

The mark of Cain. The search of the criminal-man between medicine and law¹

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Sometimes, in order to glance at the future, it is unnecessary to look into a crystal ball, you only have to read some good science fiction novels. Not always does the writer's imagination give us a clear picture of our destiny, but it is also true that the capacity of some novelists to approach problems that will arise only in years to come is really amazing.

Well then, on the basis of such declared faith in science fiction, I will start my lesson talking to you of two tales (of one of them there is also an interesting film version, released in 2002), tales that, somehow, are about the subject I would like, today, to deal with.

The first (from which Steven Spielberg has made a film) is *Minority Report*². Actually the film version is quite different from the plot of Philip Dick's novel, written away back in 1956, but the crux of the matter is the same. In both cases, they talk about a hypothetical future in which humankind is trying to get rid of murders and most of the brutal crimes by a system called *Precrime*.

Through the premonitions of three persons, having extrasensory perception, the ability of predicting events (the *precogs*, that is the precognitives), the police is able to prevent murders before they happen and arrest the culprits-to-be. In other words, the arrest, the conviction and the consequent punishment happen before the offence has been committed. "Imagine a world without murder", says a commercial of *Precrime*. But the system, for several reasons, has not got common consent. We suspect it may have some holes. So, Capitan John Anderton, chief of *Precrime* (a remarkable Tom Cruise in the movie), becomes involved in a matter – actually a scheme intent on framing him – that sees him revealed by the *precogs* as murder-to-be. I will not tell you the whole story. I will confine myself to stress the fact that the title "Minority report" alludes to the eventuality that the previsions of the three *precogs* are not always concordant. A chink, therefore, that opens the future to the horizon of possibility again, rather than locking it into that one of unavoidable necessity.

Beyond the different plot of the movie and of the novel, one thing unites them: the consciousness that to foretell a human action, no matter how many means you have, is not such a foregone fact. By the way, in Dick's novel, at the end, Capitan Anderson frustrates the scheme, but this will cost him exile from planet Earth. In Spielberg's movie the heroic Tom Cruise, not only frustrates the scheme, but he is also able – after having contributed to demolish *Precrime* – to re-form his family and to have a second baby, after the first one disappeared, some time before, without trace. But what do you expect? Hollywood claims its own happy endings.

The second novel of which I would like to talk to you is *A Philosophical Investigation* by Philip Kerr³. The novel, written in 1992, talks of a society not far from ours; the year of the story is 2013. Through neuroscientific research they arrived, foretells Kerr, at an amazing discovery. It is the absence of a certain matter in the brain to produce, at least in males, aggressiveness. On the basis of this observation they started a program whose acronym is L.O.M.B.R.O.S.O (the name of a famous Italian psychiatrist, who died exactly one century ago and of whom I will speak shortly). The acronym, unraveled, means *Localization of medullar Brain Resonations Obliging Social Orthopraxy* (that is, education to right behavior). By a Proton Emission Tomographer (the diagnostic machine known as PET) they are able to detect those persons whose brains lack a Vento-Medial Nucleus (VNM) that acts as an inhibitor to the Sexually Dimorphic Nucleus (NSD), a preoptic area of the male human brain responsible for the male aggressive response. Quite likely considerations, don't you think so? If you

were not medical students, you would be inclined to believe it is a real situation. In any case, on the basis of a screening conducted on four million men in England (the country in which the story develops) they find 0.003% of NVM-negative subjects. The L.O.M.B.R.O.S.O.-Program is directed precisely to feeding (kept strictly secret) the names of the persons who show these features into a databank. Whoever is found NVM-negative is filed under a pseudonym taken from the list of the authors of the *Penguin Classics*, a real and very famous book series in England. The usefulness of this Program is related to the possibility of using it in the case where a brutal crime has been committed, so the databank can be consulted to point the investigation, limiting the number of the suspects. Unluckily for English citizens (or luckily, it depends on the point of view), the filed person under the name of Wittgenstein is able to enter into the computer program. At this point Wittgenstein (a philosopher who I hope most of you know, at least by hearsay) has this great idea: after having struck his name off the databank, he downloads the list of all the filed subjects, and starts to eliminate them, one by one. The person in charge of the investigation, chief inspector Jake Jackowicz (in this case the hero of the tale is a woman) will work very hard to find the culprit of the murders. And in the end, she will be fascinated, anyhow, by his way of reasoning. If all the persons filed into the L.O.M.B.R.O.S.O.-Program – asserts Joseph Esterhazy, alias Wittgenstein – are doomed because of a brain abnormality to commit some brutal crimes, why wait until they commit these offences, before rendering them harmless to society? Wittgenstein himself admits he is in this destiny,

and he decides to follow it in the best way for humankind, that is, becoming the killer of killers-to-be. Even in this case the novel ends without leaving the reader high hopes. The L.O.M.B.R.O.S.O.-Program is only delayed because of this incident. Waiting for the discovering of more effective measures to protect the system, safety and the secrecy of the stored data. Anyway the Program, as a reporter says in one of the last pages of the book, is not a project of only one country. It is part of a political strategy of the European Community. And the decision has been approved and ratified by all the States who are members of the European Parliament. The experimental introduction into England can be considered only a mere chance.

Well now, with science fiction I have finished. Now I am passing on to science. The distance, as you will see, is not so great, at least regarding Kerr's novel.

Between the eighties and nineties of the last century a quite famous neuroscientist, Benjamin Libet, studying the temporal relation that exists between the intention to move and the cerebral activation necessary to do it, stressed how the brain activity in the supplementary motor cortex, involved in the preparation of the movement (the so called "readiness potential"), precedes by some hundreds of milliseconds the manifestation in the consciousness of the sensation of will⁴. Libet's experiments, performed at that time by an electroencephalograph (because diagnostic instruments based on neuroimaging did not yet exist) were very simple. They asked the persons who underwent these experiments to indicate, pushing a button, the exact moment in which the decision concerning the choice among some pictures has been made. The fact that, as I just said, the readi-

ness potential preceded by some hundreds of milliseconds the sensation of will led Libet to assert the conscious willingness does not play a central role in human behavior, inasmuch as cerebral processes temporally go ahead of the choice to act in a certain way. So, behaviors would be caused by brain and not by person's will.

Recently Libet's experiments have been taken up again by some scientists, who used surely more sophisticated techniques of analysis. John-Dylan Haynes, for instance, continued on this search path, using the functional magnetic resonance. Correcting some imperfections of Libet's tests, Haynes and other researchers showed that the predictive information concerning the choice of a movement is already present in the frontopolar cortex ten seconds before the subject has consciousness of it⁵. Of course, the author of the experiment recognizes the complexity of these decisions is not comparable to those of real life. In the laboratory you have to make very easy choices and with a really limited content. In real life, contrarily, some decisions have a great level of complexity, infinitely higher in comparison to pushing a button, because of the huge number of reasons that everyone must evaluate before choosing whether to tread one path rather than another (for instance: Will I study law or medicine? Will I get married or not? Will I have a baby or not?). In any case, according to Haynes, his experiments would be able to falsify the belief of common sense for which at the moment we make a choice his result is free and not entirely decided by cerebral activity.

Now I am leaving the more congenial field for you, that of medicine, and I will move onto more favorable ground for me, that of law.

As you have verified, both the novels of Dick and Kerr and the experiments of Libet and Haynes turn around the same question, that is: are human deeds (good deeds as crimes) the fruit of free choice or, for some reasons (for example a certain cerebral structure), are they contained in our destiny beforehand? In other words, I get married, I have a baby, I do a job or, at most, I steal at the station, because I choose to do it, or because it has already been decided that I would have made these choices in my life? Most of you could object: it is nothing but a futile philosophical disputation. After all, why would I be interested in knowing if I choose to do what I want, or if I am obliged to do it? I could answer that a lot of religions (included that one I am sure some of you follow, that is, the Catholic religion) are founded on the assumption that everyone can choose between good and evil. If this choice were not free, the punishment of hell or the deserved prize of divine nearness *ad aeternum* would not have any sense. It would be only a question of flipping a coin, heads or tails. Heads, you go to heaven. Tails, to hell. But, you know, religion and philosophy have close family relationships. They seem to be done to live in the world of abstractness. In any case, if a scientific discovery can challenge some profiles of a religion it would not be great damage to humanity. It has already happened. Think of Galileo Galilei or Charles Darwin. But there are other fields of social life that could be shocked by the incontrovertible discovery of predestination in our lives. For instance that field of penal justice.

Some of you, probably, will leave this University with a specialization in psychiatry. And it is not impossible that during your career you will be called by a judge to

make a psychiatric examination regarding the mental capacity of the perpetrator of a crime. But why does penal justice need a psychiatrist and to verify if a person is *compos sui*, as they say in Latin? Penal justice needs it for the simple fact that the application of a punishment (in the penal systems of all the countries in the world) is based on the condition of whoever has committed a crime has freely chosen to do so. Without liberty there is no punishment. You can be placed in a psychiatric institution. But this is not really a penalty, it is an administrative regulation, oriented to the cure of the subject and to the security of society. Once the social dangerousness has ended, so too does the restraint end. If the judge considers, on the basis of an examination, a person to be of unsound mind (and so not free in choosing his actions), he must acquit him.

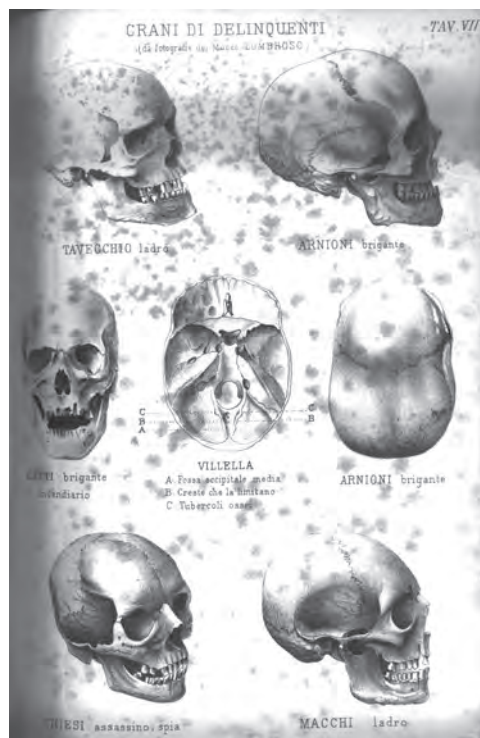
Having said that, some of you could ask if more recent scientific discoveries on human behavior have had repercussions in the field of penal justice. As regards our continent, I would say not a lot, maybe a little more in the United States of America. But back in Europe, it has not been sensational. Nevertheless, I want to mention to you the pioneering judgment of the Court of Assize of Appeal in Trieste that, in September 2009, gave a mitigation of the sentence (I want to stress, a 'mitigation' of the sentence, not an 'acquittal') to a person who had been convicted of murder (Court of Assize of Appeal in Trieste, 01.10.2009, in «Rivista penale», 2010, 1, ff. 70-75). This mitigation had, in part, been granted because the psychiatric examination of the defense had shown a distorted chromosome profile, liable to induce violence in a person in certain circumstances. Particularly, «to be carrier of the allele at low intensity

for the gene MAOA (MAOA-L) could make a subject – recognized the Court – more prone to express his aggressiveness if provoked or socially excluded». Even if, we have to say it, the sentence does not speak of a direct link between the genetic brain profile and committing a crime. It speaks only of the recognition of such a deficit as joint cause of mental insanity, provided for by the Italian penal code, and established beforehand only by psychological tests. The examination itself, on which the sentence is based, uses the genetic indicator as one, among many, of the means adopted to reach the expert's report (and this is very far from declaring the existence of a gene of the killer⁶). In any case, the judgment has created a certain amount of sensation, not just in⁷.

Even if unrelated to this discussion, I want to mention the research of Adrian Raine, according to whom, on the basis of a great deal of data gathered in the prisons he visited, between the brains of criminals and psychopaths, and those of the control subjects without previous convictions, there do exist marked structural and functional differences⁸.

Well, now what you could ask is if medicine has been interested in only that research recently, or has it undertaken this path a long time ago?

In a certain sense, the idea that the “biography” of each criminal is written beforehand, and that some ways exist to read it in a phase that precedes his development, is not new. The belief that some features of the body were the direct expression of the moral qualities of each person has already been expressed, just to mention two examples, in the physiognomic theories of Johan Kaspar Lavater⁹ (around the second



Skulls of criminals (C. Lombroso, L'uomo delinquente, Torino, Bocca, 1878²)

half of the Eighteenth century) or by the phrenologist Franz Joseph Gall, who, a few decades later, began to be interested in the brain and in its functions¹⁰. But, perhaps, it is at the end of Nineteenth century, with the Veronese physician Cesare Lombroso, that these theories assumed the height of their scientific visibility. But, overall, they intersected with a branch of a knowledge, like the juridical one, that demanded the transferring of their results onto the field of the repression of criminality. Now you understand why Philip Kerr used the name of Lombroso to imagine a program able to show the guilty characteristics of a crime.

The reason for which Lombroso has gone down in history is linked to his obstinate search of the physical features which are able to detect a culprit before he commits a crime (the so called born criminal). If the name of this original physician and psychiatrist (who lived more than hundred years ago) were not indissolubly linked to these studies, it is very probable his destiny would have been to be confined only inside very specialist knowledge. Even if we must not omit the fact that Lombroso was interested in a myriad of subjects: from the research on pellagra (an illness that lashed the Italian countryside at that time) to that work on homeopathic medicine, from the study on hypnosis to that on spiritualist and mediumistic phenomena. The Lombrosian theories concerning *Criminal man* (the title of the most famous book of Lombroso, first published in 1876, but that had another four editions¹¹) are quite known. I will try to summarize them briefly¹².

Lombroso was persuaded (and he remained so for life) that criminals (or at least most of them) were a sort of an anthropological species different from that represented by normal persons living in civilized countries. Wild beings, closer to the natural condition rather than to behavioral standards of western civilization. And as the anthropology of the time wanted to show the physical differences that characterized men belonging to different parts of the earth (with a different social, economic and cultural development), in the same way, on the basis of identical assumptions, it would not have been impossible – Lombroso asserted – to point out the physical features that differentiated, in Europe and in the other civilized countries of the world, a criminal from a normal person.

Lombroso's search, it is clear, was not born in a pneumatic vacuum. In the field of psychiatric science, for instance, for several years they had been discussing if, in some sensational cases of mental abnormality, it was still possible to speak, regarding these persons, of belonging to humankind or, instead, of proximity to the animal kingdom¹³. And several studies have tried to point out the physical and physiological features that could differentiate between madmen and sane persons.

From this point of view a superficial use of Darwin's theory of evolution could be produced in support of this hypothesis. So, according to the biogenetic law of Ernest Haeckel (one of the prophets of Darwinism), the ontogenesis (that is, the whole of the consecutive phases of development of the life cycle of man as of any other living beings) reproduced the phylogenesis (that is, the history of the evolutionary development of living beings from the age of their appearance on earth to the present time). And so, if a person, from the moment of his conception to that of his birth, went back along the tracks of the physiology of living being until his latest human condition, it was impossible to exclude that a stop in fetal growth would have led to the birth of a person belonging to a different stage of civilization compared to that person of the epoch in which they lived. A person may be able to integrate into some primitive societies of Africa or Australia, but totally unable to abide by the rules of life in a civilized country¹⁴.

After all, the more original operation of Lombroso was introducing law-breakers into this kind of matter, operating a sort of "pathologization" of crime¹⁵. According to Lombroso, also the criminal was a savage,

born in a civilized society. And like a savage he would have behaved in any case. So, the only problem was to detect the anthropological features that characterized this kind of man, in order to neutralize him before he could cause too much damage to the society in which he lived.

Lombroso expressed this theory in an absolutely radical way, at least in the first two editions of the *Criminal man*, considering every criminal as belonging to this kind of individual necessarily doomed to crime. Later, on the basis of the criticisms, which also came from his closest collaborators and friends (like the lawyer and professor of penal law Enrico Ferri), Lombroso moderated this position. He made room also for the figure of the occasional criminal (that is, a normal person who, in particular circumstances could commit a single crime) and for the research of social causes (and not only the bio-anthropology) of the crime.

Concerning social causes, it was precisely in these years that a dispute arose, within criminological science, that even nowadays does not seem have found an exact solution. So, are persons pushed to crime by reasons linked to social organization, or, on the contrary, are they moved by an interior strength, to which it is impossible to resist? You mean that the option for one or another theory involves different consequences at the level of the fight against criminality. In the first case, to beat crime we must change, at least partially, some features of society. In the second one, you can defeat crime only starting a hand-to-hand fight with the criminal, a subject totally insensitive to every transformation of the environment in which he lives¹⁶. By the way, I have to say that mixed-theories (that is, those ones which consider the in-

fluence of both factors) seem today to be very popular in the criminology field¹⁷.

The more resolute supporters of the social etiology of crime, at that time, were those authors connected to political projects of transformation of society, like Fillippo Turati (one of the founding fathers of the Italian Socialist Party). Turati in his book *Crime and social question* (published in 1883¹⁸) tried to highlight the enormous unequal distribution of wealth, peculiar of bourgeois society, which pushed the lower-classes to commit crimes for the sole aim of surviving. In this context, the achievement of a society founded on socialist principles would have caused a clean-cut in the number of committed crimes. But also who did not link the struggle against crime to the socialist palingenesis of the bourgeois society, like Enrico Ferri (also he came to the Socialist Party in the last years of Nineteenth century), tried to connect the dimension of the criminality to the way in which society of the time regulated its own social, political, economic relations.

What Ferri said (in a very famous book written in 1881 and entitled in the first edition *New horizons of law and penal procedure*, and after *Criminal sociology*¹⁹) was that if they have reformed some of these sectors of society, maybe they would have not beaten crime definitively, but they could restrain it in a socially acceptable dimension.

Lombroso, as I said before, considered criticisms (at least those of Ferri). He also took cognizance of other objections concerning the impossibility to explain all criminal phenomenon through the hypothesis of atavistic reversion. So, not to leave this link between crime and mental illness, he used other psychiatric categories of the time, like *moral insanity*²⁰ or *epilepsy*²¹. In

any case, Lombroso never stopped looking for the anthropological features of the born criminal. In fact, at a certain moment, he thought he has found in a malformation of the skull, the medial occipital dimple (normally present in some monkeys and lemurs) one of the most important physical features able to predict the criminal career of a person.

Lombroso's studies, it is obvious, were not at the time the only studies on this matter. The path of the Veronese psychiatrist was followed by a lot of researchers. Do you want an example? Now I will read you a very short list of works, among an infinity of small or big ones about this specific subject, and which appeared in a journal founded by Lombroso himself in 1880 and entitled «Archivio di psichiatria». A very prestigious review at the time and generally considered of great scientific value. I will now move onto the titles: Perracchia, *The gait of criminals and epileptics*²²; Ottolenghi, *The change of materials* (that is, faeces and urine) *in born criminals*²³; Ottolenghi again, *The olfaction of criminals*²⁴; and again, *Taste in criminals in connection with normal men*²⁵; Gradenigo, *Hearing in criminals*²⁶; Santangelo Spoto, *Polydactyly and degeneration*²⁷; Carrara, *On the development of the third molar tooth in criminals*²⁸; Ascoli, *On the development of the wisdom-tooth in criminals*²⁹; De Sanctis (one of the few Italian physicians mentioned by Sigmund Freud), *Dreams in criminals*³⁰; Battistelli, *The piliferous system in normal men and in degenerates*³¹; Gay, *The morphology of nails in the degenerate*³².

Lombroso's theory of born criminal, as you can imagine, met with very strong resistance. First of all by a lot of lawyers, not only in Italy³³. If they had accepted the idea that a person was obliged, by his own physi-

cal structure, to behave as a criminal, all the traditional penal edifice would have collapsed. A judge, in front of a law offender, would have had only to verify the existence in his body of those marks that necessarily destined him to a criminal life. Once having established this, the one thing to do was to decide the best measure to take for neutralizing his social dangerousness. In this way, all the principles on which western juridical civilization had been built, at least from Beccaria on, were deleted. First of all that one of the necessary relationship between severity of punishment and gravity of crime. After all, if a person had necessarily been destined to break law, why had you have to wait until he committed a second crime? It was better to render him harmless at once and for as long as was possible.

The fact that most Italian juridical science was contrary to these ideas, was shown by the total absence of Lombroso and his school's (named *Positive school of penal law*) suggestions in the first penal code for the united Italy of 1889.

But Lombroso had to suffer also strong attacks from fellow colleagues in his discipline, as the French physician Alexander Lacassagne. In fact around Lacassagne several transalpine researchers who firmly rejected the Lombrosian theory of born criminal and the existence of anthropological stigma to criminal tendency gathered. In particular on the occasion of the second International Congress of Criminal Anthropology, held in Paris in 1889 (and also in the next, held in Brussels in 1892). Lacassagne and his followers preferred an explanation connected to social environment in which a person developed his personality to a bio-anthropological explanation of the causes of crime. But, all things consid-

ered, if these authors are read nowadays, we realize that the topics that distinguished their reflections from those ones of Lombroso were not so much³⁴. They believed (embracing a neo-Lamarckian view of the hereditary transmission of the characteristics) that the features of personality socially acquired were passed down from generation to generation. So, the habit of prostituting oneself, not only could be handed on from mother to daughter through example, but also through inheritance. And from this point of view we must admit that differences with what Lombroso said about born criminals are not many, at least on the level of lawless acts. The heredity of characteristics socially acquired, made a person criminal since birth. And this tendency was the reason for which these subjects had to be rendered harmless for society as soon as possible. After all, it is really an unremarkable fact their unbelief in the occipital dimple as indicator of criminal tendency, forasmuch as most of scientists at that time did not believe in it.

In any case, Lombroso's attempt to find physical signs that could show the criminal tendency of a person was not an isolated attempt in Europe. In England, for instance, two eminent figures of the Victorian Age, Edmund Du Cane (president of the Jail Commission and director of the Prison System) and Francis Galton (Charles Darwin's cousin, anthropologist, statistician, and theorist of eugenics-to-be) were headed, in those same years, for the same path.

Du Cane, while working on the prison population census, convinced himself that to every category of crime corresponded a specific physiognomy of law offender. So a thief face, a killer face, a rapist face and so on, did exist. The realization of these

pictures would have permitted not only detecting the perpetrator among several suspects, but even controlling before the possible manifestations of social deviancy in suspicious characters.

In 1877 Du Cane asked Francis Galton to examine a set of pictures of convicts, to establish what faces were associated with specific crimes (Galton, 1908, chap. 18). Thumbing through these pictures, Galton thought to use the barely discovered photographic technology to show with more clearness the specific features of every category of criminal. So he exposed a lot of pictures of culprits of the same crime in one plate, trying to bring, in a single picture, the physiognomic constants of each criminal category to the surface. The technique, that was called "composite portraiture", did not give the expected results.

In 1878 Galton, presenting his outcomes to the Anthropological Institute of London, had to admit that the image of the "criminal type", searched with so much abnegation, remained quite impossible to find. The marks of Cain – and this was Galton's conclusion – were manifold: and so the particular features of each criminal disappeared rather than became stronger in the composite portraiture.

Francis Galton, more than for this kind study, is known for the fact that he has been the first to perfect an almost infallible identification system of persons, the dactiloscopic one³⁵. Anyway the research about the identification system, in those years, was at an advanced stage³⁶. Before Galton, the French researcher Alphonse Bertillon had discovered how there were some proportions of measure in the human body that permitted to differentiate, safely, each person from another. Bertillon

confessed that he began to be interested in this kind of studies because in France, for some years, the political class and public opinion pointed out a growing difficulty in identifying the most dangerous criminals. Among criminals used to visit court rooms, it was considered current practice to assume a false identity to avoid the hard consequences connected with the relapse into crime³⁷. In this regard, we cannot forget that in 1885, in France, a law was passed that provided for the deportation, as supplementary repressive measure, for those persons who were sentenced for more crimes of a particular seriousness³⁸.

The method elaborated by Bertillon (and called for this reason *Bertillonage*) was tested by not a few countries in the world, with good results. But the unavoidable imperfections implied in taking the measurements of the body had led, in several and sometimes sensational cases, to making some mistakes. For this reason the substitution of the Bertillon method with fingerprints technique happened within a few years.

So Francis Galton, starting to the wish to trap criminals before they could commit a crime, had arrived at providing, to all police forces of the world, an indispensable instrument of identification, able to attribute to each person his own identity and, not much later, even able to constitute irrefutable proof of the guilt of a suspect. But you know, often science proceeds in this way: starting from wrong premises, arriving at the right results.

Well, we began from the search of a method to detect the culprit of a crime before and we arrived at the fingerprints. But the thing can not surprise us. As Robert Sommer a famous scholar of the end of nineteenth century said, the studies on the

methods of identification and that one on born criminal's distinguishing marks has been bred from the same ideas³⁹.

What may we say at the end of this lecture? A lot of scientists and criminologists are wondering, in these years, on the basis of the latest outcomes of some experiments, if, after all, Lombroso was not right. That is, the hypothesis of the born criminal was correct, but the means of those times did not allow a validation of it on the scientific plane. I leave it to you, physicians-to-be, to form an opinion on this subject. I would say that this is not the most interesting question to ask. There is another one that I propose to you. Why does this aspiration to the discovery of criminal-man's distinguishing marks come up again in particular historical circumstances? In others words, Why does this dream happen again in the presence of the same epochal features (like imposing social changes, processes of transformation of economic systems, enormous difficulties in absorbing the hardly controllable and available labor, great rushes of population, ideological radical contestations that threaten the stability of the political systems)? It seems to me that in particular critical circumstances, we choose the shortcut of the born-criminal because we consider it too difficult to put a penal repression restrained inside the rights and the guarantees recognized to each person into practice. But it is precisely in these cases that the dream of detecting the criminal-man, if it is not restrained by an adequate work of reason, can become for someone a real nightmare.

I know, this matter presented in this way looks very vague, but the time allowed me has ended. And this would be the subject of another lecture.

- ¹ This is the english version of a lecture given at the Medicine Faculty of Ancona on the 27th of January 2010.
- ² P.K. Dick, *Minority Report*, London, Gollancz, 2002 (It. ed. *Rapporto di minoranza e altri racconti*, Roma, Fannucci Editori, 2002).
- ³ P. Kerr, *A philosophical investigation*, London, Chatto and Windus, 1992 (It. ed. *Un killer tra i filosofi*, Firenze, Passigli Editori, 2003).
- ⁴ B. Libet, C.A. Gleason, E.W. Wright, D.K. Pearl, *Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential): The Unconscious Initiation of Freely Voluntary Act*, in «Brain», n. 106, 1983, ff. 623-642.
- ⁵ J.D. Haynes, C.S. Soon, M. Brass, H.J. Heinze, *Unconscious Determinants of Free Decisions in the Human Brain*, in «Nature Neuroscience», n. 11, 2008, ff. 543-545.
- ⁶ A. Lavazza, L. Sammiceli, *Se non siamo liberi possiamo essere puniti?*, in *Siamo davvero liberi? Le neuroscienze e il mistero del libero arbitrio*, (ed. M. De Caro, A. Lavazza, G. Sartori), Torino, Codice edizioni, 2010, ff. 147-166.
- ⁷ M. Inizan, *Un juge italien découvre le gène du meurtre*, in «Libération», 28.10.2009; A. Ahuja, *The get out of jail free gene*, in «The Times», 17.11.2009; E. Feresin, *Lighter sentence for murder with "bad genes"*, in «Nature», 30.10.2009; E. Fazzino, *Il gene dell'assassino, ritorno a Lombroso?*, in «Il Sole 24 Ore», 29.10.2009.
- ⁸ A. Raine, Y. Yang, *Neural Foundations to Moral Reasoning and Antisocial Behavior*, in «Social Cognitive and Affective Neuroscience», n. 1, 2006, ff. 203-213; A. Raine, *From Genes to Brain to Antisocial Behavior*, in «Current Directions in Psychological Science», n. 17, 2008, ff. 323-328.
- ⁹ J.K. Lavater, *Von der Physiognomik*, Leipzig, Weidmanns Erben 1772 (It. ed. *La fisiognomica*, Roma, Atanor, 2008).
- ¹⁰ F.J. Gall, G. Spurzheim, *Anatomie et physiologie du système nerveux en général, et du cerveau en particulier. Avec des observations sur la possibilité de reconnaître plusieurs dispositions intellectuelles et morales de l'homme et des animaux, par la configuration de leurs têtes* (2 voll.), Paris, F. Schoell, 1810-1812.
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