
Should we be Epigenetically Proactive?

A Commentary on Kathinka Evers

Stephan Schleim

“Can we be epigenetically proactive?”, is the question asked by Evers in her paper in this collection. After describing an original approach to using insights from the epigenesis of neural networks to develop new training and treatment programs, in particular to educate children and adolescents to become less violent and more sympathetic, the author suggests that there is a naturalistic responsibility for using science in this manner. In this commentary, I relate her proposal to the human enhancement debate at large, with a focus on the prevalent concept of human wellbeing. After a discussion of the factors that account for people’s quality of life and the role of research that allows them to decide the priorities for a good life themselves, three caveats against Evers’s approach are presented: (1) that epigenetic intervention carries the risk of psychological side-effects; (2) that people’s autonomy must be respected; and (3) that the world’s situation may not be as bad as suggested by the author when describing the benefits of her proposal. It is therefore concluded that, at least for the time being and until these challenges are met, we should not be epigenetically proactive.

Keywords

Adaptation | Autonomy | Neuroenhancement | Social engineering | Wellbeing

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1 Introduction

[Kathinka Evers](#) [this collection](#) discusses the possibility of changing people epigenetically. In particular, she discusses the option of increasing sympathy and decreasing xenophobia and violence. The term “*epigenetics*” is often used to describe processes affecting the activity of genes such as DNA methylation, which might enable the inheritance of acquired properties ([Bird 2007](#)). In contrast to this meaning, Evers uses the term more narrowly, with reference to the epigenesis of neural networks by selective stabilisation of synapses as an essential mechanism of

brain development ([Changeux & Danchin 1976](#)). The idea of affecting people’s development—or *ontogenesis*—through this mechanism, in order to achieve a desired state (e.g., an increase in sympathy) and/or to avoid an undesired state (e.g., a decrease in xenophobia or violence) can then be called *epigenetic proactivism*.

After describing human beings as social individualists and egocentric evaluators predisposed for selective sympathy and xenophobia, Evers explains neuronal epigenesis in detail. By influencing synaptic selection, this process may

critically affect social and cultural evolution. The central brain area for this is, according to the author, the prefrontal cortex, which is involved in planning, decision-making, thought, and socialisation; in particular, lateral prefrontal areas are associated with behaviour control. With respect to a task developed to test prefrontal cortex functioning, namely the Wisconsin Card Sorting Task (Dehaene & Changeux 1991), Evers discusses how neuronal epigenesis could explain rule-learning and top-down control. Finally, she devises two examples—adolescent violence in relation to their social environments and violence in adults associated with interconfessional conflicts—to illustrate what epigenetic proactivism may mean in practice. She eventually invokes a *naturalistic responsibility* to use the respective scientific and philosophical knowledge for the benefit of ourselves and our societies.

In this commentary, I will start out by relating Evers’s proposal to the *human enhancement* debate, which has received much attention recently—in particular within neuroethics. After summarising the general assumptions and caveats of this debate, I will elaborate on the definition of people’s wellbeing prevalent in the discourse on human enhancement and present an alternative based on social science research.

Finally, I will discuss epigenetic proactivism, Evers’s original proposal for changing people, in more detail. Arguing that the actual means—whether neurobiological, psychological, or social—do not matter very much, while issues related to adaptation, autonomy, and instrumentalisation are of essential ethical and philosophical relevance, I will emphasise the role of an individual’s *informed decision*. I will discuss in particular the three theses that (1) their proposed epigenetic intervention carries the risk of psychological side-effects; (2) that people’s autonomy must be respected; and (3) that the world’s situation may not be as bad as suggested by the authors when describing the benefits of their proposal. My conclusion will therefore be that the ethical justifiability of epigenetic proactivism critically depends on whether people can freely choose themselves whether or not to become epigenetically proactive, in a

situation sufficiently free from social coercion and in sufficient awareness of the likely outcomes—effects as well as side-effects—of that intervention.

2 The human enhancement debate

In a paper on the “biopolitics” of cognitive enhancement, Peter Reiner recently referred to Plato’s *Phaedros*, where Socrates discusses what we nowadays might call the psychological side-effects of writing, namely the risk that our memory skills will deteriorate when we rely more on written texts (2013). Interestingly, Socrates’s concerns—voiced some 2400 years ago—seem to be confirmed by recent experiments indicating that people are less likely to remember information when they expect it to be easily accessible with the aid of computers (Sparrow et al. 2011). It goes without saying that everything we do has some psychological or neural impact, whether transient or permanent. However, writing—and, more recently, digital information processing—can be seen as an enhancement technology, as it enables asynchronous and distant communication with contemporaries as well as saving thoughts and ideas for the future.

We should keep in mind, though, that the very notion of *cognitive enhancement* was introduced only recently into the scholarly debate and its increasing prevalence coincided with the institutionalisation of neuroethics in the early 2000s (Figure 1). In the meantime, some authors criticised the exaggerated promises of the debate, pointing out misperceptions in the assessment of pharmacological enhancement behaviour, the complexity of the brain’s neurotransmitter systems, and the insufficient success of the much larger bio-psychiatric paradigm of improving psychological functioning in those looking for treatment (Lucke et al. 2011; Quednow 2010; Schleim 2014a). The latter means that even when the aims of the intervention are clearly circumscribed—e.g., decreasing the severity of the symptoms characteristic of a disorder—and research funds are abundant, bio-psychiatric research has unfortunately not been as successful as expected. This may relativise the hopes for effective bio-

psychological enhancement in the healthy in the near future.

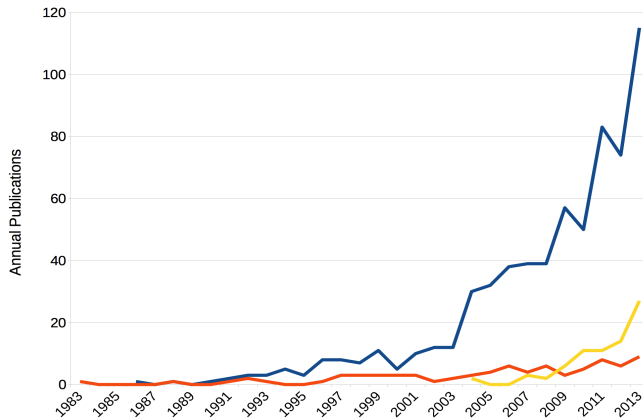


Figure 1: Publications on enhancement. Publication data from the ISI Web of Science show a steep increase in publications covering “cognitive enhancement” (blue) that coincides with the institutionalisation of neuroethics (Farah 2012). “Mood” or “affective enhancement” (orange) and “neuroenhancement” (yellow) are addressed much less frequently, although these topics also are increasingly discussed. (ISI Web of Science Topic Search)

While describing writing as a means of cognitive enhancement may seem plausible at first glance, it also carries the risk of neglecting several distinctions that may be ethically and socially important. Such distinctions are, for example, those between learning the use of an instrument to achieve a certain aim and oneself becoming an instrument for the aims of others; between using an external device and directly interfering in the body; and between defining ends autonomously and being adapted to another’s ends heteronomously. Distinctions in actual cases will not always be clear and often fall into a grey zone, but this does not mean that possible interventions cannot be discussed against these concepts. These may be understood as marking the ends of a spectrum: for example, from full autonomy to full heteronomy. Indeed, while some scholars frame the consumption of stimulus drugs such as amphetamine, methylphenidate, or modafinil by students as individual choices for better cognitive functioning (Greely et al. 2008), that is, in an autonomous fashion, several results suggest that stu-

dents might rather respond to the demands of a competitive academic environment, and thus heteronomously. I will argue later that this opposition between freedom and coercion is the crucible of ethically assessing epigenetic proactivism.

There is already empirical evidence from representative surveys or interviews with students that emphasises the relevance of this distinction. For example, M. Elizabeth Smith & Martha Farah describe in their extensive review on “smart pills” that the largest nationwide study identified admissions criteria (competitiveness) as well as two other social factors as the strongest predictors of stimulant drug consumption (2011). Interviews with non-medical consumers of stimulant drugs at an “elite” college carried out by Scott Vrecko suggest that people use stimulants for emotional and motivational ends rather than for cognitive enhancement, in particular to increase motivation to begin with or to complete boring tasks (2013). Finally, reviewing forty studies on public attitudes toward pharmacological cognitive enhancement, Kimberly J. Schelle and colleagues found that coercion to use drugs is a consistently mentioned concern (Schelle et al. 2014). This evidence associates the availability of enhancements like stimulant drugs with the pressure to adapt people to given standards of performance. Yet in the scientific literature the notion of cognitive enhancement is much more prevalent than the emotional and motivational aspects frequently mentioned in practical contexts (Figure 1).

Scientists and policy-makers in the *UK Foresight Project on Mental Capital and Well-being* note that globalisation increases demands for competitiveness as well as the pressures in our working lives (Beddington et al. 2008; Foresight Project 2008). They conclude that in a rapidly changing world like ours, we must make the most of all our resources in order to keep up with competitors; whole countries have to capitalise on their citizens’ cognitive resources. To achieve this aim, John Beddington and colleagues see vast possibilities in improving a country’s “mental capital” for all members of the population. They identify the possibility to do so at each stage in life, such as the early

identification and treatment of people with learning difficulties or the governmental support of those who want to work longer—though, notably, not shorter. A failure to react in a timely way to the challenges would come at a high cost for society, while early intervention in education could improve productivity at work and avoid costs related to a loss of mental capital (Beddington et al. 2008).

This view on performance enhancement for individual and social welfare reflects the focus of influential papers in neuroethics, emphasising the potential improvement of attention, memory, or wakefulness through the consumption of stimulant drugs or other pharmacological substances and neuroscientific technologies affecting the nervous system (Farah et al. 2004; Greely et al. 2008). Assumptions regarding the possible benefits of such substances are frequently based on trials employing test designs from *clinical psychology*, developed to identify and trace impairment in psycho-behavioural functioning, whether the investigated sample consists of patient populations, healthy people, or both (Bagot & Kaminer 2014; Repantis et al. 2010; Smith & Farah 2011).

Even if such test designs are of high clinical value, it is much less clear what statistically significant, yet often subtle, improvements in such experimental tasks, for example, in planning or memory games, mean for the *living environment* of the healthy. Whether such improvements indeed translate into an increase in individual wellbeing or the mental capital of a nation has yet to be shown. Indeed it is not even clear what a reliable and ecologically valid way of answering this question would look like. While this is still quite challenging after much debate on pharmacological enhancement, it is presently even less clear what such a standard could look like for epigenetic proactivism. In addition to measuring the benefits, neuroscientists frequently address the possibility of a psycho-behavioural trade-off—that is, the risk that an improvement in one domain would come at a loss in others (Brem et al. 2014; Hills & Hertwig 2011; Quednow 2010; Wood 2014). Given these complexities in the empirical research on

enhancement, it will be helpful to introduce an explicit definition for further discussion.

Human Enhancement =_{DF} A change in the biology or psychology of a person which increases the chances of leading a good life in the relevant set of circumstances.

Notice how this definition, proposed by Julian Savulescu and colleagues in the introduction to a recent edited volume on human enhancement (Savulescu et al. 2011), relates the good life of an individual—its biology or psychology—to the context in which that individual lives: human enhancement is something done to or with a particular person in a fixed set of circumstances, namely, a change in her or his biology or psychology. This choice already predisposes the debate and research on enhancement with respect to adapting an individual to her or his environment.

To provide an illustrative and provocative counterexample: under this definition the “treatment” of a homosexual suffering from social exclusion by instigating heterosexual acts and relations, as was routinely performed by clinical psychologists and psychiatrists until the 1970s (Barlow 1973; Hinrichsen & Katahn 1975), would qualify as a form of human enhancement—inasmuch as it succeeds in “helping” the subject to avoid the undesired sexual behaviour that instigates social exclusion and the suffering probably caused by it. With respect to this historical example we already know that leading psychiatrists later acknowledged that there was nothing inherently wrong with homosexuals, but that their suffering indeed originated from social exclusion; this reasoning eventually led to the decision not to consider homosexuality a mental disorder any longer (Friedman et al. 1976). It is instructive to contrast the definition proposed by Savulescu and colleagues with the following inverted alternative.

Human Enhancement-Inverted =_{DF} A change in the relevant set of circumstances that increases the chances of a person to lead a good life according to her or his preferences.

This alternative is not meant to be a logical inversion, but instead switches the levels of intervention, of that which is malleable and that which is considered as given. In an experimental fashion, one could also say that it is about a switch of dependent and independent variables, from the individual to its life context. Yet the aim of the intervention remains unchanged: increasing the chances of leading a good life. It goes without saying that both definitions, when put into practice, are constrained by available means and ethical principles, for example also requiring that we take the likelihood of other people's chances of leading a good life into account. It is not necessary here to argue that the inverted definition is better than the original; my intention is merely to show that we need not focus on bio-psychological changes alone. Instead, we can target the *social context* as well, decreasing the risk of adapting people to a social standard. Please note that this in itself does not imply a normative judgment, but rather widens the perspective for further analysis by taking alternative levels of intervention into consideration. As mentioned before, the balance between freedom and coercion, and autonomy and heteronomy will be essential with respect to epigenetic proactivism.

Here I have described some basic assumptions and criticism of the neuroethics debate on human enhancement, including the association of wellbeing with standards developed in clinical contexts that focus on individuals rather than on their social contexts. In the next section I will introduce research aimed at describing and understanding what people themselves consider to be quality of life, which poses an alternative to the standard adapted from clinical psychology.

3 Who defines wellbeing?

The position paper on cognitive enhancement by Henry Greely and colleagues starts out with the claim that “[s]ociety must respond to the growing demand for cognitive enhancement” (Greely et al. 2008, p. 702). The article by Beddington and colleagues on the mental wealth of nations begins with the conclusion that “[t]o

prosper and flourish in a rapidly changing world, we must make the most of all our resources—both mental and material” (Beddington et al. 2008, p. 1057). Both statements are similar in that they frame recent developments in such a way that they necessitate a reaction: we “must” respond in a particular manner. Greely and colleagues call for a “responsible use of cognitive-enhancing drugs by the healthy” (Greely et al. 2008, p. 702), though the majority of readers responding to their paper understood them as exaggerating the benefits of drug use generally or as being financially influenced by drug companies (Greely 2010). Beddington and colleagues call for the maximisation of our resources. All these authors want to increase benefits and decrease harms. However, who defines what counts as a benefit, as wellbeing, or as a good life? This is an essential and fundamental question that will influence every benefit-risk-analysis on human enhancement (Nagel 2014; Schleim 2014b).

As mentioned in the previous section, several scholars discuss the potential of means for enhancement, particularly psychopharmacological drugs, with respect to studies employing clinical test designs—whether investigating healthy people, those with a mental disorder, or even animals. Such tests measure reaction times or error rates in tasks requiring, for example, attention, memory, or planning. That is, the experimental setting frequently originates from a pragmatic context guided by identifying, treating, and/or predicting the development of a certain mental disorder. The underlying *mental disorder concept*, which is in itself controversial and subject to recurrent modifications, essentially hinges on a subject's clinically significant distress or functional impairment in the domain of cognition, emotion, and behaviour (American Psychiatric Association 2013; Stein et al. 2010). However, benefit, wellbeing, or a good life as discussed in the debate on human enhancement at large are not merely the opposites of clinically significant impairment; a five percent increase, say, in a task where a subject has to memorize as many digits as possible, and that may identify memory problems, does not reflect an increased performance in a real test, not

even a maths exam at school or university. Much less is it a suitable indicator of a benefit for the quality of life, although such a finding may be sufficient for publication in a peer-reviewed pharmacological journal.

However, there are advanced, direct, and representative measures of the quality of life. One example is the United Nations *World Happiness Report*, which compares the situation in 156 countries. The variables GDP per capita, social support, healthy life expectancy at birth, freedom to make life choices, generosity, and perceptions of corruption together explain 75.5% of the international variance of world happiness in 2012 (Helliwell et al. 2013). A more recent development is based on the OECD *Guidelines on Measuring Subjective Well-being* (OECD 2013). These allow people to create their own *Better Life Index*, prioritising eleven pre-defined domains such as education, jobs, housing, or safety.

More than 60,000 citizens from OECD countries have so far submitted their preferences, yielding important regional differences.¹ For example, people from the USA valued housing (on average 7.8 on a scale up to 10 points) and income (10.0) the highest, but work–life balance comparatively low (5.3). By contrast, people from Denmark, which is number one in the World Happiness Report, prioritised work–life balance higher than all others (9.8), and also valued life satisfaction (9.4) and community (10.0) very highly, while considering income less important (4.0). One may raise the question, of course, whether such statements are biased by social stereotypes or social desirability, but what could be a better measure of what people find important for leading a happy life than asking them directly? This is particularly so when they participate in the survey entirely on their own account.

These results emphasise two essential points for the human enhancement debate: first, people differ individually as well as regionally on what they find important for their wellbeing. Second, many of these aspects are not directly based on bio-psychological factors, but on social

factors. Indeed, the OECD construct of subjective wellbeing focuses on income, health status, social contact, employment status, personality type, and culture as determinants of life satisfaction, affect, and eudaimonic wellbeing. Unlike clinical measures of psycho-behavioural performance, they do not primarily rely on functional impairment.

Most importantly, the Better Life Index allows people to indicate themselves what they find important for their subjective wellbeing; and it turns out that many of these aspects, like housing or safety, are actual social factors that can only very indirectly be targeted by bio-psychological intervention. Therefore it becomes clear that a biased or narrowed concept of human enhancement carries the risk of missing the point of what determines or enables a better life. Further systematic analysis beyond the scope of this paper is required to show whether the factors identified are more amenable to individual psychobiological intervention, such as targeted by Savulescu and colleagues (Savulescu et al. 2011), or socio-political initiatives. Yet, while Greely and colleagues or Beddington and colleagues merely assume that increased cognitive performance will increase people's quality of life (Beddington et al. 2008; Greely et al. 2008), an initiative like the OECD Better Life Index allows people to autonomously express their own views on the issue and thus provides robust empirical evidence. This strategy helps to avoid two normative fallacies: first, that a parentalistic decision is possible when it comes to what should be good for others and, second, the idea that just because some intervention leads to a higher test score it is therefore good.

This section has highlighted, again, the tension between individual freedom and social adaptation, between autonomy and heteronomy. While most scholars would emphasise that people should be free to choose for themselves, fundamental definitions as well as the framing of human enhancement can implicitly narrow freedom, for example by introducing a limited standard for quality of life or by constraining the target for intervention. That is, when people apparently have free choice, because they are asked to choose from a number of alternatives

¹ <http://www.oecdbetterlifeindex.org>
accessed July 18, 2014

that choice may actually be quite limited, because the offered options neglect important alternatives.

As described in the previous section, people are well aware of the threat of coercion when discussing the prospects of enhancement. Coercion does not only exist at gunpoint, when acting under duress in a strong legal sense, but it can also come in a much less direct manner: For example, by telling people that they *must* choose from a limited set of options, because otherwise something bad is going to happen. Referring to what, putatively, many people are already doing or what globalisation requires increases the pressure on individuals. There are meaningful and evidence-based alternative views on human enhancement, beyond those focusing on functional impairment, as shown in this section. In the next section, I will focus on the epigenetic proactivism proposed by Kathinka Evers in more detail.

4 Epigenetic proactivism

Evers starts out their description of the naturalistic responsibility to become epigenetically proactive with a reference to the *Universal Declaration of Human Rights*. She criticises that, understood as a description of the present world, it is false to assume that all humans are born free and equal in dignity and rights; and if we understood this as a normative ideal, it would be unrealistic to guarantee these rights for every human being, given our present cerebral structure. In contrast to the human rights ideal, many people suffer from poverty and insufficient health care, and live through serious conflicts. Most people lack the sympathy necessary to respect the rights of others and all humans exhibit some kind of xenophobia. In the end, Evers even refers to the idea that humans might be subject to some built-in error or deficiency, predisposing us to self-destruction. Against this background, she proposes her epigenetic proactivism as follows:

Synaptic epigenetic theories of cultural and social imprinting on our brain architecture open the door to being epigenetically proactive, which means that we may culturally influence our brain organisation

in the aim of self-improvement, individually as well as socially and change our biological predispositions by a better fit of our brain to cultures and social structures. (Evers [this collection](#), p. 12)

She discusses two examples in more detail, namely violence in adolescents and violent interconfessional conflicts. Referring to neurodevelopmental research on children and teenagers' brains, she suggests that different educational measures such as physical exercises, cultural games, and new therapies amount to a kind of proactive epigenetic imprinting that increases control of aggression, emotion regulation, sympathy, and tolerance. It would be largely a matter of political will and social agreement, Evers claims, to develop the research enabling such educational programs and to apply them in practice. If successful, epigenetic proactivism would make societies more peaceful and inclusive, but the author also points to a problematic circularity, namely that we perhaps first need to live in an already peaceful society in order to enact such educational programs to maintain peace.

If we had to choose between epigenetic proactivism and the destruction of humankind, the decision would probably be easy; and the humbler prospect of avoiding adolescent violence and interconfessional conflicts also has some seductive allure. However, for three reasons I hesitate to agree with the conclusion that we have a naturalistic responsibility to improve ourselves epigenetically, assuming that science will develop enough at some point and offer the novel educational measures suggested by Evers: first, decreasing the disposition towards aggressive behaviour and increasing sympathy might have unexpected psychological side-effects; second, the value of human autonomy has to be considered by epigenetic proactivists, too; and third, the human condition might not be as bad as the author describes. I will discuss these three caveats in the following sections.

4.1 Side-effects of epigenetic proactivism

At first glance, who would disagree that a world with less aggression and more sympathy would

be a better world? If we could indeed decrease adolescent and interconfessional violence, why shouldn't we put such an educational program into action? Evers refers to Darwin and evolution several times in her paper. Consequently, this biological framing also raises the question of the possible evolutionary value of aggression and violence (Eibleibesfeldt 1977; Smith & Harper 1988). Darwin's original idea of the survival of the fittest emphasises the very notion of securing access to scarce resources—often at the cost of other living beings, which may even lead to the extinction of a whole species. It may well be that aggression is an essential driver of evolutionary development.

It goes without saying that from the fact that something leads to an increased survival value it does not follow that it is morally good. But it is clear that, even from a social perspective, aggression might have a function, or might be necessary for achieving some desirable ends. In the famous novel *A Clockwork Orange* by Anthony Burgess, we learn about a fictional case where a cruel and ruthless juvenile delinquent—Alex—is successfully treated bio-psychologically to stop being violent. This is carried out in a pharmacologically enhanced operant conditioning program that associates scenes of violence with aversive stimuli, such that the former delinquent feels severe nausea whenever he is confronted with aggression, including assaults against himself. This has the side effect that after the treatment Alex cannot defend himself anymore and he therefore becomes a victim of severe humiliation.

While this example is different from the case of interconfessional violence discussed by Evers, it is directly related to her other example of violence in adolescents. It is a complex biopsychological question whether negative facets of aggression can be extinguished without also affecting people's capacity for self-defence. The author is aware of the problem of circularity, that a world may first have to become peaceful for epigenetic proactivism to be successful—and the present caveat emphasises this dilemma: if only some people were educated to avoid violence and conflicts, this could easily be abused by others.

How about increasing sympathy, then? Evers is critical about the fact that people are xenophobic and restrict their sympathy to small groups, while they should ideally extend it to human society at large. As disappointing as it may be from an ethical point of view, it could well be that a distinction between one's own or one's group's welfare from that of others is essential for psychological wellbeing. A dysfunctional self–other distinction, drawing a clear line between oneself and others, may play a role in schizophrenia (Decety & Sommerville 2003; Jardri et al. 2011). Furthermore, several investigations reported an association between emotional empathy and depression or decreased life-satisfaction (Gawronski & Privette 1997; Lee et al. 2001; O'Connor et al. 2002).

These links with mental health may be speculative to some extent, yet they illustrate that even a *prima facie* positive capacity may become negative when increased too much. Accordingly, it has become common wisdom within psychopharmacology that there is an optimal level of neurotransmitter concentration in the brain and that both a decrease and an increase may be dysfunctional and/or lead to unexpected side-effects (Wood et al. 2014). Even if ethicists, in line with Evers, presented strong arguments in favour of considering the welfare of those far away from oneself or one's group (Greene 2003; Sidgwick 1907; Singer 2002; Unger 1996), it should be born in mind that an increase of sympathy might lead to a decrease in subjective wellbeing.

4.2 Human autonomy

The vision of a scientifically enhanced world, where people are better at controlling their emotions, particularly aggression and other impulses that might lead to violent behaviour, is a recurrent topic in the history of science. For example, in the 1960s and 1970s, neuroscientists, psychologists, and sociologists all discussed the problem of delinquency and aggression, also with respect to adolescents, and proposed different solutions for coping with it. The pioneer of *brain stimulation*, José Delgado, tested the effects of electrical inhibition or excitation of dif-

ferent brain areas associated with emotion processing, such as the amygdalae, in several animal species as well as in humans (Delgado 1965, 1971; Delgado et al. 1968). His discussion of the social implications of such technology is surprisingly reminiscent of epigenetic proactivism:

Understanding of biology, physics, and other sciences facilitated the process of ecological liberation and domination. Man rebelled from natural determination and used his intelligence and skills to impose a human purpose on the development of the earth. We are now on the verge of a process of mental liberation and self-domination which is a continuation of our evolution. Its experimental approach is based on the investigation of the depth of the brain in behaving subjects. Its practical applications do not rely on direct cerebral manipulations but on the integration of neurophysiological and psychological principles leading to a more intelligent education, starting from the moment of birth and continuing throughout life, with the pre-conceived plan of escaping from the blind forces of chance and of influencing cerebral mechanisms and mental structure in order to create a future man with greater personal freedom and originality, a member of a psychocivilized society, happier, less destructive, and better balanced than present man. (Delgado 1971, p. 223; reference omitted)

He and others (e.g., Mark & Ervin 1970; Valenstein 1973) were convinced that therapeutic need would drive the development of such neurotechnology. The envisioned “psychocivilized” world would be so beneficial for individuals and society at large, Delgado believed, that the advantages overruled any social and ethical caveats (Delgado 1971). At the same time, the psychologist Burrhus Skinner wrote a best-selling book on his vision of a peaceful society realised through *social engineering* and inspired by behaviourism rather than neurotechnology (Skinner 1971). Through rewarding the right

kind of actions, Skinner suggested, the socially desired behaviour would become more likely, and the undesired behaviour more unlikely. To avoid a totalitarian regime, the people subject to this social engineering should in turn control the reward structures, the so-called contingencies of a society. Yet, in spite of the book’s popularity, it was strongly criticised by Noam Chomsky for confusing science and politics and for a misapplication of central notions such as freedom and dignity (1971).

The two utopian proposals by Delgado and Skinner, the part of the human enhancement debate discussed above that describes a need for adaptation as without alternative, and epigenetic proactivism have in common that people should be changed in such a way that they contribute to a (putatively) desired social aim: a macroscopic state with better performance, competitiveness, peacefulness, and/or caring for others. This is in obvious conflict with the notion of autonomy that is so fundamental to Immanuel Kant’s moral philosophy: no human being must be treated only as a means to another end; all humans must also be treated as an ends in themselves (1785/1994). Given the description of epigenetic proactivism by Evers, stating that our brains shall fit better to our cultures and social structures, one may well ask whether those enhanced in this manner would not become mere instruments for the present system, with its social norms and values. Also with respect to John Stuart Mill’s utilitarian liberalism, interventions to improve people seem problematic, as Mill formulated the principle:

[...] that the sole end for which mankind are warranted, individually or collectively, in interfering with the liberty of action of any of their number, is self-protection. That the only purpose for which power can be rightfully exercised over any member of a civilised community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant. He cannot rightfully be compelled to do or forbear because it will be better for him to do so, because it will

make him happier, because, in the opinions of others, to do so would be wise, or even right. These are good reasons for remonstrating with him, or reasoning with him, or persuading him, or entreating him, but not for compelling him, or visiting him with any evil in case he do otherwise. [...] Over himself, over his own body and mind, the individual is sovereign. (1859/1989, pp. 17–18)

Interestingly, Mill explicitly formulated the exception of self-protection and harm to others, to which Evers refers in her paper as well. However, I doubt that epigenetic proactivists can base their ethical justification on this case, as the harm they want to avoid is very indirectly related to intervention—which will most likely be applied to many people who would not have posed a threat to others without it. Furthermore, it can be doubted how imminent the danger is at all; this last point will be elaborated in the next subsection. Although other and more recent versions of “utilitarianism”, such as preference utilitarianism, place less emphasis on autonomy than Kant or Mill, they also lend the inner core of a person, for example, her or his preferences and values, a status of special protection (Singer 2011). This core is likely to be affected by changing people’s predisposition to aggression and sympathy, as the brief description of psychological side-effects in the previous subsection suggests.

Therefore, the essential question for epigenetic proactivism seems to be whether people can autonomously consent to the intervention. Evers’s title asks whether we *can* be epigenetically proactive; I have reformulated this to ask whether we *should* be epigenetically proactive. Here it is particularly relevant that her two examples, adolescent and interconfessional violence, explicitly address the development of children and teenager’s brains—that is, people whom we do not usually consider to be (fully) autonomous. The question of whether parents can take this decision, aimed at rewiring the nervous system of their children for a social aim, is too complex to be discussed here, but it calls for a solution before we can really think

about putting epigenetic proactivism into practice.

For our present purposes it shall suffice to suggest that it is unlikely that all parents would consent to such a measure. What would then happen to those who declined to participate in epigenetically proactive educational programs? Even today, some families resist education because they see a conflict between their values and teaching on, for example, sex education or evolutionary theory. In particular, those who benefit from the present social order would be unlikely to consent to a measure that might lead to a loss of power for them. As mentioned earlier, this may make those who are made less aggressive and more empathic more likely to be exploited by those who are not. Therefore, it is an essential challenge for epigenetic proactivism to take autonomy, informed consent, and the further complexities of intervening in the core of a person’s personality into account—and to consider that people’s views on these issues will be diverse!

Until these challenges of autonomy and informed consent in particular are met, I draw the tentative conclusion that we should not be epigenetically proactive. It should be noted, though, that while I am discussing the proposal by Evers here, the argument from autonomy is independent of the means actually used to enhance people—whether biological, psychological, or social. Rather, it is essential that people are free from coercion and can decide for themselves whether or not they want to become the kind of human being envisioned by proponents in the human enhancement debate, and that they have sufficient knowledge on the implications of that choice. Evers particularly focusses on children and adolescents when discussing examples of epigenetic proactivism, but it appears to be most difficult to describe what autonomous and informed choice means in precisely this group of human beings.

4.3 The human condition

Evers emphasises that many people live in precarious circumstances, even more than sixty years after the Universal Declaration of Human

Rights; in the end, she even refers to Arthur Koestler's idea that humans might have some built-in deficiency, predisposing us to self-destruction. Obviously, against that prospect, the promises of epigenetic proactivism look seductive. Indeed, we must concede that even some twenty-five years after the Cold War international conflicts have not abated altogether—in some areas they have even multiplied, and terrorism or economic instability are a concern for many. However, from the perspective of cultural evolution, universal human rights are a rather novel development and it may be too early to take a pessimistic stance on their success and effect. Returning to the UN World Happiness Report (Helliwell et al. 2013), one may ask whether the difference between the leading countries—Denmark, Norway, Switzerland, the Netherlands, and Sweden (ranked 1st to 5th)—, those in the middle—Libya, Bahrain, Montenegro, Pakistan, and Nigeria (ranked 78th to 82nd)—, and those at the bottom—Rwanda, Burundi, the Central African Republic, Benin, and Togo (ranked 152nd to 156th)—can be explained or even overcome by means of human enhancement like epigenetic proactivism rather than internationally-aided institutional development.

One shared rhetorical feature of those visions of a better humankind is a claim that all has somehow gone wrong, and even to predict an imminent catastrophe. For example, the various *Humanist Manifestos* of the 20th and early 21st century described serious threats to human survival.² Delgado emphasized an imbalance between our material and mental evolution, putting humanity at risk (1971), and Skinner started out by referring to problems related to population growth, pollution of the environment, and nuclear armament (1971). It probably lies in the eye of the beholder to speculate whether humankind has not yet destroyed itself because or in spite of unprecedented technological powers.

It is a matter of fact that we have not yet done so, and although many things have gone

wrong, others have gone right. Steven Pinker recently gathered evidence that, particularly when viewed in relation to the vast population growth of humanity, our present times are much more peaceful than the past (2011). He describes processes of pacification and civilization as well as a humanitarian and rights revolution that can provide hope that things will change for the better, not only for the worse. Therefore, even if human enhancement in general or epigenetic proactivism in particular may offer genuine improvement of the human condition in several ways, they are probably not necessary for human survival.

5 Conclusion

Kathinka Evers summarises research on the epigenesis of neural networks to describe a vision of epigenetical proactivism, a development of new training and therapeutic programs to improve humans. She asks whether we *can* be epigenetically proactive, pointing out the benefits of decreasing the prevalence of adolescent and interconfessional violence, and in so doing develops her answer: yes, in principle, we can be epigenetically proactive. However, she also describes a naturalistic responsibility to do this, which is the point at which my discussion of her proposal diverged from her view. Particularly with respect to autonomy and free choice I think that, for the time being, we should not be epigenetically proactive; and we should be even more cautious when interventions in children's and teenagers' brains are at issue. Minor caveats are related to the possible psychological side-effects of decreasing our disposition towards aggression and increasing that of sympathy, as well as a more optimistic view of how humankind is developing.

In this paper, I also related epigenetic proactivism to the human enhancement debate more generally, which has become much more comprehensive than can be addressed in such a brief commentary. It was important to examine the definition of wellbeing and the framing of urgency, as well as the primary level of intervention—bio-psychological or social—, issues that are also related to autonomy. This does not

² See the three Manifestos of 1933, 1973, and 2003 of the American Humanist Association on <http://americanhumanist.org/Humanism/> (accessed July 21 2014).

mean that knowledge on epigenetics could not be used in another manner for the purposes of enhancement, in situations where people can make an informed decision for themselves whether and how to engage in a certain kind of training. In this sense, it would be interesting to compare epigenetic proactivism to other non-pharmaceutical means of enhancement, such as nutrition, exercise, sleep, or meditation (Dresler et al. 2013). Generally speaking, the knowledge described by Evers could also be related to debates on improving school education neuroscientifically (Hook & Farah 2013; Posner & Rothbart 2005). Furthermore, when targeting human capacities that are also salient for moral cognition, the debate on *moral enhancement* may be an important reference point with overlapping prospects and concerns (Douglas 2008, 2013; Harris 2011).

Evers warned that science has been hijacked repeatedly throughout history and that in particular the dream of creating perfect human beings has a sordid past. Here I wholeheartedly agree with her and her related call for historic awareness. I hope that I have succeeded in showing why, beyond this awareness, it is also essential to take people's own views and autonomy into account. It may not only be the case that too much focus on enhancing people makes them sad by focusing too much on their deficiencies (Schleim 2014b; Schopenhauer 1874), but in the attempt to create superhuman beings a human catastrophe might also be provoked.

Acknowledgments

I would like to thank the two editors as well as two anonymous reviewers for their extraordinarily helpful and constructive comments on a previous version of this paper.

References

- American Psychiatric Association, (Ed.) (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington, VA: American Psychiatric Publishing.
- Bagot, K. S. & Kaminer, Y. (2014). Efficacy of stimulants for cognitive enhancement in non-attention deficit hyperactivity disorder youth: A systematic review. *Addiction*, 109 (4), 547-557. [10.1111/add.12460](https://doi.org/10.1111/add.12460)
- Barlow, D. H. (1973). Increasing heterosexual responsiveness in the treatment of sexual deviation: A review of the clinical and experimental evidence. *Behavior Therapy*, 4 (5), 655-671. [10.1016/s0005-7894\(73\)80158-3](https://doi.org/10.1016/s0005-7894(73)80158-3)
- Beddington, J., Cooper, C. L., Field, J., Goswami, U., Huppert, F. A., Jenkins, R. & Thomas, S. M. (2008). The mental wealth of nations. *Nature*, 455 (7216), 1057-1060. [10.1038/4551057a](https://doi.org/10.1038/4551057a)
- Bird, A. (2007). Perceptions of epigenetics. *Nature*, 447 (7143), 396-398. [10.1038/nature05913](https://doi.org/10.1038/nature05913)
- Brem, A. K., Fried, P. J., Horvath, J. C., Robertson, E. M. & Pascual-Leone, A. (2014). Is neuroenhancement by noninvasive brain stimulation a net zero-sum proposition? *NeuroImage*, 85 (3), 1058-1068. [10.1016/j.neuroimage.2013.07.038](https://doi.org/10.1016/j.neuroimage.2013.07.038)
- Changeux, J. P. & Danchin, A. (1976). Selective stabilization of developing synapses as a mechanism for specification of neuronal networks. *Nature*, 264 (5588), 705-712. [10.1038/264705a0](https://doi.org/10.1038/264705a0)
- Chomsky, N. (1971). The case against B.F. Skinner. *The New York Review of Books*, 17 (11), 18-24.
- Decety, J. & Sommerville, J. A. (2003). Shared representations between self and other: A social cognitive neuroscience view. *Trends in Cognitive Sciences*, 7 (12), 527-533. [10.1016/j.tics.2003.10.004](https://doi.org/10.1016/j.tics.2003.10.004)
- Dehaene, S. & Changeux, J. P. (1991). The wisconsin card sorting test: Theoretical analysis and modeling in a neuronal network. *Cerebral Cortex*, 1 (1), 62-79. [10.1093/cercor/1.1.62](https://doi.org/10.1093/cercor/1.1.62)
- Delgado, J. M. (1965). Sequential behavior induced repeatedly by stimulation of the red nucleus in free monkeys. *Science*, 148 (3675), 1361-1363. [10.1126/science.148.3675.1361](https://doi.org/10.1126/science.148.3675.1361)
- (1971). *Physical control of the mind; Toward a psychocivilized society*. New York, NY: Harper & Row.
- Delgado, J. M., Mark, V., Sweet, W., Ervin, F., Weiss, G., Bach, Y. R. G. & Hagiwara, R. (1968). Intracerebral radio stimulation and recording in completely free patients. *Journal of Nervous and Mental Disease*, 147 (4), 329-340.

- Douglas, T. (2008). Moral enhancement. *Journal of Applied Philosophy*, 25 (3), 228-245. [10.1111/j.1468-5930.2008.00412.x](https://doi.org/10.1111/j.1468-5930.2008.00412.x)
- (2013). Moral enhancement via direct emotion modulation: A reply to John Harris. *Bioethics*, 27 (3), 160-168. [10.1111/j.1467-8519.2011.01919.x](https://doi.org/10.1111/j.1467-8519.2011.01919.x)
- Dresler, M., Sandberg, A., Ohla, K., Bublitz, C., Trenado, C., Mroczko-Wasowicz, A. & Repantis, D. (2013). Non-pharmacological cognitive enhancement. *Neuropharmacology*, 64, 529-543. [10.1016/j.neuropharm.2012.07.002](https://doi.org/10.1016/j.neuropharm.2012.07.002)
- Eibleibesfeldt, I. (1977). Evolution of destructive aggression. *Aggressive Behavior*, 3 (2), 127-144. [10.1002/1098-2337\(1977\)3:2<127::AID-AB2480030204>3.0.CO;2-Y](https://doi.org/10.1002/1098-2337(1977)3:2<127::AID-AB2480030204>3.0.CO;2-Y)
- Evers, K. (2015). Can we be epigenetically proactive? In T. Metzinger & J. M. Windt (Eds.) *Open MIND*. Frankfurt a. M., GER: MIND Group.
- Farah, M. J. (2012). Neuroethics: The ethical, legal, and societal impact of neuroscience. *Annual Review of Psychology*, 63, 571-591. [10.1146/annurev.psych.093008.100438](https://doi.org/10.1146/annurev.psych.093008.100438)
- Farah, M. J., Illes, J., Cook-Deegan, R., Gardner, H., Kandel, E., King, P. & Wolpe, P. R. (2004). Neurocognitive enhancement: What can we do and what should we do? *Nature Reviews Neuroscience*, 5 (5), 421-425. [10.1038/nrn1390](https://doi.org/10.1038/nrn1390)
- Foresight Project, (2008). *Final project report*. London, UK: The Government Office for Science.
- Friedman, R. C., Green, R. & Spitzer, R. L. (1976). Reassessment of homosexuality and transsexualism. *Annual Review of Medicine*, 27, 57-62. [10.1146/annurev.me.27.020176.000421](https://doi.org/10.1146/annurev.me.27.020176.000421)
- Gawronski, I. & Privette, G. (1997). Empathy and reactive depression. *Psychological Reports*, 80 (3), 1043-1049. [10.2466/pr0.1997.80.3.1043](https://doi.org/10.2466/pr0.1997.80.3.1043)
- Greely, H. (2010). Enhancing brains: What are we afraid of? *Cerebrum*, 14, 1-10.
- Greely, H., Sahakian, B., Harris, J., Kessler, R. C., Gazzaniga, M., Campbell, P. & Farah, M. J. (2008). Towards responsible use of cognitive-enhancing drugs by the healthy. *Nature*, 456 (7223), 702-705. [10.1038/456702a](https://doi.org/10.1038/456702a)
- Greene, J. (2003). From neural “is” to moral “ought”: What are the moral implications of neuroscientific moral psychology? *Nature Reviews Neuroscience*, 4 (10), 846-849. [10.1038/nrn1224](https://doi.org/10.1038/nrn1224)
- Harris, J. (2011). Moral enhancement and freedom. *Bioethics*, 25 (2), 102-111. [10.1111/j.1467-8519.2010.01854.x](https://doi.org/10.1111/j.1467-8519.2010.01854.x)
- Helliwell, J., Layard, R. & Sachs, J. (Eds.) (2013). *World happiness report 2013*. New York, NY: Sustainable Development Solutions Network, a Global Initiative for the United Nations.
- Hills, T. & Hertwig, R. (2011). Why aren't we smarter already: Evolutionary trade-offs and cognitive enhancements. *Current Directions in Psychological Science*, 20 (6), 373-377. [10.1177/0963721411418300](https://doi.org/10.1177/0963721411418300)
- Hinrichsen, J. J. & Katahn, M. (1975). Recent trends and new developments in the treatment of homosexuality. *Psychotherapy-Theory Research and Practice*, 12 (1), 83-92. [10.1037/h0086413](https://doi.org/10.1037/h0086413)
- Hook, C. J. & Farah, M. J. (2013). Neuroscience for educators: What are they seeking, and what are they finding? *Neuroethics*, 6 (2), 331-341. [10.1007/s12152-012-9159-3](https://doi.org/10.1007/s12152-012-9159-3)
- Jardri, R., Pins, D., Lafargue, G., Very, E., Ameller, A., Delmaire, C. & Thomas, P. (2011). Increased overlap between the brain areas involved in self-other distinction in schizophrenia. *PLoS One*, 6 (3), e17500. [10.1371/journal.pone.0017500](https://doi.org/10.1371/journal.pone.0017500)
- Kant, I. (1994). *Grundlegung zur Metaphysik der Sitten*. Hamburg, GER: Meiner.
- Lee, H. S., Brennan, P. F. & Daly, B. J. (2001). Relationship of empathy to appraisal, depression, life satisfaction, and physical health in informal caregivers of older adults. *Research in Nursing & Health*, 24 (1), 44-56. [10.1002/1098-240x\(200102\)24](https://doi.org/10.1002/1098-240x(200102)24)
- Lucke, J. C., Bell, S., Partridge, B. & Hall, W. D. (2011). Deflating the neuroenhancement bubble. *American Journal of Bioethics Neuroscience*, 2 (4), 38-43. [10.1080/21507740.2011.611122](https://doi.org/10.1080/21507740.2011.611122)
- Mark, V. H. & Ervin, F. R. (1970). *Violence and the brain*. New York, NY: Harper & Row.
- Mill, J. S. (1989). *On liberty*. London, UK: The Walter Scott Publishing Co.
- Nagel, S. K. (2014). Enhancement for well-being is still ethically challenging. *Frontiers in Systems Neuroscience*, 8 (72). [10.3389/fnsys.2014.00072](https://doi.org/10.3389/fnsys.2014.00072)
- O'Connor, L. E., Berry, J. W., Weiss, J. & Gilbert, P. (2002). Guilt, fear, submission, and empathy in depression. *Journal of Affective Disorders*, 71 (1-3), 19-27. [10.1016/s0165-0327\(01\)00408-6](https://doi.org/10.1016/s0165-0327(01)00408-6)
- OECD, (2013). *OECD guidelines on measuring subjective well-being*. Paris, FR: OECD Publishing.
- Pinker, S. (2011). *The better angels of our nature: Why violence has declined*. New York, NY: Viking.
- Posner, M. I. & Rothbart, M. K. (2005). Influencing brain networks: Implications for education. *Trends in Cognitive Sciences*, 9 (3), 99-103. [10.1016/j.tics.2005.01.007](https://doi.org/10.1016/j.tics.2005.01.007)

- Quednow, B. B. (2010). Ethics of neuroenhancement: A phantom debate. *BioSocieties*, 5 (1), 153-156. [10.1057/biosoc.2009.13](https://doi.org/10.1057/biosoc.2009.13)
- Reiner, P. B. (2013). Biopolitics of cognitive enhancement. In E. Hildt & A. Franke (Eds.) *Cognitive enhancement: An interdisciplinary perspective* (pp. 189-200). Dordrecht, NL: Springer.
- Repantis, D., Schlattmann, P., Laisney, O. & Heuser, I. (2010). Modafinil and methylphenidate for neuroenhancement in healthy individuals: A systematic review. *Pharmacological Research*, 62 (3), 187-206. [10.1016/j.phrs.2010.04.002](https://doi.org/10.1016/j.phrs.2010.04.002)
- Savulescu, J., Sandberg, A. & Kahane, G. (2011). Well-being and enhancement. In J. Savulescu, R. H. J. ter Meulen & Kahane (Eds.) *Enhancing human capacities* (pp. 3-18). Oxford, UK: Wiley-Blackwell.
- Schelle, K. J., Faulmüller, N., Caviola, L. & Hewstone, M. (2014). Attitudes towards pharmacological cognitive enhancement – A review. *Frontiers in Systems Neuroscience*, 8 (53). [10.3389/fnsys.2014.00053](https://doi.org/10.3389/fnsys.2014.00053)
- Schleim, S. (2014a). Critical neuroscience – or critical science? A perspective on the perceived normative significance of neuroscience. *Frontiers in Human Neuroscience*, 8 (336). [10.3389/fnhum.2014.00336](https://doi.org/10.3389/fnhum.2014.00336)
- (2014b). Whose well-being? Common conceptions and misconceptions in the enhancement debate. *Frontiers in Systems Neuroscience*, 8 (148). [10.3389/fnsys.2014.00148](https://doi.org/10.3389/fnsys.2014.00148)
- Schopenhauer, A. (1874). *Parerga und Paralipomena, Band I*. Zurich, SUI: Haffmans.
- Sidgwick, H. (1907). *The methods of ethics*. New York, NY: Macmillan and Co.
- Singer, P. (2002). *One world : The ethics of globalization*. New Haven, CT: Yale University Press.
- (2011). *Practical ethics*. Cambridge, UK: Cambridge University Press.
- Skinner, B. F. (1971). *Beyond freedom and dignity*. Toronto, Canada: Bantam.
- Smith, M. E. & Farah, M. J. (2011). Are prescription stimulants “smart pills”? The epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals. *Psychological Bulletin*, 137 (5), 717-741. [10.1037/a0023825](https://doi.org/10.1037/a0023825)
- Smith, J. M. & Harper, D. G. C. (1988). The evolution of aggression: Can selection generate variability? *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences*, 319 (1196), 557-570. [10.1098/rstb.1988.0065](https://doi.org/10.1098/rstb.1988.0065)
- Sparrow, B., Liu, J. & Wegner, D. M. (2011). Google effects on memory: Cognitive consequences of having information at our fingertips. *Science*, 333 (6043), 776-778. [10.1126/science.1207745](https://doi.org/10.1126/science.1207745)
- Stein, D. J., Phillips, K. A., Bolton, D., Fulford, K. W. M., Sadler, J. Z. & Kendler, K. S. (2010). What is a mental/psychiatric disorder? From DSM-IV to DSM-V. *Psychological Medicine*, 1759 (1765), 1759-1765. [10.1017/s0033291709992261](https://doi.org/10.1017/s0033291709992261)
- Unger, P. K. (1996). *Living high and letting die: Our illusion of innocence*. New York, UK: Oxford University Press.
- Valenstein, E. S. (1973). *Brain control*. New York, NY: Wiley.
- Vrecko, S. (2013). Just how cognitive is “Cognitive Enhancement”? On the significance of emotions in university students’ experiences with study drugs. *American Journal of Bioethics Neuroscience*, 4 (1), 4-12. [10.1080/21507740.2012.740141](https://doi.org/10.1080/21507740.2012.740141)
- Wood, S., Sage, J. R., Shuman, T. & Anagnostaras, S. G. (2014). Psychostimulants and cognition: A continuum of behavioral and cognitive activation. *Pharmacological Reviews*, 66 (1), 193-221. [10.1124/pr.112.007054](https://doi.org/10.1124/pr.112.007054)