the human contacts. In this sense *E-Sparks* focuses on the exploration for a communication between the human being and the *alien*. The *contact* is revisited as the first step to assume common symbols, to qualify behaviors, to recognize part of ourselves in the *alien*. Our underlain goal is to soliciting of visitors to a dramatic question: who am I interacting with ? artificial creatures, people or myself ?

The answers of the *entities* are generally incoherent, especially during the first phases of the evolution, but after some days of interaction, due to the learning features, the ability of the creatures to give *inherent* answers increases, and the play is still more stimulating for attending audience. The play is unconsciously driven by the visitor which uses often irony and personification of the digital creatures. The exchange generally assumes the form of a *theatrical fiction* where creatures and humans dialog exploiting the intriguing fashion of language, a sort of *free association game* similar to what was already discovered by surrealists with the famous play of the "cadavre exquis" (fig. 1). In that play, artists like Dali, Duhamel, Prèvert, Tanguy, Ray, Morise, Mirò, Eluard, Picasso took inspiration from the apparently free sentence combination produced by the play, in a predefined semantic context.

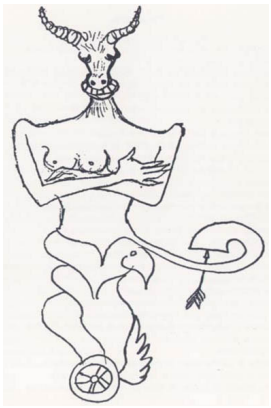

Fig. 1: The "cadavre exquis" from Eluard, Ray, Picasso, 1925)

One of the most interesting aspects of the installation is the continuous adaptation of the creatures to the language due to the accumulation of experience of visitor participation. Changing the context of the visitors, the creatures progressively replace the old words and semantic relations with the new instances. In this adaptation process, the creatures continuously reflect the language changes and the attitude of the visitors to respond to artificial *personified* entities.

The interesting paradox in the E-Sparks installation is that the visitor is apparently speaking with artificial creatures, where actually he is speaking with many other visitors who left a *trace* in the artificial society (eventually long time before). This dialog is possible through the mediation and recombination of the artificial creatures: they are a bridge between the people and a mirror of the human society and its symbols.

THE INTERACTIVE INSTALLATION

In the installation, *digital creatures* move over surface which represents a separation membrane between the real and an *alien-virtual world* projected on a wall screen. The *creatures* animate the surface that appear pulsating and fluctuating, animated by swarm formations.

Fig. 2: Interaction between visitors and creatures.

In front of the screen, the visitors can interact through gestures and voice (fig. 2). The creatures are equipped with an *artificial brain* and *sensors* that make them able to see and listen to the visitors. The *eye* is attached to a video-camera looking the shadow of the visitors over the screen and the *ear* is attached to a microphone where the visitor can speaks. The brain, built using memory and neural networks, allow them capable to process visual and sound information, to control the movements, to learn words by the visitors and to produce vocalizations.

The *entities* can learn two basically ways of interaction. The first kind is to follow the visitor shadow projected on the screen. At the beginning the creatures have *no idea* how manage the data from the sensors, but after a while they *realize* that it is convenient to move towards the visitors in order to gain *energy*. The learning process is based over a *behavior partial emulation*: the creature with lower energy try to partially emulate the behavior of the best creatures.

The other way of interaction is realized through spoken sentence exchanged between creatures and humans. The creatures are able to self-organize a sort of free association of semantic units. After a voice stimulus, the creatures try to recognize the sentence searching for eventual semantic associations with the already memorized units. The semantic language network (fig.3) is progressively reconstructed trough a statistically reinforced procedure based on the answers the visitors. The answer is a mosaic of sentences learned from other previous visitors. None predefined vocal material is inserted at the begin of a digital society.

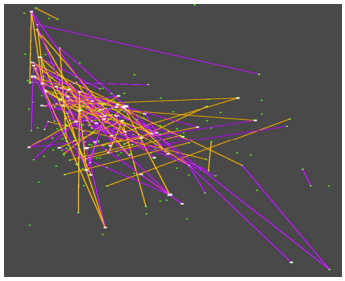

Fig. 3: The language network

Finally each creature develop own language network and a different degree of development depending by its story of contacts with humans. The results is the emergence of a common dictionary of *semantic units*. When the archive of *semantic units* is full the creatures decide which relation to save in the memory. This choice is made using a very recent theory of the language (A.E Motter & al. 2002, M. Steyvers & G. Tenenbaum 2002) and looks for the language as a *small word* network (Watts & Strogatz '98). This way the *semantic hubs* progressively emerge and a continuous adaptation mechanism is inserted in order to develop a continuous ability of the creatures to adapt and evolve in the time. It is possible follow their *cultural growth* in the time, and navigate in their semantic network, discovering good association and creative errors.