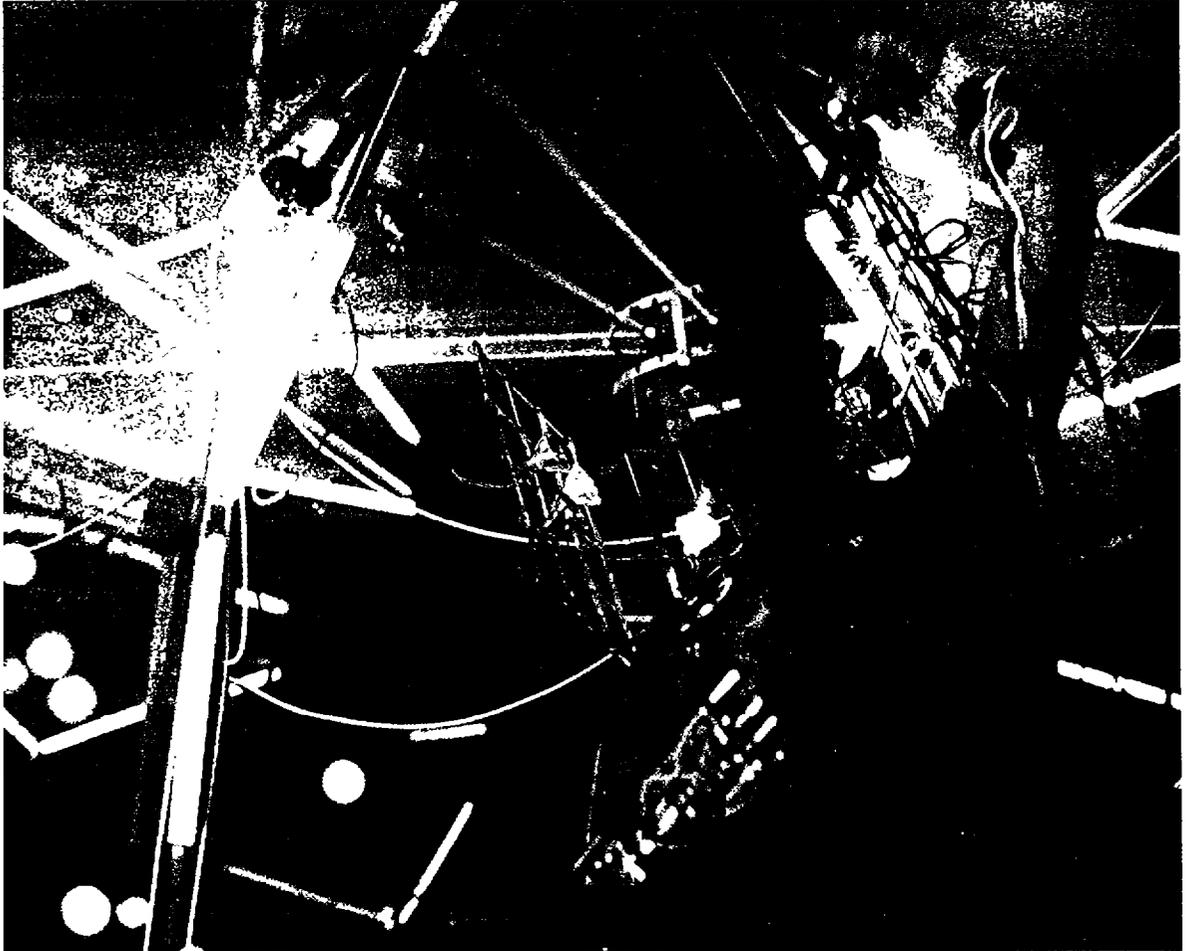


Prosthetics, Robotics and Remote Existence: Post-Evolutionary Strategies

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1. **OBSOLETE BODY.** It is time to question whether a bipedal, breathing body with binocular vision and a 1400cc brain is an adequate biological form. It cannot cope with the quantity, complexity and quality of information it has accumulated; it is intimidated by the precision, speed and power of technology and it is biologically ill-equipped to cope with its new extraterrestrial environment. The body is neither a very efficient nor a very durable structure. It malfunctions often and fatigues quickly; its performance is determined by its age. It is susceptible to disease and is doomed to a certain and early death. Its survival parameters are very slim -it can survive only weeks without food, days without water and minutes without oxygen. The body's LACK OF MODULAR DESIGN and its over-reactive immunological system make it difficult to replace malfunctioning organs. It might be the height of technological folly to consider the body obsolete in form and function, yet it might be the highest of human realizations. For it is only when the body becomes aware of its present position that it can map its post-evolutionary strategies. It is no longer a matter of perpetuating the human species by REPRODUCTION, but of enhancing the individual by REDESIGNING. What is significant is no longer male-female intercourse but human-machine interface. THE BODY IS OBSOLETE. We are at the end of philosophy and human physiology.



Stelarc
"Amplified Body, Laser Eyes & Third Hand"
photograph by Tony Figallo

Human thought recedes into the human past.

2. REDESIGNING THE BODY/REDEFINING WHAT IS HUMAN. It is no longer meaningful to see the body as a site for the psyche or the social, but rather as a structure to be monitored and modified. The body not as a subject but as an object -NOT AS AN OBJECT OF DESIRE BUT AS AN OBJECT FOR DESIGNING. The psycho-social period was characterized by the body circling itself, orbiting itself, illuminating and inspecting itself by physical prodding and metaphysical contemplation. But having confronted its image of obsolescence, the body is traumatized to split from the realm of subjectivity and consider the necessity of re-examining and possibly redesigning its very structure. ALTERING THE ARCHITECTURE OF THE BODY RESULTS IN ADJUSTING AND EXTENDING ITS AWARENESS OF THE WORLD. As an object, the body can be amplified and accelerated, attaining planetary escape velocity. It becomes a post-evolutionary projectile, departing and diversifying in form and function.

3. THE INVASION OF TECHNOLOGY. Miniaturized and biocompatible, technology lands on the body. Although unheralded, it is one of the most important events in human history -focussing physical change on each individual. Technology is not only attached, but is also implanted. ONCE A CONTAINER, TECHNOLOGY NOW BECOMES A COMPONENT OF THE BODY. As an instrument, technology fragmented and de-personalized experience -as a component it has the potential to SPLIT THE SPECIES. It is no longer of any advantage to either remain "human" or to evolve as a species. EVOLUTION

ENDS WHEN TECHNOLOGY INVADES THE BODY. Once technology provides each person with the potential to progress individually in its development, the cohesiveness of the species is no longer important. What is now intriguing is not the mind-body distinction but the body-species split. The body must burst from its biological, cultural and planetary containment. The significance of technology may be that it culminates in an alien awareness -one that is POST-HISTORIC, TRANS-HUMAN and even EXTRATERRESTRIAL (The first signs of an alien intelligence may well come from this planet).

4. AMPLIFIED BODY, LASER EYES AND THIRD HAND. If the earlier events can be characterized as probing and piercing the body (the three films of the inside of the stomach, lungs and colon/the 25 body suspensions) determining the physical parameters and normal capabilities of the body, then the recent performances extend and enhance it visually and acoustically. Body processes amplified include brainwaves (ECG), muscles (EMG), heartbeat (ECG), pulse (PLETHYSMOGRAM) and bloodflow (DOPPLER FLOW METER). Other transducers and sensors monitor limb motion and indicate body posture. The sound field is configured by buzzing, warbling, clicking, thumping, beeping and whooshing sounds - of triggered, random, repetitive and rhythmic signals. The artificial hand, attached to the right arm as an addition rather than a prosthetic replacement, is capable of independent motion, being activated by the EMG signals of the abdominal and leg muscles. It has a pinch-release, grasp-release, 290° wrist rotation (C.W. and C.C.W.) and a tactile feedback system for a rudimentary "sense of

touch." Whilst the body activates its extra manipulator, the real left arm is remote controlled-jerked into action by 2 muscle stimulators. Electrodes positioned on the flexor muscles and biceps curl the finger inwards, bend the wrist and thrust the arm upwards. The triggering of the arm motions pace the performance and the stimulator signals are used as sound sources as are the motor sounds of the Third Hand mechanism. The body performs in a structured and interactive lighting installation which flickers and flares responding and reacting to the electrical discharges of the body -sometimes synchronizing, sometimes counterpointing. Light is not treated as an external illumination of the body but as a manifestation of the body rhythms. The performance is a choreography of controlled, constrained and involuntary motions - of internal rhythms and external gestures. It is an interplay between physiological control and electronic modulation. Of human functions and machine enhancement.

5. THE HOLLOW BODY. Off the Earth, the body's complexity, softness and wetness would be difficult to sustain. The strategy should be to HOLLOW, HARDEN and DEHYDRATE the body to make it more durable and less vulnerable. The present organ-ization of the body is unnecessary. The solution to modifying the body is not to be found in its internal structure, but lies simply on its surface. THE SOLUTION IS NO MORE THAN SKIN DEEP. The significant event in our evolutionary history was a change in the mode of locomotion. Future development will occur with a change of skin. If we could engineer a SYNTHETIC SKIN which could absorb oxygen directly through its pores and could efficiently

convert light into chemical nutrients, we could radically redesign the body, eliminating many of its redundant systems, malfunctioning organs -minimizing toxin build-up in its chemistry. THE HOLLOW BODY WOULD BE A BETTER HOST FOR TECHNOLOGICAL COMPONENTS.

6. PAN-PLANETARY PHYSIOLOGY. Extraterrestrial environments amplify the body's obsolescence, intensifying pressures for its re-engineering. There is a necessity to design a more self-contained, energy-efficient body, with extended sensory antennae and augmented cerebral capacity. Unplugged from this planet - from its complex, interacting energy chain and protective biosphere -the body is biologically ill-equipped, not only in terms of its sheer survival, but also in its inability to adequately perceive and perform in the immensity of outer-space. Rather than developing specialist bodies for specific sites, we should consider a pan-planetary physiology that is durable, flexible and capable of functioning in varying atmospheric conditions, gravitational pressures and electro-magnetic fields.

7. NO BIRTH/NO DEATH - THE HUM OF THE HYBRID. Technology transforms the nature of human existence, equalizing the physical potential of bodies and standardizing human sexuality. With fertilization now occurring outside the womb and the possibility of nurturing the fetus in an artificial support system THERE WILL TECHNICALLY BE NO BIRTH. And if the body can be redesigned in a modular fashion to facilitate the replacement of malfunctioning parts, then TECHNICALLY THERE WOULD BE NO REASON FOR DEATH - given the accessibility of replacements. Death does not

authenticate existence. It is an out-moded evolutionary strategy. The body need no longer be repaired but simply have parts replaced. Extending life no longer means "existing" but rather of being "operational." Bodies need not age or deteriorate; they would not run down nor even fatigue; they would stall then start -possessing both the potential for renewal and reactivation. In the extended space-time of extraterrestrial environments, THE BODY MUST BECOME IMMORTAL TO ADAPT. Utopian dreams become post-evolutionary imperatives. THIS IS NO MERE FAUSTIAN OPTION NOR SHOULD THERE BE ANY FRANKENSTEINIAN FEAR IN TAMPERING WITH THE BODY.

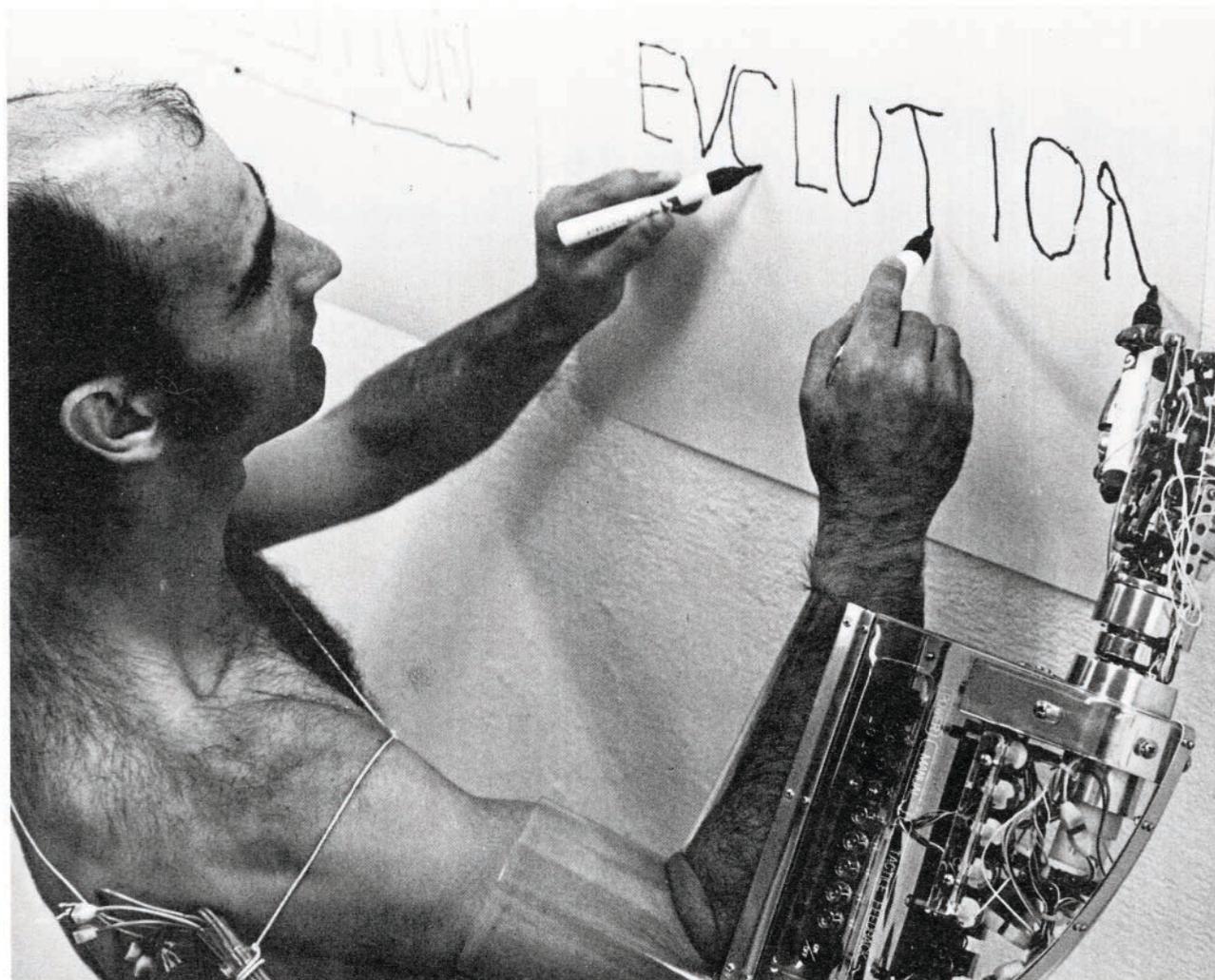
8. THE ANESTHETIZED BODY. The importance of technology is not simply in the pure power it generates but in the realm of abstraction it produces through its operational speed and its development of extended sense systems. Technology passifies the body. Because technology so successfully mediates between the body and the world, it disconnects the body from many of its functions. DISTRAUGHT AND DISCONNECTED, THE BODY CAN ONLY RESORT TO INTERFACE AND SYMBIOIS. The body may not yet surrender its autonomy but certainly its mobility. The body plugged into a machine network needs to be passified. In fact, to function in the future and to truly achieve a hybrid symbiosis the body will need to be increasingly anesthetized...

9. HYBRID HUMAN-MACHINE SYSTEMS. The problem with space travel is no longer with the precision and reliability of technology but with the vulnerability and durability of the human body. In

fact, it is now time to REDESIGN HUMANS, TO MAKE THEM MORE COMPATIBLE TO THEIR MACHINES. It is not merely a matter of "mechanizing" the body. It becomes apparent in the zero G, frictionless and oxygen-free environment of outer-space that technology is even more durable and functions more efficiently than on Earth. It is the human component that has to be sustained and also protected from small changes of pressure, temperature and radiation. The issue is HOW TO MAINTAIN HUMAN PERFORMANCE OVER EXTENDED PERIODS OF TIME. Symbiotic systems seem the best strategy. Implanted components can energize and amplify developments; exoskeletons can power the body; robotic-structures can become hosts for a body insert. And with micro-miniaturized robots we will now be able to colonize the surface and internal tracts to augment the bacterial populations-to probe, monitor and protect the body.

10.- TOWARDS HIGH-FIDELITY ILLUSION. With teleoperation systems, it is possible to project human presence and perform physical actions in remote and extraterrestrial locations. A single operator could direct a colony of robots in different locations simultaneously or scattered human experts might collectively control a particular surrogate robot. Teleoperation systems would have to be more than hand-eye mechanisms. They would have to create kinesthetic feel, providing the sensation of orientation, motion and body tension. Robots would have to be semi-autonomous, capable of "intelligent disobedience." With teleautomation (Conway/Volz/Walker), forward simulation -with time and position clutches- assists in overcoming the problem of

real time-delays, allowing prediction to improve performance. The experience of Telepresence (Minsky) becomes the high fidelity illusion of Tele-existence (Tachi). ELECTRONIC SPACE BECOMES A MEDIUM OF ACTION RATHER THAN INFORMATION. It meshes the body with its machines in ever-increasing complexity and interactiveness. The body's form is enhanced and its functions are extended. ITS PERFORMANCE PARAMETERS ARE NEITHER LIMITED BY ITS PHYSIOLOGY NOR ITS IMMEDIATE SPACE. Electronic space restructures the body's architecture and multiplies its operational possibilities.



Stelarc
"Handwriting"
writing one word simultaneously with 3 hands
photograph by A. Okada