

Techno Sex in Art: Mating Man and Machine

In the Solve et Coagula Experiment

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Abstract

Techno Sex concerns embodied and situated experiences. One central research question is in how far advanced technologies allow for corporeal and physical techno-sexual experiences? In particular how one can establish satisfying physical connections between technologies and humans? The paper presents *Solve et Coagula* as one of the imperative media art projects to create a physical amalgamation between a human user and a computer programmed to feed of the users emotions. The project demonstrates how a tactile bodysuit in combination with the development of a haptic language can be used to create corporeal connections in applications relevant to techno sex. The project reveals usability issues relevant for the design of future haptic systems facilitating for intimate relations between humans and machines.

Mapping the Field

Today technologies are used in abundant ways to enhance how humans conduct and experience sex. Techno Sex comes in a great variety, spans across several fields and problem areas. It currently poses more questions and challenges than it can answer. How do Techno Sex impact human relations? Is it transhumanism on steroids? If more appealing and less threatening than 'true' intimacy, can it then enhance and improve sexuality, overcoming the many sexual tensions and repressions currently experienced? Will Techno Sex with its Sex Bots provide solutions that eliminate prostitution? Or is it hypersexualizing our society? With a consequent negative impact on how women are valued. From a biopolitical point of view, Techno Sex might even be the perfect prison or societal control mechanism: if it gets so good that it keeps us happily and busy in (some kind of) bed, then there's no reason for joining the @evolution outside in the streets. [1]

From a technological point of view, the current status of Techno Sex is rather primitive and far from the dream of the perfect humanoid replica or omnipresent sex slave. Actual techno sex toys and robots are mechanically speaking crude and based on haptically cold, unnatural materials such as plastic. Although there are several interesting products ranging from Real Dolls to Chat bots and digitally controlled vibrators

synchronized to 3D, navigable porn movies such as RealTouch™, we are still in a position where we sexualize technologies more than the Tech Sex products actually singlehandedly satisfy us. [2] Such sexualizing of technologies is called The Pygmalion Syndrome: 'that is indicative of the highly mythic content with which we as a culture have imbued our thinking machines. [3]

One central research question is therefore in how far advanced technologies allow for physical techno-sexual experiences? In particular how one can establish satisfying physical connections between technologies and humans? How to make Techno Sexual experiences like Ivan E. Sutherland's 1965 description of *The Ultimate Display*, the display that transforms the virtual into the physically real and possibly even lethal? [4] In the context of electronic art, this paper investigates a techno-sexual fusion between a human user and a machine tuned to emotional experiences. The actual physical connection of a human to a techno-sex interface is a haptically complex problem. To achieve some kind of sensorial connection akin to 'natural' sex between two humans is one precondition for having Ultimate Techno Sex, as Sutherland would describe it. A fundamental challenge is how to technologically create an experience of feeling touched? This can be solved in several ways and the *Solve et Coagula* (SeC) artistic experiment demonstrates how it is possible to mechanically reproduce complex patterns of touch applicable to the experiencing of techno sex. [5]

Status Questionis: Corporeal Techno Sex in Art

How do we make art out of the techno-sexual, that is aesthetically valuable experiences resulting from the erotic amalgamation of body and technology? The techno-sexual can be described as any technology that somehow affects human sexuality and human sexual conduct. The Techno Sexual domain has a long history. Like what monkeys of both sexes are observed doing today, early human ancestors must have done too, that is masturbate with sticks, stems and even plants. [6] Humans have also carved elaborate masturbation devices for centuries, the oldest known dating 28.000 years back.

[7] In the context of electronic art Techno Sex can also be understood as cybersex, describing erotic and sexual pleasures experienced through cybernetic, digital, and computer-based technologies and communication. [8] [9] Whereas sex and sexuality plays a historic, and at times explicit role in the visual arts, there has not been many explicitly touch based Techno-Sex experiments within the community of electronic art. Two of the best-known and most innovative projects involving touch in a sensual manner significant to the understanding of techno erotic experiences are Telematic Dreaming (1992) by Paul Sermon and Bodymaps (1995-97) by Thecla Schiphorst. [10] [11]

Telematic Dreaming connects two double beds, each with one participant, in separate locations via a real-time videoconferencing network. The participants see the projection of each other on the bed, thus giving a visual and telepresent impression that they share the same bed. The video-based installation contains neither direct tactile stimulation, nor any sexual references, but users report a strong sense of physicality both when touching the projection of the other and when being virtually touched. [13] The installation is a prime demonstration of how haptic vision, that is how users produce a mental impression of being touch by watching the live imagery. This indicating how and why we can find telematic embraces intimate, personal, and often sexual.

Bodymaps: artifacts of Touch is an interactive video and sound installation controlled by a computer. The participant sees an image of a lady projected down onto a bedlike structure covered in white velvet cloth that is in itself inviting and sensual to touch. Underneath the bed sheet there are embedded 15 electromagnetic field sensors and eight force sensitive resistors. The bed can so detect touch, pressure and the amount of force applied to the surface. Touching the bed, the projected body responds and comes 'alive' with sound and movement. The artist Schiphorst' intent of the work is to create a relationship between participant and technology that invokes a space of experience, reflection and vulnerability. Although the intention is to raise awareness of one's relationship with oneself through the act of touch, the installation produces strong haptic sensations indicative of how touch can be experienced erotically in the context of techno sex.

The *cyberSM* project by Stahl Stenslie and Kirk Woolford is known for the use innovative haptic technologies in combination with explicit sexual references. [12] In 1993 it demonstrated the first haptic, full-body, person-to-person communication system between Cologne and Paris. It created a multisensory Techno Sexual experience based on real-time, visual, auditory, and tactile communication through a computer environment. Users wear bodysuits with built-in vibrotactile, heat- and electric-current-based stimuli, and the participants were enabled to physically "touch" each other over distances. The bodysuit stimulated eight larger zones on the body, thus inducing an immersive sense of being touched. At the outset, participants had to choose their own visual identity, or avatar, from a large 3D

"bodybank" of scanned and digitized human bodies. Any gender can be combined, creating transgendered avatars. The project so involved both gender play and the concept of liquid personalities and identities. When the avatars are exchanged, they function as an interface both to be touched and to transfer touch. *cyberSM* represents a first, but functioning version of Rheingold's teledildonic vision, capable of forming strong emotional and sensual ties between its participants. [14] It was the first media art project to involve haptic bodysuits. This touches on an ironic aspect of full body, immersive Techno Sex: you somehow have to dress to have sex.

Solve et Coagula – Mating Man and Machine

The *Solve et Coagula* project by Stahl Stenslie and Knut Mork was shown at C3 center in Budapest and at Ars Electronica 1997. [15] The project developed a bodysuit interface with a full body haptic sensory resolution. [16] The installation can be described as a techno-sexual experiment with the purpose of conceiving a new life form that is half digital, half organic. It was an original experimentation with what could be labeled a symbiotic system with an interdependent sensory loop between man and machine. The project therefore describes its resulting output as a 'transhuman cyberorganism'. The sexual experience thereof is dependent upon a machine body and emotions that simulate the trans-species encounter. The project subtitle says 'mating man and machine'. This is accurate in as far as the project attempted to pair man and computer together through physical sensations. The cognitive and corporeal experiences are mixed and materialize as the shape of the cyberorganisms' new machine-body.



Fig 1. *Solve et Coagula*, 1997, Stenslie/Mork, multisensory VR installation, Views from the installation. In the middle the user surrounded by the 'creature' which the body suit rendered physically real through haptics. Copyright Stenslie.

One artistic goal was to question what happens when the machine acquires humanlike emotions, and the human

turns machinelike. This was achieved by joining user and machine through the bio-cybernetic interface consisting of a sensoric stimulation-suit in combination with visual and aural immersion. The machine is essentially an 'intelligent' software programmed to 'feed' on the user's input. Examples of input that influence the machine are the users' indirectly expressed emotions like fear and lust, and controlled bodily expressions like speech, shouting and movements. The users emotions are recognized by preset analyses of ranges and combinations of sound and touch. In turn the machine attempts to sensorially manipulate the user into certain affective physical expressions by vibrotactile output in the bodysuit, 3D sounds and an immersive VR imagery. If the computer-based intelligence were in a state of 'anger' it would encourage 'angry' movement and vocal expressions from the user. If it is lustful it responds to 'lustful' input. Several models and parameters for emotional input and output was designed and tested for this causal interaction loop. The machine is 'fed' through the readings by the sensors placed inside the bodysuit, and the user can influence the computer-creature to adjust the intensity and dramaturgy of the installation. The art-experience has become a techno-sensual fusion of man and machine, pushed forward by a symbiotic interactivity, a form of interaction that is dependent upon the user's presence and bodily functions.

The SeC Installation

On entering the installation the participant steps inside a five-meter tall ovoid shell of metal arms. This is another example of the contextual and psychophysical coding of the installation. In SeC one of the goals was to construct an encompassing physical installation that corporeally impresses the user in a completely immersive manner.



Fig 2. *Solve et Coagula*, 1997, the five-meter tall installation of iron at Kunstnerens Hus in Oslo. Copyright Stenslie.

An effective perceptual experience is a matter of several senses playing together, including details down to the visual design of the equipment. Also here the psychophysical coding by design of the physical

environment was important to guide the user's perceptual experiences. Video beamers projected a view of the creature's constantly changing body on projection surfaces placed around the installation. The visual manifestations change constantly in response to the participant's movements and vocal output.

The SeC Bodysuit and Techno-Sexual Tactility

One of the crucial research questions is how to make Techno Sex physically experiential. In SeC the body suit worn by the participant is the key component to a physical, two-way techno-sexual stimulation. The suit serves as an intelligent, two ways communications interface between the machine and the human. It provides (i) tactile stimuli so that the creature can touch the participant's body and manipulate his haptic perception, and (ii) built-in pressure sensors through which the creature can sense the user's body.

The suit was designed in one piece that was easy and fast to dress. It was built like a human skin to be wrapped around the body. Altogether it weighed around two kilos including cables and was both fairly comfortable and transparent to use. What however had a noticeable weight were the control cables that attached to the suit as an umbilical cord. For the 120 zones 240 cables were used, two for each vibrator. Their weight influence the user's movements, but by attaching them on the back and hanging the cables from above this was not a too noticeable a problem.



Fig 3. *The SeC bodysuit*, 1997. The 120 tactile effectors are equally distributed throughout the suit, effectively covering the whole body. The user holds the pressure sensitive devices in each hand. Copyright Stenslie.

In other projects involving bodysuits such as cyberSM, bodysuits covered only parts of the body. The term 'areal-effectiveness' can be used to indicate how much of the total area of skin/body it stimulated. The overall areal-effectiveness of cyberSM was approximately a third of the body, and therefore comparatively low. The SeC project developed the first bodysuit to practically completely cover the body. Inside the SeC bodysuit the participant is equipped head-to-toe in the tools needed

for interacting with the artificial intelligence: the lightweight body suit, microphone, and a head-mounted display.

The term *Tactile resolution* can be defined as how much of the body is being stimulated at what intensity and by what stimuli. The SeC suit had a vibrotactile resolution of 120 zones each haptically influencing an area of the body approximately five by five centimeters in size. A zone was comprised by a custom-made vibrotactile vibrator where a micromotor served as the main haptic output effector. Through the custom built interface each effector was individually controllable and variable in strength from the slightest shivering to intense vibration. The zones were equally distributed across the body apart from the feet. This exception had more a practical reason of risk for cable strain and breakage. Besides this the feet are indeed an interesting area of the body to include. In their hands the user held two organ-shaped pressure pads with built in, custom-made pressure sensors and effectors.



Fig 4. *SeC pressure sensitive interfaces*, 1997. Part of the SeC bodysuit. Copyright Stenslie.

One main advantage of the SeC' suit compared to other bodysuits and haptic devices is the increase in vibrotactile resolution to cover the whole body. This enabled more complex haptic expressions and outputs.

Towards a Haptic Language of Physical Techno Sex

The development towards a haptic language is long and at least dating back to Giovan Battista della Porta (1535 – 1615). He proposed a cryptographic and telegraphic system built upon a direct stimulation of the flesh. [17] In his system, two 'friends' were each to have an open and

fresh wound. Around the wound there should be two circles containing the alphabet. Communication should happen by 'typing' letters with a knife on the one 'friend'. The other 'friend' would then 'sympathically' feel the corresponding letters and vice versa. Messages could so be exchanged. It is hard to foresee a practical way of constructing such a 'bodygraph', but a sympathetic translation of touch is conceptually relevant for the use of the body to both write and decipher message, and hence to the development of a functional haptic language.

The author's own observation throughout several trials has shown that many users have common reactions to the same haptic outputs, thus indicating the existence of a haptic language that is corporeally comprehensible by all humans. To complete its description is out of scope for this paper. The intention with this paper is to start the listing of contributions to a future vocabulary of touch. A haptic vocabulary is a supply of expressive techniques or devices, possibly a list or collection of terms or codes of touch available for assemblage into meaningful haptic expressions. The resulting combinations should literally make sense. With the increase in sensory resolution the SeC suit, one could for the first time talk about having the possibility of developing a more expressive haptic language.

The resolution enabled the construction of complex sensory patterns to be imprinted on the body. To better design these haptic patterns the 120 effectors were mapped out onto a generic 3D drawing of the body. (Figure 5) On this image the various touch patterns were drawn so that we could more easily envision their effect and code them into the computer for testing. The patterns were designed both in sequence of zones triggered and the individually variable strength of the effectors. The design of the patterns varied from string-like, linear triggering of the effectors to larger areas being triggered simultaneously. The first SeC version used around thirty different patterns in various combinations.

The haptic perception induced by the patterns varied. The haptic vocabulary developed into being able to create distinct sensations from being pulled, pushed, resistance, weight, (human) touch, tickling to objects and 'insects' crawling around on the users body. One user in the initial blind test was not told anything about what the sensations could or should mimic, but reported several strong and distinct impressions ranging from objects moving through the body to insects crawling around. Many users had an impression of the suit being alive.

To maximize the physical effect of each effector it was important to get it placed as close and firmly onto the skin as possible. The suit was designed with lightweight, stretchable cloth that was easy to strap onto the different body parts. More effect was achieved when users were naked beneath the suit, but due to the large number of participants and for hygienic reasons they were allowed to wear light clothing underneath. The strength of the effectors was still felt even then. The custom-built control interface has a maximum electric output of ten amps power. When several of the sensors

were triggered the users were given a strong sensation of the effect of one watt of electrical power.

Inside the installation these patterns were triggered by the emotional states of the computer according to our dramaturgical evaluation of their effect. For the first time having experience with the whole body as a sensual canvas, it became a matter of open experimentation of finding out what sensation each pattern would trigger in what state of the installation. As was found, this also varies from user to user, but there are definitively patterns that most users recognize. Additionally to the predesigned patterns the installation would also trigger individual zones-based upon the character's state of mind.

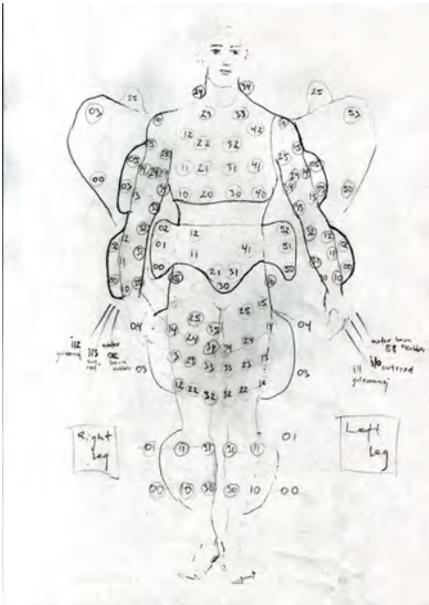


Fig 5. *SeC bodymap*, 1997. Illustration showing the effector placement in the *SeC* bodysuit. Copyright Stenslie.

Physical 3D Sound Environment

The computer-based creature speaks to the participant through moving, three-dimensional sounds projected from the eight channel sound system surrounding the installation. Its 'voice' is a bizarre, mutant-like combination of organic noises and distorted samples of the human voice. The sound, and in particular in combination with a subwoofer, also has a physical effect on the user. Normally sound is discounted as corporeal stimuli beyond listening to music. As the extremely loud music performances by the Austrian art group Granular Synthesis shows, it can indeed be used to create strong corporeal sensations. [18] The implementation of 3D

sound in *SeC* was first meant to create audible aural movements in the space of the installation. This was thought to help the user as points of reference for their navigation. In practice it is hard to map a physical installation, 3D visuals and sound precisely together. One of the problems here is the need for a larger, reflection-free space to ensure a higher degree of control over sound positioning. However, even if the sound was less of a navigational helper, it did have a corporeal effect on the body. Having a powerful speaker and subwoofer at hand, the sound of the installation proved to fill the space with a certain sense of physical and sensual density. It affected the body with an additional corporeal sensation.

Sensual Interaction through Voice and Touch

The installation gets its input from the user through voice and body. Just as the creature expresses itself vocally to the participant, so does it in turn respond to the sound of the participant's voice. It attempts to analyze the pitch and tone of their utterances as some kind of emotional feedback, and respond to the participant in ways it deems appropriate. Through two kidney/organic like shaped figures held in the hands, the participants could touch the creature by pressure sensors. (See figure 4).

Sensory Reset

The perceived strangeness of the situation being placed inside an alien setting has the effect of resetting the user's expectations. Without familiar clues from familiar environments such as the computer screen, mouse and keyboard, the user does not anymore know what to expect. This leaves him or her open to what can happen next, susceptible to new impressions. Such a technique of 'sensory reset' is a known applied method within commercial exhibition design. Catching the attention of visitors is essential in these contexts. A similar notion to the 'sensory reset' is also found in Merleau-Ponty's understanding of habitual perception. Our body is comprised of two layers, the *habit-body* and the *body at this moment*. [19] To the *habit-body* the world is obvious, transparent and manipulative. To the *body at this moment* the natural connection has broken down and it has become externalized as 'a thing manipulatable in itself' (ibid).

Every user was met by a personal guide that both instructed at the start of the installation and asked the user about his experience at the end. Although we did not record all users' responses, most of them verbally gave a positive feedback of the overall experience. Psychophysically designing the environment through the architectural dramaturgy of the physical appearance appeared to have a positive influence on the users impression. As the dramatic looks of the physical installation demonstrates, the psychophysical manipulation is a technique to tune the users mental and physical attention and manipulate them towards sensibility for specific aesthetic expressions. An

additional important factor to the visual presentation is the audible dimension.

Visual and Aural Immersion enhance Tactility

The participant wears stereoscopic viewing glasses through which they are visually immersed inside the computer-constructed 3D reality of the creature's body. The creature presents the participant with organic 'body parts' as representatives of its various emotional states. The creature brings the participant to each body part through a vein- or intestine-like labyrinth of tunnels. It has five different organons, each representing a different state of mind of the creature. The visuals as well as the sound became important to contextualize how the users experience being touched. The touch patterns appeared to be better understood when synchronized with the immersive visuals. One reason for this is the unusual stimuli of being touched 'intelligently' by something as mechanical as a bodysuit. As McLuhan writes on hot and cold media, users always appear to be looking for sense and meaning. Cold, low bandwidth media can therefore at times be more interesting and emotionally immersive than hot, high bandwidth media. [20] Although rich in stimulus, the multisensory design in combination with the alien look of the installation was 'cold' as its unfamiliarity made users having to decode and fantasize about possible meanings and functionalities.

To make sense out the touch one needs a certain haptic resolution. In difference to the cyberSM suit where the touch alone was too mechanical and abstract a stimulus, the SeC bodysuit could make aesthetically interesting content out of the touch patterns alone. However, the combination of sound, visuals and touch provided the necessary multisensory bandwidth to expand the value of the experience.

Techno Sexual Usability Issues of SeC

Techno Sex does not need to mimic or even look like 'natural' human sex. Like the early Furry Muck chatrooms, embodied forms of future Techno Sex might become rather different from what we are now used to think of sex. [21] [22] The SeC installation also leaps away from ordinary perceptions of erotic imagery and visualizes the machine more like alien organons.

Even if unusual and almost bizarre in appearance, the installation was designed to be easy to understand and use. All feedback from users pointed to this. Each user was dressed by an assistant that also explained how the basic system functions. User responses varied from those dancing around to passive behavior where some users just stood still waiting for things to happen. In most cases the users of the installation would move and look around, but it was generally harder to make them use their voice. Emitting loud vocal expressions seem to have a higher social threshold. Many participants appeared reluctant to for example scream.

The multimodal interactivity system of SeC attempted to manipulate the senses into a sensory

symbiotic relationship between user and computer system. It thereby confronts the user with unknown, strange and -from the point of view of Techno Sex- also seductive phenomena. This fusion of technology and art attempted to transform the artistic experience into an aesthetic process of procreation. Even if different and abstract in nature, the project points towards Techno Sex as not just a possibly physical experience, but also as something that fundamentally affects our relationship to technology.

The Haptic Future of Techno Sex

The partial overview of previous haptic and sensual experiments has shown that the questions and problems of using touch as a medium in electronic art has a relatively short history. The mentioned projects dealing with touch and touching technologies are early examples with many shortcomings, yet their output point towards future solutions for bridging the still unsatisfying physical gap between body and technology in Techno Sexual interfaces. The projects mentioned further indicate how applying the medium of touch can enrich user experiences, both techno sexually and otherwise. Today most of us are embodied in technologically supported realities where desires and Pygmalion syndromes are much part of reality. More hands-on projects are needed to acquire a deeper and critical understanding of these emerging techno-sexual cultures. Artistic research projects like Solve et Coagula affirms how little we know about our own techno-sexuality and points out how further experimentation is needed to evaluate both the utopian and dystopian consequences of Techno Sex on humans and society.

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