The Coming of a Neurocentric Age?
Neurosciences and the new biology of violence:
a historian’s comment

Peter Becker

Summary. The article begins with an observation regarding the increasing presence of neuroscientists in criminological, pedagogical, economic, and religious discourses. How have neuroscientists managed to enter into public and political debates that are not about medical issues such as the prevention and treatment of diseases like Parkinson’s and Alzheimer’s, but rather social, economic, and political issues? Focusing on the field of criminology, I first cast a critical look at the criminological narratives of neuroscientists and emphasize the critical function of evolutionary theory as a kind of a ‘putty’ to turn scattered empirical evidence into a coherent narrative. Secondly, I reflect on the promises linked to this new perspective that brings a biological turn to criminology. Thirdly, I discuss the implications of this biological turn for our understanding of the social context as well as conceptions of normality within criminological narratives and criminal policy.

Keywords. biology and violence; criminology; neuroscience

It is difficult not to stumble over some passing references to neurosciences when browsing newspapers and newsmagazines. References to neurosciences are used to support a variety of different claims – from marketing through education to cultural activities. The neuroscientists’ move from the lab to the public and political field has been made possible by heavy investment into brain sciences, by the enormous technological advances for viewing the brain, and by the breakthroughs in the scientific understanding of cognition and neural functioning. Neuroscientists appear as the heralds of a new scientific age, who are about to solve the last riddles of mankind: the reconstruction of the actual working of the brain¹.

Already now, the neuroscientists, their scientific discoveries and the popular imagination related to them, have begun to mend the ways in

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¹ Kandel, 2006, p. 11.
which we make sense of ourselves and of society. Jake Dunagan, research
director at the American Institute for the Future and interested in the role
of emerging technologies in transforming subjectivity, culture, and govern-
ance, heralds the coming of a *Neurocentric Age*. It is closely linked to the
“progress in neurosciences” and to the appearance of new transdisciplinary
formations such as *social neuroscience*.

The neurocentric age has wider repercussions on the way in which the
systematic study of society and subjects is framed. As to Jake Dunagan, the
impact of this neurocentric turn is being felt in other disciplines, and new
approaches to epistemology, research methods, and long-standing philo-
sophical dilemmas are being generated and debated. New labels for new
fields of knowledge appear where the prefix ‘neuro’ is used to indicate the
birth of a new interdisciplinary configuration around the neurosciences.
Among these neurologisms, we find neuro-economy, neuro-didactics, and
neuro-aesthetics as well as neuro-ethics, neuro-theology, and neuro-law.

In the field of criminology, the coming of the neurocentric age reframes
the criminal in biological terms. It is part of a reductionist agenda, as Paolo
Legrenzi and Carlo Umiltà point out. This shift in perspective is reminis-
cent of the changes engendered by criminal anthropology and criminal
biology on criminological discourse, on penal practices, and on public per-
ceptions of crime about a hundred years ago. Can we thus speak of a return
of Cesare Lombroso on the criminological scene and in penal policies? Even
though the Italian criminal anthropologist of the late nineteenth century is
still present as point of reference in scholarly works and the media, we need
to be attentive to the differences in discursive practices between the first
biological turn and the neurocentric turn of our days.

My paper is written as a comment on the current biological turn and will
begin with a critical look at continuities and discontinuities between the
criminal biology of the first half of the twentieth century and the neurosci-
entists’ comments on the problem of violence and crime. I will use the case
of Phineas Gage for this purpose. Having sketched briefly the peculiarities
of the neuroscientists’ biological perspective on crime and violence, I will
then look more systematically at the push and pull factors, which enable

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3 Cacioppo and Berntson, 2002, p. 3.
“the most obsessed-over branch of all the sciences”, Zimmer, 2008, p. ix.
6 Legrenzi and Umiltà, 2009, p. 57.
the neuroscientists to move from their labs into the public and political arena. In a third step, I look at the media and their role in providing a public space for the neuroscientists’ claims regarding political issues, in bestowing authority on them by featuring them as public intellectuals, and by acting as translators for their scientific research.

Have you ever met Phineas P. Gage?

The very small amount of attention that has been given to the above wonderful case … can only be explained by the fact that it far transcends any case of recovery from injury of the head that can be found in the records of surgery. It was too monstrous for belief […]

Only recently I learned about Phineas P. Gage. He is one of my many discoveries on the way to better understanding the increasing attraction of biological explanations of violence in the public and political debate over the last twenty years. Gage, that is, the scholarly and public debate on his case, offers an opportunity to pinpoint the concurrence of continuity and discontinuities in the neuroscientific debate on violence. For this reason, I will introduce my comments on the new biology of violence and its eager reception in the public with brief reflections on his case and its afterlife in books, web pages, and popular music.

Phineas P. Gage was a railroad worker who lived around the mid-nineteenth century. This was a time when European states and intellectuals had, in principle, more serious problems on their mind than the fate of American workers. Nevertheless, Phineas Gage arrived rather quickly at center stage in heated scientific debates with strong political under-

7 Jackson, 1870, p. 149.
9 A comprehensive overview on the case of Phineas Gage can be found at the internet portal created and maintained by Malcolm Macmillan at the School of Psychology, Deakin University, in Victoria (Australia): www.deakin.edu.au/hmnbs/psychology/gagepage/Pgstory.php (last visited on February 17, 2008). The web page of the Phineas Gage fan club featuring new developments in brain research can be found at http://phineasgage.wordpress.com/category/emotion/ (last visited on June 5, 2008).
10 There is a rock-music band named Phineas Gage which published a first album in 1990; an artist called Drunk who published an album entitled Phineas Gage in 1999; and there are six songs from different artists dealing with the accident of Phineas Gage. One of them features a video with an animated representation of the accident: http://de.youtube.com/watch?v=m7nmkXhMtzQ (last visited on February 17, 2008).
currents in Europe. This was due to the relevance of his case within the controversies regarding the localisation theories of Paul Broca and David Ferrier. Their anti-clerical, atheistic, and republican leanings took the dispute beyond the narrow confines of the neuroscientific community. It was not merit but rather a moment of distraction that caused the lasting fame of Phineas Gage. Phineas Gage was the foreman of a railroad building crew and helped the American dream to come true. They were breaking through mountains to move ahead with the rails through Vermont. To use the force of gunpowder most efficiently, the crew covered the gunpowder with sand before ignition. This directed the explosive action most efficiently against the rocks. On September 13, 1848, the crew was working close to Cavendish, VT. Another hole was drilled and filled with explosive, when Gage became distracted and harm was on its way. How this accident happened is not exactly known. There are two slightly different narratives present. The first puts more blame on Gage himself. He should have looked back to his men while tampering the explosive itself – the most delicate part of the blasting. The second story blames his men. They were expected to fill the hole with sand. Without checking on them, Gage started to tamper. In any case, the explosive was ignited by sparks resulting from the contact of the iron with the rocks. The charge was set off and forced the tamping iron through his head.

This accident caused his life and afterlife to make a decisive turn. His notoriety in scholarly publications is impressive: his case is discussed in about 60% of all introductory textbooks in psychology. What makes his case relevant for my argument is the discontinuity it reveals between the criminal biology of the fin-de-siècle and today’s variant. Even though genealogies are established between these two fields of knowledge, the differences are remarkable regarding the disciplines involved, the theoretical concepts employed, and the evidence used. His case mattered in the nineteenth-century debate about the localization of speech. It did not play any role, however, in biological explanations of crime and violence of the late nineteenth and early twentieth centuries. Even though I have been reading extensively criminological and psychiatric literature of this time, I have not met Phineas Gage on these occasions.

12 Macmillan, 2000, p. 27ff.
13 See Markowitsch and Siefer, 2007, p. 126.
15 See Damasio, 2004, p. 38.
Phineas Gage entered the debate on violence and crime only when neuroscientists shifted their interest to studying personality change as a result of the damage to specific parts of the brain. Gage suffered from a heavy destruction of the brain in those areas that are held responsible for decision making and processing of emotions. The neuroscientists Hannah and Antonio Damasio brought his case back to light in their extensive study of the relationship between lesions of the brain and personality change. Gage as testimonial for personality change through brain injury turned him into a prominent figure within criminal biology. Violent criminals – the so-called psychopaths – suffer from an impairment of those parts of the brain that were damaged also in Gage’s skull. It is for this reason that his case offers evidence for neuroscientists about extremely violent perpetrators – the monsters of our days – even though he himself was never violent. It is therefore somewhat misleading that the German physiologist Hans Markowitsch refers to the Gage case in those parts of his co-authored book where he reflects on the “animal within men” (*Das Tier im Menschen*).

Brain researchers who refer to the case of Phineas Gage are haunted by the paucity of evidence. There was never an autopsy performed and our knowledge about his biography is extremely limited. The exact localisation of damage has been estimated many times on the basis of the skull and the tamping iron, which are both preserved in the Warren Museum at Harvard University. The lack of evidence opened space for creative readings, which were more based on theoretical reasoning than tangible evidence, as the more positivistic-minded psychologist Malcolm Macmillian bemoans:

Many characteristics are attributed to Gage that are neither reported by Harlow nor documented elsewhere. Where the scientific misrepresentations do not come from partial or careless readings of Harlow’s 1868 paper, they often attribute characteristics to Gage that were first reported in other patients, particularly those who underwent frontal lobe surgery in the 1930s.

This point can be carried even further. In the case of Gage, not much evidence has been collected and transmitted regarding both the exact form of his injury and his social and family background. This leaves the

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16 See Damasio, 1994.
18 See Macmillan, 2000, pp. 80-82 for a discussion on one of the latest attempts to reconstruct the damage using advanced simulation models.
19 Macmillan, 2000, p. 5. On the same subject see also pp. 116-120 and 333.
neuroscientists with an empirical void, which was bridged with theoretical assumptions, as Macmillan laments. To him, these scientific representations are “distortions generated by a theoretically driven vision of what Gage should have been like.” For a cultural study of neuroscientific arguments on violence, this creative reading provides interesting evidence about their theoretical and narrative underpinnings. Evolutionary theory plays an important role, as we can learn from Debra Niehoff’s engagement with the Gage case. She presents her vision on the dramatic turns of Gage’s life as illustration for the emotional consequences of cortical damage. In order to explain the anatomical basis of Gage’s behavioral change, Niehoff resorts to an evolutionary model of brain development with “the phylogenetically experienced amygdala” as the “functional heart of the emotional response network” to which also the frontal cortex belongs.

In principle, there is a plethora of evidence available in neuroscientific research. Their laboratories and clinical studies produce an enormous amount of data. They allow fascinating insights into the anatomy, physiology, and chemistry of the brain as an active and ever changing interface between environment and individual agency. These data remain limited, however, to single individuals, humans, apes, and rodents. While the interaction between social environment and brain development is taken into account, in-depth studies of individual biographies and systematic reflections on the political and economic structuring of the environment of subjects are not easily accommodated within this new neuroscientific approach, as Michael Hagner critically points out. The lack of in-depth biographical studies creates an empirical deficit regarding the analysis of the relationship between trauma, environment, and brain functioning. Evolutionary theory is used as an alternative to biographical in-depth research to link behavioral patterns to a mind, the history of which is no longer related to the individual past but rather to the human past. This evolutionary underpinning has several consequences. The first consequence is felt in the choice of evidence. If we deal with a brain emerging from phylogenetic evolution, we can link the social and psychological behavior of mammals to men; scientists can thus study mice to better understand the interactive processes that make human juveniles violent. The second consequence can be traced in the organization of neuroscientific narratives, which Erin O’Hara aptly

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20 Ivi, p. 333.
23 See the example described in Niehoff, 1999, p. 247ff.
characterizes in the following manner: “Stated differently, neuroscientific studies are often predicated on hypotheses generated by applying evolutionary theory to the study of the brain”24.

*From the laboratory into politics*

We are looking for genetic, biological, environmental, medical causes of violence. The sociologists have had their day and things have only gotten worse. It’s time for the biologists, the geneticists, the neuroscientists to take over25.

In his novel *Brain Storm*, Richard Dooling has one of his female heroes, the neuroscientist Dr. Palmquist, make a vigorous statement on the research program of her discipline. It is fictitious but not fictional, as even a cursory look at the contributions of neuroscientists to political debates about violence and education proves. Taking over the field is the ambition of those neuroscientists who follow the figure of Dr. Palmquist and reach out from their labs into politics. Their aspiration is not limited to engendering a shift in theories, research tools, and narratives. The claim of neuroscientists is much bolder: they aim at replacing the social and political sciences as main advisors in the political decision-making process. A telling example can be found with the argument of Terrie Moffitt and Avshalom Caspi. They blame the insufficient design of sociological studies for the failure of intervention programs to reduce antisocial behavior and present their research strategy as the analytical and political solution: “Simply put, the cost of getting causation wrong is not trivial”26.

These claims have been noticed and commented upon mainly by philosophers, while scholars from the social sciences and cultural studies remained remarkably silent. A welcome exception is the fine book of Nikolas Rose, on *The Politics of Life Itself*. It scrutinizes the widespread politicisation of medicine, human life, and biotechnology through an in-depth analysis of recent developments in life sciences and biomedicine. Rose uses “neuropolitics” to link the medico-industrial complex and its investment in the development and marketing of new psychiatric medication to the emergence of a new kind of self-hood, which Rose labels fittingly as “neurochemical self”.

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24 See O’Hara, 2004, p. 1680 with additional references.
This subject is prone to maximize his or her potential – with the support of smart drugs operating on the molecular level of the brain\textsuperscript{27}.

Rose’s work is crucial for an understanding of the wider cultural transformations that provide space for biomedicine, new psychiatric medication, and neuroscientific comments on political issues. At the core of these transformations Rose situates a new understanding of the self, which he connects to various analytical categories such as self-control and risk management\textsuperscript{28}. To explain the success of neuroscientists in winning support from media and influential gate-keepers with regard to their ‘political’ ambitions\textsuperscript{29}, the reference to the new subjectivity in its wider political context is not sufficient, however. Considering the remarkable differences between countries regarding the politics of the bioethical debate as well as the emergence and organisation of cognitive sciences\textsuperscript{30}, we need to inquire into the national differences also in the case of neurosciences. A comparative analysis is needed of the interaction between research and research-related economic activities on a global scale, advisory networks operating on a national and European level, and, finally, the national media and political cultures that define the conditions under which neuroscientists can move from the lab to the Feuilleton and the advisory boards.

The claims made by neuroscientists to take over the agenda-setting in several policy fields are reminiscent of the situation at the end of the nineteenth century, when anthropologists, psychiatrists, and hygienists became influential figures in social and criminal policy. This is not to say that we can experience today the comeback of Cesare Lombroso – the influential founder of criminal anthropology at the end of the nineteenth century\textsuperscript{31}. A comparison across time rather allows for the identification of similarities and differences in the interplay between politics, science, and the public. It directs the attention to analytical perspectives that might be obscured by the ‘noise’ produced by the most prominent actors in the debate.

Looking at the current discursive and institutional practices from a historical viewpoint, we can easily identify an almost obsessive focus on the philosophical question of the free will\textsuperscript{32}. This is the ‘noise’ that cloaks the

\textsuperscript{27} Rose, 2007, p. 222ff.
\textsuperscript{28} Ivi, p. 220.
\textsuperscript{29} See Zimmer, 2008, p. ix.
\textsuperscript{31} See Lombroso, 1884.
\textsuperscript{32} See exemplarily the fine collection of essays in Geyer, 2004.
view on the more substantial issues. Using the rather pejorative term ‘noise’ in referring to this debate is not meant to belittle the efforts of scholars to come to terms with the philosophical implications of the application of neuroscientific arguments in the political field. There are strategically more important points to be raised, however. Looking back at the emergence of criminal anthropology and criminal biology as actors in the political field, their rather meager impact on the refashioning of the penal law is quite obvious as they failed to gain directing influence on the penal reform initiatives. They nevertheless made a difference in the ways in which suspects were tried and criminals treated in prisons.

To understand their impact, we need to follow the advice of Bruno Latour\textsuperscript{33} and look systematically at the networks created by the protagonists of criminal anthropology and criminal biology. These networks extended into the advisory boards for the rewriting of penal law, but the most consequential ones were the alliances with the public and with the prison system. Using the authority of evolutionary theory, criminal anthropology was able to alter the cultural knowledge about deviance and most importantly about the subjects who committed crimes. I have analyzed this shift by looking at the changing master narratives used in the representation of crime and criminals\textsuperscript{34}. The alliance with the public was crucial for their success in other domains, mainly in the prison system. Criminal biology was introduced to establish new classification schemes for inmates in order to better differentiate between different groups of prisoners\textsuperscript{35}. The main cleavage was defined by the openness of the culprit to reform. Evidence for establishing this difference on the level of the individual inmate was found in a rather arbitrary combination of constitutional, hereditary, and social indicators. The application of these categories was not legitimated by detailed knowledge about the ways in which constitutional and environmental factors concurred in the production of criminal careers. Their appeal was based rather on three points:

- a widely held belief that the prison system is not living up to its promises
- a new concept of the self, which was seen as strongly determined by its constitution
- the idea of the non-political character of technological tools like classification systems, card indexes, etc.


\textsuperscript{34} See Becker, 2002.

I have extended the historical part of this argument for good reasons. The institutionalization of criminal biology in the prison system and not in the penal code teaches us the lesson to look for all alliances that today’s neurosciences are crafting. Today, we are finding again neuroscientists who are looking to promote more mundane and applicable solutions\textsuperscript{36}. The Law and Neuroscience Project funded by the McArthur Foundation is a good case in point. It supports research and communication activities with the aim to more systematically integrate neurosciences into criminal policies and legal decisions\textsuperscript{37}. The Brain Waves Project organized by the British Royal Society within the framework of their Policy Project initiative offers a platform for scholars from different disciplines to assess the benefits and risks of the application of neuroscientific insights and technologies in various public policy fields such as health, education, security, and law. The report on module 4 (Neuroscience, responsibility, and the law) will reflect on the use of new forms of neuroscientific evidence and its impact on legal processes and the application of neuroscientific tools in criminal investigation, in court, and in risk assessment\textsuperscript{38}.

Neuroscientific research should inform legal decisions at all levels, from deciding about pleas for insanity\textsuperscript{39} to choosing adequate forms of reaction (prison or treatment, limited or indefinite confinement). In the near future – so the argument goes – neuroscientists will design preventive policies and screen for potential perpetrators. The American neuropsychologist Daniel Martell explains the particular appeal of neuropsychological evidence in the criminal context with

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the expert’s ability to bring quantified, normative data on brain-behavior relationships to bear in support of what have traditionally been professional opinions based on mental status examinations and clinical interview techniques\textsuperscript{40}.
\end{quote}

If individuals with an identifiable tendency for anti-social or violent behaviour can be identified at an early stage in their lives, preventive (therapeutic) measures should be able to curb the outbreak of these tendencies if applied properly. For those who have already committed crimes, the neu-

\textsuperscript{36} See Garland, 2004a.
\textsuperscript{37} See Gazzaniga, 2008; applied to the treatment of psychopaths see Morse, 2008.
\textsuperscript{38} The report is not yet available; see http://royalsociety.org/brainwaves-law; last visited: December 9, 2010.
\textsuperscript{39} See Sapolsky, 2004.
\textsuperscript{40} Martell, 1992, p. 315.
roscientists claim to develop the superior, quantitative tools to predict their future dangerousness\textsuperscript{41}, establishing a difference between ‘ordinary’ criminals and the small group of highly dangerous offenders posing an imminent threat to society\textsuperscript{42}. The appeal of their technologies can be explained not only with the “\textit{fétichisation du chiffre}”\textsuperscript{43} but equally with the need of the penal system for standardized personality assessments in the prison system following the legal provision to take ‘dangerous’ offenders out of circulation for an extended period of time\textsuperscript{44}.

The technical solutions proposed by neuroscientists and, as in the French case, strongly demanded by political actors, are spurred by the idea and practice of prediction-based prevention, a key preoccupation within the field of neurolaw as well as in contemporary society\textsuperscript{45}. Further research in neuroscience and genetics will therefore focus on, e.g., discovering markers for early detection of anti-social behaviour. There are more fields of criminal justice where knowledge from neuroscience and genetics can and most likely will be put to use, starting from the forensic use of DNA patterns for determining the identity of potential suspects on crime scenes, to the use of MRI-based lie detection and the neuropsychological analysis of deliberation processes of juries\textsuperscript{46}. New psychiatric pharmaceutical therapies are proposed to influence the rates of violent crime, leading to an overall decrease of violent behaviour\textsuperscript{47}, and, more generally, to govern social behaviour in a more rational way\textsuperscript{48}. For almost all participants in this debate, we have to note a remarkable indifference towards the social, ethical and legal consequences of their research strategies with the exception of a beginning concern about the imminent threat of “neuroscientific discrimination” through screening procedures\textsuperscript{49}.

Looking back at the fin-de-siècle provides us with indications of how to approach the neurosciences of the late twentieth and the early twenty-first centuries and the neuroscientists’ move into the political arena. It is impor-

\textsuperscript{41} See Glenn and Raine, 2009; cfr. also Markowitsch and Siefer, 2007, pp. 236-238.
\textsuperscript{42} See Garland, 1999.
\textsuperscript{43} See Chneiweiss, 2009, p. 46ff.
\textsuperscript{44} Ameisen, 2009, p. 55.
\textsuperscript{45} See Byk, 2009, p. 54.
\textsuperscript{46} On lie detection, see Pardo, 2006, p. 302ff). See also the mission statement of the Law and Neuroscience Project funded by the MacArthur Foundation: http://www.lawandneuroscienceproject.org/about/index.html (last visited July 23, 2008).
\textsuperscript{47} See Marcotte and Markowitz, 2009.
\textsuperscript{49} See Garland, 2004b, p. 14ff and pp. 32-34.
tant to reconstruct systematically the formation of alliances between the neurosciences on the one hand and the media, other disciplines, and political and economic actors on the other hand. We must not be misled by the ‘noise’ produced by philosophical debates from the politically more consequential attempts to establish neuroscientific concepts of the self within different domains through technical solutions.

Neurosciences and politics: A new fad or a new thought style

Influential reviewers have concluded that the study of antisocial behavior has been stuck in the ‘risk-factor’ stage … we know what statistically predicts psychopathology outcomes, but not how or why … There are consequences to the field’s failure to push beyond the risk-factor stage to achieve an understanding of causal processes. Valuable resources have been wasted because intervention programs have proceeded on the basis of risk factors, without sufficient research to understand causal processes\(^{50}\).

Terrie Moffitt and Avshalom Caspi use evidence collected during the *Dunedin Multidisciplinary Health and Developmental Study* to reflect anew about the relevance of biological and social factors in the explanation of socially intolerable forms of violence. They follow a general trend in neuroscientific arguments about social problems by favoring a multifactorial approach. Their approach is innovative as they study the correlation between genetic and environmental influences not on the more general level of adoption and twin studies but with a new empirical design: they use child maltreatment as a measured environmental risk and correlate it with the genetic polymorphism encoding the enzyme monoamine oxidase A, which is crucial for the inactivation of neurotransmitters.

The results are remarkable: Maltreatment of children, an important ‘risk-factor’ for the prediction of antisocial outcomes, has remarkably less effect on children within the high-MAOA-activity genotype group. For the authors, this means a clearly reduced relevance of negative environmental influences on children who were at low genetic risk\(^ {51}\). These findings are impressive; there remains nevertheless serious doubt as to, whether they live up to the claim of moving beyond the risk-factor stage. Is there already sufficient knowledge about the complex interaction between the neurochemical functioning of the brain – informed by genetic polymorphisms

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\(^\text{51}\) Ivi, p. 142.
at the MAOA locus – and environmental stimuli? Considering the current state of neuroscientific research, as characterized by some of its leading actors, this question has to be answered in the negative.

Wolf Singer, director of the Max Planck Institute for Brain Research, bemoans the lack of analytical tools to even model the complex interaction within an individual brain\textsuperscript{52}. Today, six years after the publication of Singer’s reflections on brain research, there have been plenty of new insights produced, but the overall picture still remains in the dark. Carl Zimmer, an American science writer, addresses this deficit in his introduction to the 2008 edition of the DANA anthology, \textit{Cerebrum}:

\begin{quote}
Most of jigsaw is still missing, and when neuroscientists themselves try to come up with overarching hypotheses to make sense of their results, it turns out that the pieces can fit together in many different ways\textsuperscript{53}.
\end{quote}

On these grounds, it is quite impossible to move beyond the risk-factor stage and reconstruct the causal processes to which Moffitt and Caspi refer. Neils Birbaumer, the Tübingen professor of clinical and physiological psychology, makes this point with reference to the study of brain regions that are active during specific forms of behavior and conflicts. He argues that there is a huge difference between knowing where a process is situated and how the process actually works. The claim of neuroscientists to use location data for explanations of social behavior is therefore unacceptable to him\textsuperscript{54}.

These differences between the analytical claims and the actual research need to have effects also on the way we can relate to the redefinition of the social through the neuroscientific lens. The social appears as the mere environment of a neurochemically and genetically defined individual, as we can learn from Debra Niehoff’s argument on the emergence of violent behavior:

\begin{quote}
The product of both nature and nurture, aggressive behavior is an ongoing and collaborative effort between the world of genes and proteins inside the body and the constantly changing and occasionally hostile world on the outside […] After birth, the genetically opinionated brain reaches out to sample key features of the environment and organize essential social relationships\textsuperscript{55}.
\end{quote}

\begin{flushright}
\textsuperscript{52} See Singer, 2002, pp. 40-42 and 95.  
\textsuperscript{53} Zimmer, 2008, p. x.  
\textsuperscript{54} Birbaumer, 2004, p. 28ff.  
\textsuperscript{55} Niehoff, 1999, p. 51.
\end{flushright}
Terry Moffitt and Avshalom Caspi break down these general reflections in empirically measurable relationships between genetic disposition and bad parenting as a social environmental factor. They provide fascinating insights into a form of nature-nurture relationship responsible for the production of anti-social behavior. Their conclusions remain on the level of risk factors, however, even though these factors are more differentiated than the ones in previous sociological models. Their findings are far from presenting the promised causal processes. Looking at the results of the Moffitt-Caspi study, the rationale behind the redefinition of social programs for the prevention of violence becomes better understandable. As to Debra Niehoff, the environment needs to be addressed by prevention programs. These programs are not cost intensive social interventions, but rather improvements in the direct social environment of risk groups.

How can these genetically defined risk-groups be targeted? Hans Markowitsch and Werner Siefer refer explicitly to the Moffitt-Caspi study when they suggest the introduction of comprehensive genetic screening procedures for newborn children. The screening should help to identify those children who are at high genetic risk. The two authors are far from proposing a return of eugenic or even racial hygienic measures through the backdoor of neuroscientific research. On the contrary, the interaction between genetically programmed brains and the environment is of crucial importance for the development of children, as they argue. Markowitsch and Siefer invite, however, educators, teachers, and parents to give more attention to the children at high genetic risk – not to control them but rather to supervise their social environment in order to guarantee proper development despite their disadvantaged starting point.

Screening, education programs, supervision of parents, and eventually the relocation of children at risk – this appears to be the toolbox that is relevant for this specific example and which might result in focused prevention programs based on neuroscientific research. An interdisciplinary group of experts is currently contemplating within the framework of the Brain Waves Project organized by the British Royal Society about the benefits and risks of applying neuroscientific insights and technologies to public security and law. Looking at the proposed screening programs, it is obvious that they are not based, so far, on sufficiently precise knowledge about the processes that cause individual children to take up antisocial behavior. The introduction of measured genetic risk into the statistical equation

56 Ivi, p. 267ff.
57 Markowitsch and Siefer, 2007, p. 194ff.
does improve the correlation. But the argumentation of Moffitt and Caspi remains on the probabilistic, statistical level and cannot claim an epistemologically superior status over the arguments of social scientists.

Neuroscientists operate on the same epistemological grounds as their counterparts from the social sciences. The difference can be found in the analytical model, which is organized around, but not limited to, the neurochemical brain. This conceptual creed is well expressed in the introduction of a report on psychobiological research on violence, put together by a research group at the Hanse-Wissenschaftskolleg in Delmenhorst. They refuse any claims to simply replace social science concepts with psychobiological ones. Instead, they want to identify the interrelation between genetic-biological, brain physiological, neuroparmacological, and evolutionary psychological factors as well as between those and social factors.\(^{58}\)

The emphasis put on the study of the inner working of the brain from different perspectives and the relegation of the social to environmental factors is obvious in the summary statements within the research report of the Delmenhorst group.\(^ {59}\) It is also present in the Moffitt and Caspi paper. They use the Monoamine oxidase A (MAOA) gene as empirical basis because of its proven interaction with the neurochemical functioning of the brain. Environmental factors like bad parenting enter the equation only through the ways in which they relate to the brain.\(^ {60}\) With this neurochemical brain at the centre of the analytical model, the other analytical factors like biography, environment, and experiences are reduced to their direct impact on the brain.\(^ {61}\)

This redefinition of the social is an important implication of neuroscientific models. The introduction of somatic qualities of the individual subjects does certainly add differentiation to the model – a differentiation that is missing in social science approaches. Together with the redefinition of the social to an environmental factor in neuroscientific and not system theoretical terms, the focus on the individual and his or her brain will be the basis of a new style of thought about social problems and their solution. A good case in point is the conclusion of the fine book of Debra Niehoff on the biology of violence, where she discusses a new perspective for the fight against violence. The social and the political appear briefly when she points

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\(^{58}\) Lück and Strüber, 2005, p. 9.

\(^{59}\) Ivi, pp. 57–60.

\(^{60}\) Moffitt and Caspi, 2006, pp. 140–142.

\(^{61}\) See Baumann, 2006; Rose, 2007.
Niehoff positions her political project on the level of the direct environment of the individual, which is situated, however, in a space structured by political, economic, and social forces beyond the control of the subjects. This wider political context remains out of sight in the neuroscientific arguments on violence. The redefinition of the social is thus one of the implications of the presence of neuroscientists in the political arena; it requires a more systematic reflection on the analytical model of the neuroscientists and its implications.

Even after a tentative exploration of the field, it is quite obvious to me that the presence of neuroscientists in the political arena is not a new fad and that they will not return to the secluded spaces of their laboratories. This assessment is based on the way in which neuroscientific positions are increasingly institutionalized within the debates about social issues. Several large foundations such as the European Science Foundation, the MacArthur Foundation, and the Volkswagen Foundation as well as the British Royal Society actively invite neuroscientists to share their expertise with legal scholars and practitioners in the field of law, as well as with social and political scientists in the re-assessment of social problems, especially crime and violence.

What does this mean for security politics in the future? It is difficult to guess and a brief look into the past might offer some clues. At the turn of the nineteenth to the twentieth century, there was a similar welcoming attitude towards biological thinking on subjects and on their integration into society. This did not result in an immediate change of the penal code, even though the advocates of the new criminological creed were much in favor of it. It did result, however, in a shift of perception facing social and criminal problems, and in the introduction of new technical solutions for the classification of subjects. Criminal biology became the key technology to reclassifying the prison population even though its protagonists were unable to detail the causal nexus between future behavior (likelihood of recidivism) and the physical and somatic variables they used.

Neuroscientists of the late twentieth and the early twenty-first century revere similar dreams. Markowitsch and Siefer wait for the coming of the age of “neurojurisprudence”, while, at the same time, they propose

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63 See Becker, 2002.
technical innovations for the criminal procedure and the classification of prisoners. To make this utopian vision become reality, the Law and Neuroscience Project, funded by the MacArthur Foundation with ten million US dollars, will engage in high-profile research on criminal responsibility – especially on diminished brains, addiction, and decision making. Even more important, the funding includes a large-scale outreach program to inform the general public through the media and to offer training in relevant neuroscience for legal officials.

The increasing media presence, the systematic inclusion of neuroscientists into the discussion on social problems, and the present discontent with existing policies will guarantee a longer presence of neuroscientists in the political arena. As a historian, this observation warrants a systematic study of the wider political factors that provided space for the outreach of neuroscientists into the political arena. As an intellectual, I see this research closely linked to the need for a different kind of dialogue with the neurosciences – a dialogue that is based on the mutual appreciation of the contributions from the other side. This does not need to result in a collaborative project as envisaged by Vernon Mark and Frank Ervin in their 1970 publication on violence and the brain, where they suggested the creation of interdisciplinary teams. Brain scientists and clinicians, social scientists and criminologists, legal experts, cytogeneticists, and specialists in public health should have worked peacefully side by side. A new form of dialogue requires, however, an understanding of the political enjeu, on the implications of the neuroscientific focus on the neurochemical brain, and – equally important – on an appreciation of the fascinating research produced in the laboratories.

Neurosciences and the public

Fig. 1 proves the rapid increase in media attention that neurosciences received over the course of the last ten years. The data are collected with a systematic search in the databases of the Austrian Press Agency, which produced also the chart. The first search criterion was the term Hirnforschung (brain research), which was found in about 6,000 articles between 1955 and 1964. To make this utopian vision become reality, the Law and Neuroscience Project, funded by the MacArthur Foundation with ten million US dollars, will engage in high-profile research on criminal responsibility – especially on diminished brains, addiction, and decision making. Even more important, the funding includes a large-scale outreach program to inform the general public through the media and to offer training in relevant neuroscience for legal officials.

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64 See Markowitzs and Siefer, 2007, p. 238ff.
2007. The search was continued with more differentiated criteria; the general trend remains the same.

This impressive rise in the numbers of articles in newspaper and newsmagazines has gone largely unnoticed by scholars from the social sciences and cultural studies. The few writers who have systematically inquired on the increasing presence of neuroscientists in the media, have focused on the feuilleton and the debate over the question of the free will. The points raised in this regard provide, however, a fruitful starting point for reflections on the broader picture represented by this chart.

Sabine Maasen, Lutz Wingert, and Nikolas Rose relate the rising star of the neurosciences to the reduced appeal of social utopias and their main protagonists. Utopian visions such as equal opportunities, absence of violence and deviance, better integration of cultural and ethnic others – all these visions are no longer linked to the complex interplay between institutions, programs, and subjects but rather to subjects and their performance in ‘markets’. The fabrication of the natural self (Nikolas Rose) and the utopian visions of subjects, who can realize their full potential in the interaction with institutionally defined spaces (Lutz Wingert) – these are concep-

67 See Maasen, 2006.
tual tools developed to better understand the conditions under which the contributions of the neurosciences make sense to a broader public.

There are different publics, which are addressed by the media coverage of neuroscientific research. The debate on the implications of new advances in brain research on the notion of the free will is a public debate without a public, as Sabine Maasen argues. The more specialized outlets like the Ärztezeitung or the various publications geared at an economically interested public offer news and editorials on more specific aspects of neuroscientific research. There is the obvious assumption that information on neuroeconomics and its use in marketing will be welcome by the readership interested in marketing. In the print media with a broad circulation the reports on brain research appears in three different forms: the breaking news, the passing reference, and the featuring of celebrities.

The breaking news part focuses on new findings with a high relevance to the life of the reader. The topics range from new treatment for Alzheimer’s over better education of the younger generation to more satisfaction in personal and professional life, and to lessening conflicts in the social realm. Depending on the quality of the paper, the articles are more or less informative; in any case, they result from a translation process of research papers into information with a broader public appeal. This translation is a joint effort from the journalist, the public-relation persons of the research institutions, and the researchers. It results in a story, which relates complex analytical issues to daily concerns of the people. This makes brain research not only tangible but also meaningful for the broader public.

The second gestalt in which brain research is present in mass circulation papers is the passing reference. It is the most frequent usage and is based on authority, which neurosciences derive partly through their increased presence in the media. The passing reference legitimates claims of all different kinds. This works well, as a research project at Yale University proves. The researchers have compared the approval rate of logically doubtful statements with and without the passing reference to neuroscience. Two groups have been tested: experts and lay people. The lay people – more or less comparable to the readership of mass circulation papers – fell frequently into the rhetorical trap and found bad arguments convincing if they included any kind of reference to neurosciences.

68 Ivi, p. 292f.
70 Weisberg, 2008; for a thoughtful comment see Legrenzi and Umiltà, 2009, pp. 64-74.
The third way of presenting neuroscience is through its protagonists. In the German-speaking press, neuroscientists play increasingly the role of public intellectuals. They use the media-derived authority\textsuperscript{72} of their field of knowledge to enter political debates about social and health problems. A good case in point is Wolf Singer, director of the Frankfurt-based Max Planck Institute for Brain Research. He received the Communicator Prize of the German Research Foundation in 2003 for his successful attempts to communicate his research and its wider political implications especially in the field of education policies through frequent presence in a wide variety of print and broadcasting media\textsuperscript{73}.

As we know from Helga Nowotny, expertise used in the development of political programs rarely follows the clear lines of disciplinary boundaries\textsuperscript{74}. Wolf Singer will be heard as a public intellectual and not merely as a neuroscientist, when he speaks about educational policy. It is through their role as public intellectuals that neuroscientists can deploy their expert knowledge for making general reflections on matters of broad public concern\textsuperscript{75}.

In Sabine Maasen’s reading, neuroscientists as public intellectuals play on two registers simultaneously to claim public recognition and authority: As neuroscientists they invoke evidence generated in empirical research, theoretical perspectives to access a \textit{truth} with heavy impact on the fabric of society; as public intellectuals they follow an enlightening mission to disillusion people in order to lift their audience up towards a timely conception of self and society, in line with the neuroscientific findings\textsuperscript{76}. Their authority is built on the credibility of professional expertise, even though the positions taken by public intellectuals are closer to opinion than to knowledge, as Heinz Eulau reminds Andrew Stark and the readership of the journal \textit{Political Science and Politics}\textsuperscript{77}.

The ascent of neuroscientists to the status of public intellectuals and the media coverage given to brain research depends on many factors. Fundamental political changes like the advent of a neo-liberal society with its specific form of governance and subjectivity and the replacement of social sciences and political philosophy by biology and economy as leading

\textsuperscript{72} My arguments on media-derived authority are based on the conceptual framework presented by Herbst, 2003.
\textsuperscript{73} See the report in the information service for the sciences: http://idw-online.de/pages/de/news67199 (last visited July 24, 2008).
\textsuperscript{74} See Nowotny, 2003.
\textsuperscript{76} Maasen, 2006, p. 288.
\textsuperscript{77} See Eulau, 2002.
The sciences are – as to Sabine Maasen – among the key factors\textsuperscript{78}. In order to understand fully the conditions under which the success story of the neurosciences could materialize, a comparative look is needed.

\textit{Neurosciences and the art of translation}

[...] the fate of a statement depends on others’ behavior ... The total movement of the ball, or a statement, of an artefact, will depend to some extent on your action but to a much greater extent on that of a crowd over which you have little control. The construction of facts, like a game of rugby, is thus a collective process\textsuperscript{79}.

At first sight, this observation of Bruno Latour characterizes the processes through which media-derived authority is generated. Influential gatekeepers and agenda-setting journalists decide to pick up the ball of the neuroscientists and start using it within their own narrative strategies. It would be misleading, though, to think about the relationship between neurosciences and the media as a simple one-way street traffic of scientific results to popularizing journalists. To be sure, the journalist from the news-magazine \textit{Der Spiegel} does not produce research results; he is just part of the network which links the laboratories to funding agents, politics, scholars from other disciplines, themes to be explored, and a broader public. In linking laboratory research to new themes and other actors, the journalist can help, however, to turn findings into undisputed facts, like the relevance of the serotonin level for depression and aggression. At the same time, the journalist’s activities might result in questioning of findings and the need to reopen the black box.

The conceptual toolbox of Bruno Latour and of other scholars working within the framework of the \textit{Actor-Network-Theory} have clearly demonstrated the need to look beyond the divide between society and politics on the one hand and science and technology on the other hand. The complex web of alliances crafted by scholars in pursuit of their research careers has lasting impacts on their scientific work. This holds also true for brain research as the ten-million-dollar grant from the MacArthur Foundation shows. It was made possible by the lobbying of high-profile neuroscientists, the activities of influential focus groups like the Dana Foundation,

\textsuperscript{78} Maasen, 2006, p. 297.
\textsuperscript{79} Latour, 1987, p. 104.
and the positive image of brain research in the public imagination. The grant opens up new opportunities for research in an applied field of neuro-sciences, for reaching out to the public with popularization campaigns, and for the building of new networks involving neuroscientists, legal scholars, and practitioners from the bench\textsuperscript{80}.

A study of translation processes cannot be limited to scrutinizing the network building activities and the mutual influence exerted by the actors within the network. It has to look also at the rhetorical strategies deployed by brain researchers, the impact these strategies had on the research itself and on the presentation of their findings both within and outside of their own scientific community. Presenting claims, convincing readers, and mobilizing support requires adequate rhetorical strategies.

A telling example is presented in Fig. 2. It is the cover page of an article of Martin Enserink in \textit{Science}, in which he discusses the neuroscientific

\hspace{1cm}Fig. 2. Science, 2000

\textsuperscript{80} See Greely, 2007, p. 533.
advances to explain violence in human beings. It is curious that two sets of images are placed on the cover page without direct relation to the argument. They are not even referred to in the remainder of the text. The same is true for the title. It refers to a biblical concept of violent wrongdoing, which is not exploited later on81.

These images obviously serve a rhetorical purpose of their own. The Rhesus macaque and its “primate threat display” point to the shared behavioral patterns between humans and their ancestors82. From this viewpoint the image was well chosen. The same can be said for the second one, which contrasts a PET-Scan from a psychopath with one taken from a ‘normal’ citizen. The visual comparison reveals immediately important differences between the ‘normal’ and the psychopath. The latter does not have any activities in the prefrontal lobe where compassion is situated.

Images are important not just in the presentation of results. Burri and Dumit encourage us to look at the production, the engagement, and the deployment of images:

[...] examining production means studying images as artifacts; examining engagement means analyzing the role of images as instruments in science; and examining deployment stands for focusing on how images are used outside the laboratories and how they intersect with different forms of knowledge about ourselves and our world83.

The significance of imaging techniques in brain research is obvious. Neurosciences use the opportunities, which open through the availability of new scanners and higher resolution images84.

The discrete charm of normality and normalization

But we should like to point out that as long as senseless killings and brutality are acceptable events in our cities, on our highways, and in our foreign relations, then identifying any violent individual as unique will continue to be very difficult indeed. How, in fact, can society even define what is ‘abnormal’ under these circumstances?85

83 Burri and Dumit, 2008, p. 300.
84 Rose, 2007, p. 196.
85 Mark and Ervin 1970, p. 159.
Neuroscientists are haunted by their own evolutionary premises. Therefore, they feel the need to differentiate between aggression as the positively connoted adaptive behavior and violence as the maladaptive behavior. Debra Niehoff defines thus violence as “aggression directed toward the wrong target, in the wrong place, at the wrong time, with the wrong intensity”\textsuperscript{86}. The brain as interface, where perception, memory, and experience are translated into action, is the decisive player in the emergence of violence. At the heart of maladaptive behavior there is a misunderstanding between the brain and the environment, as Niehoff argues\textsuperscript{87}.

It is easy to find proof for her reasoning. Injuries to the brain, derailed brain chemistry, and the destructive impacts of permanent psychological stress will certainly have an impact on how the subject defines situations and responds to them. Nevertheless, Niehoff does not offer a precise definition of how to differentiate between adaptive and maladaptive behavior. Her argument oscillates between the individual level – the supposed rationale of violence responses – and the level of expertise, where these responses are evaluated within a neuroscientific framework. The differentiation between normal and ‘abnormal’ is never made explicit, even though she always lurks in the background, clouded by an evolutionistic view on behavior.

I have singled out the book of Niehoff, because it is impressive for the breadth and clarity of the argument. A differentiation between aggression and violence, which she provides at the beginning of her book, is not to be found in all of the books of her peers. Sometimes, there is the understanding that socially unacceptable behavior is the one that Niehoff considers to be maladaptive responses to the environment. The line of demarcation appears to be the standards used by the social community to assess behavior.

Other authors simply conflate the normative with the biological standards. The most naïve argument in this respect can be found in the book of Markowitsch and Siefer. They argue that penal codes are represented in our brains as we have spent years to learn what we ought to do and what we are not allowed to do\textsuperscript{88}. Criminals are thus considered to be “not normal”\textsuperscript{89}.

The lack of sensitivity for the social and political character of the definition of normality is not innate in the neurosciences. In the book of Mark and Ervin, which exerted strong influence on the development of the field, we

\textsuperscript{86} Niehoff, 1999, p. IX.
\textsuperscript{87} Ivi, p. 181.
\textsuperscript{88} Markowitsch and Siefer, 2007, p. 129.
\textsuperscript{89} Ivi, p. 11.
can find a much more open, politically conscious attitude towards the problem of definition, as the quote at the beginning of this section shows. This openness towards the wider social and political context has been lost in the abundance of empirical data and under the guidance of evolutionary theory.

This has implications for the political recommendations of neuroscientists of how to control violence. They are focused on the individual offender and target his or her maladaptive behavior. Surgical solutions, the removal of so-called brain-triggers of violence, which had their time in the 1970s, are no longer part of the menu. Today, we are confronted with a wide array of preventative and therapeutic measures such as medication, specialized therapies, and special attention to children at risk.

There will be a brave new world, if brain researchers are given more influence to remodel the penal system. It will be based not on punishment but on treatment, on prevention and not on retribution. Prevention will use various tools like genetic screening and functional brain imaging identifying those groups at risk to develop a criminal career. They can be subjected to specific programs in order to address their specific shortcomings in the brain. There is no resurgence of criminal biological programs of the past, which were based on the assumption of a non-reversible difference between ‘normal’ and psychopathological individuals. Instead, brain researchers emphasize the optimistic vision of a brain continuously apt to change for the better⁹⁰.

Neurosciences offer a new way to look at subjects and their agency. Self-fulfillment with optimized neuronal functioning through the consumption of highly focused medication represents one side of the coin. The other side holds the darker image of those people, whose life takes a wrong turn. They are sketched as the unfortunate outcome of a maladjusted brain, which is unable to process environmental stimuli in a proper way. These misfits can be traced through genetic screening, located through PET-Scans, and treated with medication and reeducation programs. The good news carried by this fresh look at the boundary between them and us regards the boundary itself. It appears not so much as constructed than as open. The brain is malleable and subject to change permanently. For this reason, even the brains of the most cold-hearted psychopaths could be re-programmed, if they are ready for it. This optimistic view looks into a bright future, where only people like Phineas Gage, that is, unfortunate victims of accidents with significant brain damage, are unable to improve their ways. For all the rest, there is hope – and there will be special preventative programs designed to make hope come true.

⁹⁰ Ivi, pp. 228-232.
Bibliography


