THEOREM 3

(Antoine de Saint-Exupery)

The more a machine is developed,

the more it disappears

KINESIS - *efficient causality*

PRAXIS - *final causality*

...cyborg or homo cybersapiens?

SYNERGY

"syn" + "ergon"

...cyborg or homo cybersapiens?

HOMO CYBERSAPIENS

(De Andres, 2002)

- **If human action imposes itself on the technical object, then it can obtain its final aim.**
- **If the technical object imposes itself on human action, then man is subordinate.**
- **The determining capacity of the final aim belongs to human actions: technics is by nature indeterminate (or determinate to all).**
- **Modern man tends to attribute the determining capacity to technical objects.**
- **The final key belongs to man who is dominated by the machine only if he freely chooses.**

"Feel my pacemaker if you don't believe me!"

The body as “natural product”

“adequate instrument”

Are technics capable to produce an adequate instrument to human plasticity?

The natural character of the body is not only the exclusion of artifacts, but the statement of the adequate conditions in order to the human final aim.

Cyberorganic devices:

n.g.e.

Kant

"Act in such a way that you treat humanity, whether in your own person or in the person of another, always at the same time as an end and never simply as a means."

↙ general principles of research on human subject must be taken in consideration; obiously, experimentation in this radical type of intervention on human beings must be undertaken with great caution and adequate knowledge:

1. The knowledge sought through research must be important ant obtainable by no other means, and the research must be carried on by qualified people;
2. Appropriate experimentation upon animals an cadavers must precede human experimentation;
3. The risk of suffering or injury must be proportionate to the good to be gained;
4. Subjects must be selected so that risk and benefits will not fall unequally upon one group in society.

- **Principle of respecting and promoting the “whole person”**
- **Principle of totality**
- **Principle of historical integrity**
- **Principle of relational integrity**
- **Principle of psycho-affective integrity**
- **Principle of solidarity**
- **Principle of justice**
- **Principle of not-marketing of the human body**

Techno-ethical and anthropological aspects of the Synergy of Natural and Artificial Hardware

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1. Introduction to techno-ethics

TE can be defined as the sum total of ideas that brings into evidence a system of ethical reference that justifies the profound dimension of technology as a central element in the attainment of a "finalized" perfection of man. This definition presupposes a positive view of technology as anthropologically relevant, which notwithstanding its being one of the first truths known to mankind, has been strongly questioned in many sectors of culture in these last decades. TE‘s central theme is that mankind is technical by its very nature. Technology is not an addition to man but is, in fact, one of the ways in which mankind distinguishes itself from animals. Animals are provided with “natural tools” in order to survive, but the human person is born devoid of natural tools to survive. He or she alone has the capacity to produce “artificial tools” as a cultural element.

The difference between one who works with instinct and one who works with reason, is that the former works merely in order to survive, while the one who works utilizing his or her intellectual capacity gives *added value* to his or her live. By *added value*, I don’t mean a product, but I mean *added value* to the very essence of man, in which mankind has improved. For example, a robot who simply works, accumulates more output (it doesn't become “more robot”), while a man who works becomes more complete in his or her own essence of man or woman. This is because the aim of human work is not only limited to provide for specific needs, but also – and more widely – to tend to the last truth of reality, in order to use it in the progress of mankind.

At this point, we must pose the central questions about the *added value* of mankind. Where does truth lie? Is it inherent in the preexistence of good? What is the good?

Since human beings are naturally social, the search for Good can never be a selfish fact. Aristotle says that the completion of man’s being is to have friends and positive interpersonal relationships; hence truth and good consist in intersubjectivity which is the sharing of the intentional objectives of intellect (truth) and free will (good) with others.

In interpersonal relationships, the sharing of intellect and free will is manifested by the sincere giving of oneself to another. In this giving act, man includes not only the spiritual dimension but

also the physical one. Therefore this act of giving to each other also incorporates the capacity of man to interact with physical matter, which is technology. Methodologically speaking, TE is a practical science that studies the technical dimension of the human acts in order to provide criteria for its orientation toward the true augmentation of mankind. This means that TE has eminently a deductive method which finds its theoretical bases in reference to anthropology.

The anthropological base of TE includes the integration of technics in the acts of the human persona. In my opinion, the fundamental rules for the positive integration of these two dimensions (personal acts-technical objects) are as follows:

- If human action imposes itself on the technical object, then it can obtain its final aim.
- If the technical object imposes itself on human action, then man is subordinate.
- The determining capacity of the final aim belongs to human actions: technics is by nature indeterminate (or determinate to all).
- Modern man tends to attribute the determining capacity to technical objects.
- The final key belongs to man who is dominated by the machine only if he freely chooses.

1.1. Three basic theorems of TE

In order to simplify, I have proposed three theorems of TE, that can be used as basic principles. These three theorems are:

Theorem 1: *The objective of technology is to increment human relationships* both with a physical dimension and a spiritual one. Returning to the beginning of the thesis, we began by stating that the creation of tools points to ethics and that ethics points to intersubjectivity and that intersubjectivity is the fundamental dimension to the production of material tools.

The second theorem is that "*When experimental science becomes technology it then becomes spiritual*, more human".

Man, who is conscious of realizing himself through interpersonal relations by means of the sharing of intentional objects of the intellect and the will, knows of his duty and capacity to do this not only according to the spiritual dimension of his being but also in respect to the material dimension. His interaction with matter to enable it to reach full integration into interpersonal dialogue, is the ultimate content of technology. In this sense, technology has as its object the increment of the relational nature of mankind, and as a result, when science becomes technology, it becomes more spiritual. The dominant techno-science that led technology to a subjugated position should be substituted with an authentic science open to the authentic truth on man. This is a truth which transcends its domain but in the service of which it can and should enter in its praxis: *scientia*

ancilla technologiae.

So the humanization of science by technology means that the human person is highlighted. This can be summarized in this third and final theorem:

Theorem 3 is based on Antoine de St. Exupery's book *Wind, Sand and Stars*. The main idea is that *the more a machine is developed the more it is taken for granted*. The classic example is that of electricity. When electricity was first introduced it was noticed and marveled upon, now we don't even notice it … until it is no longer present.

2. The Cyborg question

One of the central points in this debate is based on the imminent integration of robotic elements in the human organism. This has highlighted a dated ethical and anthropological dilemma that has been dealt with in a practical and exclusive manner in science-fiction literature: the cyborg.

2.1. Conceptual chaos

The techno-ethical question to pose is: in what manner is the cyborg really an element of positive human augmentation? The answer to this question presupposes other questions: what is a cyborg? and what is "human augmentation"? A radical redefinition of terms is urgently required. In ethical sciences precise terminology is vital.

Instead, terminologically speaking we are in a total state of chaos! After all, the term "cyborg" is superfluous, since every organic life is cybernetic!

The cause of this can be found in the distinction that Descartes makes between *res cogitans* and *res extensa*, which has determined a dichotomy between the human and mechanical that is still prevalent in the terminology of certain academic (and non-academic) environments and thus breeds an ambiguous "argot" and expressions that must be superseded in order to understand adequately the ethical nuances of this domain. For Descartes these two concepts are related to different "things"; he previews in the "*Discorse de la methode*" that the final dominion of the *res cogitans* on the *res extensa* will involve the production of a mechanical man. This is a conclusion very close to the trans-humanist desire of eternity by the mental upload (res cogitans) in a machine (res extensa).

Another possibility is to affirm a new kind of being, neither human nor machine, as the result of a "melding". In this case, the Cyborg will be a new "kind" of man, a new "species" produced by technicians! But this is only a dogmatic assertion, as in the Haraways' "Cyborg Manifesto" in

which the “unfinished condition of mankind” is resolved in a totally hypothetical new form of existence that has the same reality as Nietzsche's ubermensch.

When the use of terms as *symbioses*, *partnership*, *common language*, is underlining the ontological autonomy of the components, the problem regards the correct use of the concepts. First of all, “symbioses” is an adequate term only for living organisms; “partnerships” requires a real possibility of intentional sharing, which is not possible between organic and mechanical; finally, the existence of a “common language” between organic and mechanical is not possible; it is fairly true that cybernetic nature is common for both organic and mechanical, but the symbolic capacity is quite different. You are able to understand a machine only if you first have given it, at least partly, the symbolic spectrum of your language. If the machines were autonomously able to speak... we should be not able to understand them.

2.2. Conceptual proposal

I propose a sort of mathematical paradoxical formula:

MAN + MACHINE = MAN
LIVE ORGANISM + MACHINE = LIVE ORGANISM

There is no “fusion”, but “assimilation” of mechanical in organic. The idea of “fusion” is cyberpunk!

When Maria Chiara Carrozza used the term “fusion” in her wonderful paper at the techno-ethical workshop in Tokyo 2001 (*“Functional Replacement and Humanoids Robotics: the Fusion of Natural and Artificial Hardware”*), she had the ability to link the substantive “fusion” to “organic hardware”, and not to the whole concept of organic being as unitarian subject. Otherwise, you can speak about “fusion” of mechanical hardware “IN” (not “and”) an organic subject.

However, in order to avoid the terminological confusion, I prefer the use of the term “SYNERGY”, from the greek “syn”+”ergon”, that points to the common functional operation, which is in fact one, because the subject that determinates the final aim of the action is one , although it comes from two or more operative principles.

3. Ontological analysis of Cyborg

But, what is a cyborg?

So, as I said before, an initial point to make is that cyborgs are not mixed beings; they are not “part-human-part-machine beings; nevertheless we can say that a cybernetic organism is a “product” of technology. Furthermore, cyborgs and robots are ontologically different realities. They must not be approached in the same manner since they are radically different in their essence.

The term “cyborg” points to a functional dimension of the being, and I think that it must not be used as a “name” to indicate a human being. “Cyborg” is, grammatically speaking, an “attribute”, that is to say, a term that expresses a quality, like “clever” or “lazy”.
To avoid misunderstandings, I suggest that we do not speak of “cyborg” as the term is in itself very limiting, instead we should speak of a technologically augmented human person that we can define as *Homo cybersapiens*.

3.1. Rediscovering the artificial...

If one thinks that we are becoming cyborgs... the truth is that we are cyborgs from the very beginnings of mankind. In the title of the paper of Maria Chiara there is another interesting intuition: the matching between natural and artificial. It is exactly the opposite of the Cartesian distinction between res cogitans and res extensa. Nowadays it is very difficult to find a person who doesn't think that “natural” in good and “artificial” is bad!
I dare say it is quite the contrary!
Remembering the theorems of TE, it's possible to say that man transcends the universe, but the universe and man are not two separate realities: man includes the rest of material reality in his nature as a dialogical being: each and every "object" can present the occasion for meaningful relationship.
Within the search for meaningful relationships with the cosmos, that are never merely objective, but rather inviting the participation of the person and his dialogic being, the special fecundity of the artistic experience is almost evident. As far as what follows is concerned, I would like to remind you that in classic greek “*tekné*” means “arts” and “technics” simultaneously: human interaction with material in order to create interpersonal dialogue. In those who enjoy it, it always involves a call external to us, marked by the subjectivity of the artist and is full of a complexity of evocations. Such a call simultaneously involves an opening of the personal being, something not produced by merely objective experiences, and an interior enrichment, consequence of the fact that the same work gives of itself, renders itself present within the observer as proper to him: it is "different but not distant". There occurs a dialogical circularity in which possession of the work of art and possession by it in an apparent paradox, leads to a mutual improvement.
The paradigm of interwoven relations allows us to appraise technology along the patterns of art. The aesthetical dimension of existence has as its basis the transformation of any interaction of the single person with material reality into interaction with others. The artificial element is seen in its most noble sense - as the product of the free interaction of man with material reality and in so far as it is free, creator of interpersonal dialogue. There is need to rediscover the anthropological

positivism of the term "artificial", which is always an expression of freedom: in fact, man himself is an artificial being, in the measure according to which he is capable of "making himself", of "auto-constructing" himself through his own actions, for the good or for the bad; for this reason, the production of artifices, from the technical (machines) to the symbolic (language), has an intrinsic ethical value. The artifice becomes vehicle of the being in the world, of being with others, of being oneself.

3.2. *Homo cybersapiens: virtue&tekné*

According to Leonardo Polo, a Spanish philosopher, the precedents of cybernetics are found clearly in Aristotle, who established the distinction between vital operations -*praxis*- and physical movements -*kinesis*-, and speaks about information as the modification of the state of equilibrium and of feed-back as the way of controlling information. The *kinesis* is oriented towards the attainment of an external aim, and it is bound by the Aristotelian *efficient causality*; praxis is characterized by the previous possession of the final aim, and it makes reference to the *final causality*.

One can affirm that the organic system of the human person has a total plasticity in that free choice can mold and change the biological structure of the human person; this plasticity is the constitutive dimension of the so called ethically-acquired habits (virtues); f reedom is a transcendental of human beings that connect man with nature through habits (Polo). One can modify the initial biological structure after choosing new paths and challenges and working them until the new choices become an integral component of the “persona”. But the point is that in man *free will is not a given, but is attained.*

To simplify: there is a “kinesis-praxis” system in every cybernetic machine, and there is a “kinesis-praxis” system in every live organism, and there is a “kinesis-praxis” system in every human being. In common they have the possession of the final aim of their acts. But the formality of the possession is quite different in each case.

Simple machines have only kinesis; cybernetic machines have also “artificial” praxis guided by AI; organic beings have vital praxis as well ; finally, human beings have personal praxis guided by human intelligence and free will. Kinesis is common to all, and for this the use of a “kinetical” machine to improve human condition has not techno-ethical problems (only “ethical” ones, if the use of the machine is not correct!). Between cybernetic machines and human beings, instead, the praxis is not the same, because it makes reference to the final causality, which is obviously not the

same for human beings and machines. So, there is a techno-ethical question that poses itself in these terms: the final aim of the machine must be always subordinate to the final aim of the human (*telos*); thus, the free auto-destination of the man to the final aim is respected. The determination of goodness or badness of the final aim belongs to the general ethics.

In conclusion the biological nature of man enables him to have “plasticity”. Technology can be used to conserve, repair and improve this biological nature. What man does with this “plasticity” depends on the free choice of humankind, therefore there is an ethical dimension to these acts that has to presuppose the respect and dignity of the human person. If this is correct, the third theorem is fulfilled, and we can understand well this quotation of Manfred Clynes, the inventor of the term “cyborg”: "*Initially it's a little hard to learn to ride a bike but once you learn it you do all of these things automatically and the bike becomes almost a part of you*".

4. Techno-ethical criteria for cyber-organic interventions: elemental rules.

The cyborg is a human being, *homo cybersapiens,* and thus has personal dignity. Therefore ethical principles which are applied to the human person are applied in the same manner to cyborgs. The number of possible cases to apply is virtually endless; thus, we must have general rules in order to permit an honest and conscientious behavior. I think that Kant offers a good fondation when he asserts the "formula of the end in itself" as: "Act in such a way that you treat humanity, whether in your own person or in the person of another, always at the same time as an end and never simply as a means."

If the human person must always be treated as end and never as a means, it is to avoid every intervention in which the manipulativeness of the human being becomes instrumentalization. Dignity and equality for all human beings is fundamental.

First of all, we must be attentive to the fact that the reference to *action* is central but not sufficient for a complete ethical judgment about cybergorganic interventions. It is necessary to premise the question of the *constitution*. I mean that human being is not his or her action, but is his or her body; the integration of mechanical kinesis or cybernetic praxis into vital human praxis implies that when a mechanical or cybernetic component acts, the “I” who acts is the human person. So, the question is not only the relation between natural and artificial in order to the action, but also the question if the artificial component is adequate or inadequate to human nature.

The “natural” character of the human body is not only the exclusion of artifacts, above all because

mankind is “naturally artificial”, but the statement of the physically adequate conditions in reference to the human final aim: the nature produces the human body as an “adequate” instrument for the plasticity of mankind.

The question is: are technics able to produce an adequate instrument to human plasticity? If you want to answer “yes”, you must to be able to know all the potentialities of human nature and, besides, be able to supply the means to realize them. It is doubtful that man could ever do this, not only for his temporal limitation (induction), but because the human plasticity is creative, implies ever new possibilities (deduction).

Obviously, it is possible to think of a cybernetic instrument that goes very close to these characteristics; but it seems that, at last, every cyberorganic device must include a certain degree of inadequateness. Cyberorganic devices will be absolutely necessary for human augmentation, but they will be ever “not good enough”! Ontologically speaking, for a determinate function, natural will be always better. Only when it will be necessary to repair or to improve the function, it be justified to resort to cyberorganic interventions.

This means that the task of the bioengineer is always open to a new deal: there is no a limit in doing things better!

Finally, I'm going to propose only a list of classic ethical principles to summarize these concepts (O'Rourke 1999), but a deep discussion is needed.

1. **the principle of respecting and promoting the "whole person"**: in this sense, radical transformations of the present normal human body would be permissible if they improve rather than mutilate the basic human functions, especially as they relate to supporting human intelligence and creativity.
2. **the principle of totality**: human person is an “unified totality” (uni-totality): that means, all the components of human person must be totally integrated in the personal “I” (Tettamanzi, 1991). As human person is an unified totality in time and in space, it is very important to underline the next derivate principles:
3. **principle of historical integrity**: based on the unique and irreducibility personal memory, the personal identity is given in the time; this continuity must be guaranteed in every intervention;
4. **principle of relational integrity**: the relational ability of the person in its social and cosmic dimensions must be guaranteed
5. **principle of psico-affective integrity**: the psycho- affective dimension it is an inalienable characteristic of the single person.
6. **principle of solidarity**.

7. **principle of justice**.
8. **principle of non-marketing of the human body**.

And, finally, general principles of research on human subject must be taken into consideration; obviously, experimentation in this radical type of intervention on human beings must be undertaken with great caution and adequate knowledge:

1. The knowledge sought through research must be important and obtainable by no other means, and the research must be carried on by qualified people;
2. Appropriate experimentation upon animals and cadavers must precede human experimentation;
3. The risk of suffering or injury must be proportionate to the good to be gained;
4. Subjects must be selected so that risk and benefits will not fall unequally upon one group in society.