

PROGRAMMING THE FUTURE:  
EPIGENETICS, NORMATIVE FICTIONS,  
AND MATERNAL BODIES

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*Abstract*

We have apparently transitioned to what has been described as a “postgenomic era”, and the spectre of biology is again haunting philosophy and the social sciences, but not necessarily as it has figured in the past. The emerging field of epigenetic research examines how experience “gets under the skin” and regulates gene expression, and is poised to reshape age-old debates on “nature v nurture”. However, as argued by critical science and technology scholars, epigenetics might also serve to reinforce extant forms of gendered and racialized inequality. The stage is thus set for a battle staged on the terrain of power/knowledge and at the intersection of science and philosophy. This article enters the fray by building on Sarah S. Richardson’s work on «maternal bodies» and the «epigenetic imaginary». Taking a genealogical approach, the article shows how the maternal body has become a means of programming the future, and how the scene is set for this to continue in tandem with “the new biology of adversity”.

*Keywords:* Epigenetics, Biology of Adversity, Biosocial, New Materialism, Post-genomics

1. *Introduction*

The theme for this issue of «P.O.I.» is intriguing and also wide-ranging\*. If we reflect on the legacies of feminist philosophies and focus that task – as proposed by the editors – by using the lens of “difference”, then we are faced with a plurality of possible arcs connecting past to present. Where might we start, and what would the parameters – theoretical, historical, cultural – be for such an inquiry? It seems to me that the theme of legacies invites a choice that cannot

\* I wish to thank the editors for making this issue of «P.O.I.» possible, and also the journal’s anonymous reviewers for their very thoughtful comments and suggestions. I am grateful to Liam Farrell for his feedback on an earlier draft of this article.

escape the politics of decision, i.e. what to include and, by default, what to exclude. In moving into the space of decision, I propose to distil two related questions from Michel Foucault<sup>55</sup>. First is a genealogical question: what are we and how have we come to be what we are? It must be acknowledged that this sidesteps the important issue of standpoint – it does not attempt to qualify who the “we” is, and I return to this shortly. A subsequent question spans ethics and politics and moves towards the issue of difference: why does this matter; why might we want to pose this question at all? To borrow again from Foucault, it matters because we might refuse what we are, and thereby become other than what we are. A similar attitude can be discerned in Judith Butler’s work. For example, in the preface to the 1999 edition of *Gender Trouble*, Butler responds to her critics by explaining that:

It seemed to me, and continues to seem, that feminism ought to be careful not to idealize certain expressions of gender that, in turn, produce new forms of hierarchy and exclusion... The point was not to prescribe a new gendered way of life that might serve as a model for readers of the text. Rather, the aim of the text was to open up the field of possibility for gender without dictating what kinds of possibility ought to be realized<sup>56</sup>.

Butler is here addressing a subject not quite as loosely formulated as Foucault’s. Nevertheless, there is an affinity between Butler’s non-prescriptive figuring of gender and Foucault’s stance of refusal. In the background to this critical attitude is an acute awareness of, or to put it in stronger terms, a scepticism of conceptions of human difference that begin from “nature”. Insofar as the biological enters the theoretical or analytical frame, it plays a secondary role to the shaping and conditioning of life by apparatuses of power/knowledge and regimes of truth. There are of course good reasons for this, as even a cursory survey of the historical record testifies to the ways in which the life sciences have been, and arguably continue to be, imbricated in biopolitics, and are thereby complicit in generating gendered and racialized hierarchies and associated forms of cruelty, inequality and exclusion.

<sup>55</sup> M. FOUCAULT, *The Subject and Power*, in «Critical Inquiry», VIII, 2 (1982), p. 785.

<sup>56</sup> J. BUTLER, *Gender Trouble: Feminism and the Subversion of Identity*, Routledge, London-New York 1999, p. 8.

This scepticism has been taken to task by new materialists<sup>57</sup>. However, it is also important to note, as argued by Noela Davis, that new materialism need not be seen to dismiss or disregard feminism's legacies, including those of a post-structuralist variety<sup>58</sup>. Instead, and echoing Butler's aim of opening up the field of possibility, Davis suggests that «new materialism acknowledges and respects the fullness of its heritage even as it reworks the endowment which is enfolded within it»<sup>59</sup>. Davis is here drawing attention to developments in the biological sciences. We have apparently, and very recently, transitioned to a “postgenomic age”<sup>60</sup>, with epigenetics disturbing if not also debunking an understanding of the genome as functionally analogous to a computer – as though genes are the embodied equivalent of a sovereign power that codes and programmes phenotypes and developmental processes. It is by weaving these two strands together – new materialism and epigenetics – that I propose the following as a point of departure: the «spectre of biology»<sup>61</sup> is again haunting philosophy and the social sciences, but not necessarily as it has figured in the recent past<sup>62</sup>. Catherine Malabou grasps the significance of this situation in suggesting that «resistance to what is known today as biopower – the control, regulation, exploitation, and instrumentalization of the living being – might emerge from possibilities written into the structure of the living being itself [and] not from the philosophical concepts that tower over it»<sup>63</sup>. Viewed from one angle, epigenetics holds out the

<sup>57</sup> See for example K. BARAD, *Getting Real: Technoscientific Practices and the Materialisation of Reality*, in «Differences», XI, 2 (1998), pp. 87-128.

<sup>58</sup> N. DAVIES, *Politics Materialized: Rethinking the Materiality of Feminist Political Action through Epigenetics*, in «Women: A Cultural Review», XXV, 1 (2014), pp. 62-77.

<sup>59</sup> Ivi, p. 63.

<sup>60</sup> See M. MELONI, *Impressionable Biologies: From the Archaeology of Plasticity to the Sociology of Epigenetics*, Routledge, London-New York 2019.

<sup>61</sup> C. WEEDON, *Feminist Practice and Poststructuralist Theory*, Blackwell, Cambridge-Oxford 1987, p. 127.

<sup>62</sup> I say “recent” in recognition of Meloni's genealogy of plasticity, which shows in meticulous detail how the notion of the genome as «the true autobiography of the species» began to take shape as recently as the end of the nineteenth century. M. MELONI, *Impressionable Biologies*, cit., p. 124.

<sup>63</sup> C. MALABOU, *One Life Only: Biological Resistance, Political Resistance*, trans. C. Shread, in «Critical Inquiry», XLII (2016), p. 429.

possibility that what lies beneath the skin could become an ally in challenging normative conceptions of the human as well as the anthropocentric valuing of life. Shift one's perspective slightly however, and epigenetics can be seen to reinstate essentialisms, such as the notion that dimorphic sex differences are hard-wired in the brain<sup>64</sup>. This is what is at stake in what Sarah S. Richardson calls the «epigenetic imaginary», and in this article I build on Richardson's work on «maternal bodies»<sup>65</sup>, thereby taking up a critical vantage point at the intersection of feminist theoretical legacies and current trajectories.

## 2. *Epigenetics and normative fictions*

In what follows, I examine how the epigenetic imaginary and the maternal body are becoming enfolded as a normative fiction. By normative fiction I am thinking specifically of how science and philosophy – as two authoritative forms of knowledge-production – inform human self-understanding, not merely through the register of *is* but also by conjuring figural imaginings, and how knowledge produced in this way sediments in social relations as *doxa*<sup>66</sup>. Additionally, and to expand on the import of imaginings, this is in part how knowledge produced through science and philosophy migrates to the realm of biopolitics, with the quasi-fictional subjects of biopower fashioned from a desire for normative certainties as much as reliance on factuality<sup>67</sup>. A paradigmatic example is the universalising abstraction known

<sup>64</sup> S.S. RICHARDSON, *Plasticity and Programming: Feminism and the Epigenetic Imaginary*, in «Signs: Journal of Women in Culture and Society», XLIII, 1 (2017), pp. 29-52.

<sup>65</sup> EAD., *Maternal Bodies in the Postgenomic Order: Gender and the Explanatory Landscape of Epigenetics*, in *Postgenomics: Perspectives on Biology after the Genome*, ed. by S.S. Richardson, H. Stevens, Duke University Press, Durham-London 2015, pp. 210-231.

<sup>66</sup> Z. BAUMAN, *This is Not a Diary*, Polity, Cambridge 2012, pp. 44-45.

<sup>67</sup> See K. RYAN, *Refiguring Childhood: Encounters with Biosocial Power*, Manchester University Press, Manchester 2020. The approach taken here is comparable to Hendrickx and Van Hoyweghen's work on 'biopolitical imputation', which is an observation I owe to one of the anonymous reviewers for «P.O.I.» (thank you). K. HENDRICKX, I. VAN HOYWEGHEN, *Solidarity after nature: from biopolitics to cosmopolitics*, in «Health», XXIV, 2 (2020), pp. 203-219.

as “Man”, which not only flattens plurality into uniformity<sup>68</sup>, but also fabricates what Adriana Cavarero refers to as a «theoretical cage» that figures the properly human as «neutral, universal and, at the same time, of the male sex»<sup>69</sup>. This matters for those among us who cannot or who refuse to measure up to the normativity of such yardsticks, which is something I examine in more detail later. Though anchored in scientific and philosophical discourse, normative fictions also exhibit a literary quality, employing metaphor to give narrative form to apparatuses of power/knowledge that condition what Jacques Rancière calls «the sensible»<sup>70</sup>. Otherwise put, normative fictions are «body-world configurations»<sup>71</sup>, akin to frames that corral what we sense and how we make sense of what we sense. I should add that this is not to suggest that all such constructs are pernicious. Rather, it offers an approach to critical inquiry that builds on my earlier references to Foucault and Butler, i.e. to lose sight of the contingency of the normative fictions that frame our understanding of who and what we are is to foreclose on possible ways of becoming other than who or what we are. Further to this point, recognising that we perceive and apprehend self-other-world relations from within such frames is to suggest a way of grasping the political implications of normative fictions – we might aim to enlarge the frame or shift the frame so that it incorporates what it otherwise excludes, or we might aim to replace one normative fiction with another, but there is no escaping the contingency and contestability of the frames that condition the sensible<sup>72</sup>. This can be discerned from feminist new materialists thinking with and through the science of epigenetics, which necessitates a few preliminary remarks on epigenetics itself.

<sup>68</sup> H. ARENDT, *The Human Condition*, University of Chicago Press, Chicago-London 1998<sup>2</sup>, pp. 7-10.

<sup>69</sup> A. CAVARERO, *The Need for a Sexed Thought*, in *Italian Feminist Thought: A Reader*, ed. by P. Bono, S. Kemp, Basil Blackwell, Oxford 1991, pp. 182-183.

<sup>70</sup> J. RANCIÈRE, *Dissensus: On Politics and Aesthetics*, Bloomsbury, London-New York 2010, pp. 36, 92, 139.

<sup>71</sup> M. MELONI, *Impressionable Biologies*, cit., p. 18.

<sup>72</sup> See J. BUTLER, *Frames of War: When is Life Grievable?*, Verso, London-New York 2009.

## 2.1 *From epigenesis to epigenetics*

The word *epigenesis* was coined during the 17<sup>th</sup> century in opposition to preformationism<sup>73</sup>. The difference hinges on the question of whether a living organism develops through a process of increasing complexity from seed or egg, or exists from its genesis as the entity it will become. At the most general level, the epigenesis/preformationist duality concerns change versus stability, oscillating between metaphysical speculation and empirical observation and acquiring a variety of discursive forms, from Aristotelianism to 18<sup>th</sup> century materialism. As for the term “epigenetic” (as opposed to epigenesis), this is attributed to the work of Conrad Waddington during the 1940s, for whom epigenetics was the study of «how genotypes give rise to phenotypes during development»<sup>74</sup>. However, as noted by Maurizio Meloni<sup>75</sup>, Waddington did not conceive of epigenetics in *molecular* terms. This is a crucial characteristic of epigenetic research today – that the chromatin structure of the genome is «marked» by experiences which become «biologically embedded»<sup>76</sup>.

In the post-genomic era, the focus of research is thus shifting from DNA sequence to DNA regulation<sup>77</sup>. In terms of how this opens out the question of plasticity, paediatrician W. Thomas Boyce tells us that «epigenetic mechanisms change gene activity or expression in response to environmental conditions by altering chromatin organization without modifying the genetic code of the DNA»<sup>78</sup>. Michael

<sup>73</sup> M. MELONI, *The Social Brain Meets the Reactive Genome: Neuroscience, Epigenetics and the New Social Biology*, in «Frontiers in Human Neuroscience», VIII, p. 128.; C. MALABOU, *One Life Only: Biological Resistance, Political Resistance*, in «Critical Inquiry», XLII, 3 (2016), pp. 429-438.

<sup>74</sup> A. BIRD, *Perceptions of Epigenetics*, in «Nature», CDXLVII, 24 (2007), p. 396.

<sup>75</sup> M. MELONI, *The Social Brain Meets the Reactive Genome*, cit., p. 108.

<sup>76</sup> M.J. ESSEX, W.T. BOYCE, C. HERTZMAN, L.L. LAM, J.M. ARMSTRONG, S.M.A. NEUMANN, M.S. KOBOR, *Epigenetic Vestiges of Early Developmental Adversity: Childhood Stress Exposure and DNA Methylation in Adolescence*, in «Child Development», LXXXIV, 1 (2013), p. 70.

<sup>77</sup> S.S. RICHARDSON, *Plasticity and Programming*, cit., p. 31.

<sup>78</sup> W.T. BOYCE, *Differential Susceptibility of the Developing Brain to Contextual Adversity and Stress*, in «Neuropsychopharmacology», XLI (2016), pp. 151-153.

Meaney, whose work on the biology of adversity I will examine in more detail later, also provides a succinct explanation:

[...] the operation of the genome at any phase of the life cycle is an emergent property of the constant and very physical interaction of the genome with environmentally regulated, intracellular signals that directly alter chromatin structure...function at any level of biology emerges as a function of the continuous dialogue between the genome and its environment<sup>79</sup>.

Sometimes expressed as “gene by environment interactions” or “G x E”, there remains the question of how this «continuous dialogue» between genome and environment should be understood. It is worth noting the extent to which the primary literature relies on conjecture and inference in tackling this question (the emphases below are mine): as an «overlay» on the genome, the epigenome is said to «possibly buffer or moderate genetic variation»<sup>80</sup>; «epigenetic variation may...constitute a biological “memory” of early life experience»<sup>81</sup>; and «maternal care *might* stably affect gene expression»<sup>82</sup>.

These uncertainties notwithstanding, the practical application of the research branches into a number of specialist fields such as cancer research, nutritional epigenetics, the health implications of environmental contaminants and toxins, and developmental psychobiology<sup>83</sup>. Of particular importance to the present discussion is the broad area of social and behavioural epigenetics<sup>84</sup>, which concerns the biological embedding of social experiences and behaviours, or more specifically, how environments induce variations in growth, metabolism, health and behaviour, with much of the research focusing on how negative

<sup>79</sup> M.J. MEANEY, *Epigenetics and the Biological Definition of Gene X Environment Interactions*, in «Child Development», LXXXI, 1 (2010), p. 69.

<sup>80</sup> W.T. BOYCE, *Differential Susceptibility*, cit., p. 152.

<sup>81</sup> M.J. ESSEX *et al.*, *Epigenetic Vestiges*, cit., p. 71.

<sup>82</sup> M.J. MEANEY, *Epigenetics and the Biological Definition*, cit., p. 56.

<sup>83</sup> See *ivi*, p. 41; M. MELONI, *Impressionable Biologies*, cit., pp. 112-113.

<sup>84</sup> See F.A. CHAMPAGNE, *Social and Behavioural Bpigenetics: Evolving Perspectives on Nature-Nurture Interplay, Plasticity, and Inheritance*, in *The Palgrave Handbook of Biology and Society*, ed. by M. Meloni, J. Cromby, D. Fitzgerald, S. Lloyd, Palgrave Macmillan, London 2018, pp. 227-250.

experiences such as stress, social adversity, and misfortune get «under the skin» in ways that «affect the course of human development»<sup>85</sup>.

There is an important question that circulates within and without the field (and sub-fields) of epigenetic research. What does all of this mean in terms of what we do with our new-found knowledge of the epigenome? As noted by Richardson and Meloni, this is not a question that the science can or will answer for us<sup>86</sup>. In locating this question at the intersection of science and philosophy, I will be focusing specifically on the maternal body, but first I want to briefly review a few examples of how feminist new materialists have grasped the nettle of this question.

In an article originally published in the magazine *Esprit*, Malabou argues that to «renew the political question», it is necessary to reconsider «philosophy’s antibiological bias» in light of the «revolutionary discoveries of molecular and cellular biology»<sup>87</sup>. For Malabou, epigenetics makes it possible to trouble «the equation between biological determination and political normalization», and to formulate an understanding of biology which is resistant to biopolitics. In terms of how biology is to be understood as a mode of resistant agency, Malabou claims that «The articulation of political discourse on bodies is always partial, for it cannot absorb everything that the structure of the living being is able to burst open»<sup>88</sup>. By comparison to Boyce and Meaney’s way of describing the relationship between the genome and “epigenetic mechanisms” (as quoted above), here we encounter a rather different way of describing the G x E relation, and in adding texture to her argument, Malabou quotes Thomas Jenuwein, director of the Department of Immunobiology at the Max Planck Institute:

The difference between genetics and epigenetics can probably be compared to the difference between writing and reading a book. Once a book is written, the text (the genes or DNA: stored information) will be the same in all the copies distributed to the interested audience. However, each individual reader of a given book may interpret the story differently, with varying

<sup>85</sup> M.J. ESSEX *et al.*, *Epigenetic Vestiges*, cit., p. 58.

<sup>86</sup> See S.S. RICHARDSON, *Plasticity and Programming*, cit.; M. MELONI, *Impressionable Biologies*, cit.

<sup>87</sup> C. MALABOU, *One Life Only*, cit., pp. 431-432.

<sup>88</sup> Ivi, p. 438.



emotions and projections as they continue to unfold the chapters. In a very similar manner, epigenetics would allow different interpretations of a fixed template (the book or genetic code) and result in different readings, dependent upon the variable conditions under which the template is interrogated<sup>89</sup>.

This is a wonderful example of what I referred to above as the literary quality of normative fictions, yet there is also a degree of slippage between a new materialist conception of agency, which I will come back to shortly, and the attributes of “Man” referred to earlier. In other words, here we glimpse a fictional post-genomic subject willfully interpreting the genetic script in a way that conjures a scenario whereby knowledge of epigenetics enables individuals to read their own “emotions and projections” into the code. To borrow from Karen Barad, it’s as though discourse shapes matter without in turn being constrained or conditioned by the matter thus shaped<sup>90</sup>.

Davis also adopts a figurative register in presenting epigenetics as a way of examining «gene-body-environment conversations that enact the physiological mechanisms through which an organism’s genome is expressed»<sup>91</sup>. The many factors encompassed by epigenetic research – including but not limited to genes, biochemistry, history, climate, diet – are thus imagined as «conversants» engaging in «dynamic cross-talk», which echoes Meaney’s notion of a continuous G x E «dialogue». However, by comparison to what is (potentially) inferred by Jenuwein’s fictional reader of the genetic text, Davis brings us much closer to a distinctly new materialist conception of agency. In qualifying the “new” in new materialism, Davis argues that what is at stake is the «chance to rethink matter, its vibrancy, dynamism and agency, and with this a politics that takes matter’s ontological insistence seriously – a politics that worlds the world»<sup>92</sup>. In terms of what epigenetics brings to this political project, for Davis it provides evidence that «the cultural, social and discursive are not separate from matter and biology, but are physically and molecularly manifested in bodies»,

<sup>89</sup> Ivi, p. 435. This quote is published on the *The Epigenome Network of Excellence* Website: <http://www.epigenome.eu/en/1,1,0.html> (accessed 24<sup>th</sup> November 2020).

<sup>90</sup> K. BARAD, *Getting Real*, cit., pp. 90-91.

<sup>91</sup> N. DAVIS, *Politics Materialized*, cit., p. 66.

<sup>92</sup> Ivi, p. 63.

thereby also affirming the new materialist vision of matter, soma and culture as entangled and agentic «worldly reconfigurings»<sup>93</sup>.

If we take this grammar of entanglement and worldly reconfigurings, adding the claim that epigenetics can enable us to overcome philosophy's antibiological bias by embracing the dynamic agency of a corporeality shaped by G x E cross-talk, which is also a mode of resistance to biopolitics, then I think it's clear that we can see a normative fiction coming into focus. As figured by feminist post-materialists, the post-genomic subject is a relational, entangled, non-binary, body-world configuration that, crucially, is not (only) a discursive construct but (also) a material reality.

Among critical science and technology scholars who take a more circumscribed approach to epigenetics, the new materialist embrace of epigenetics is laudable but perhaps not sufficiently attuned to the ways in epigenetic research can, and to some extent already is, reinstating sexual dimorphism<sup>94</sup>, racialized manifestations of inequality<sup>95</sup>, and biological determinism<sup>96</sup>. Notwithstanding the new materialist insistence on the interweaving of the symbolic and the biological<sup>97</sup>, the linguistic/discursive sculpting of the «epigenetic landscape»<sup>98</sup> remains crucial to the question posed above: what does all of this mean and what we do with our new-found knowledge of the epigenome? As noted by Meloni, if the language of genetics borrowed from information science – programming, coding, signals and switches – the metaphors populating the epigenetic landscape are derived from the arts of writing (exemplified in the above quote by Jenuwein), such as marking and labelling, which is why Meloni's work on «impressionable biologies» is so apposite<sup>99</sup>. As a way of figuring the association between epigenetics and plasticity, Meloni explains that the word «impression» comes from the Latin *impressio*, the root meaning of which

<sup>93</sup> Ivi, p. 64.

<sup>94</sup> S.S. RICHARDSON, *Plasticity and Programming*, cit.

<sup>95</sup> B. MANSFIELD, *Race and the New Epigenetic Biopolitics of Environmental Health*, in «BioSocieties», VII, 4 (2012), pp. 352–372.

<sup>96</sup> M.R. WAGGONER, T. ULLER, *Epigenetic Determinism in Science and Society*, in «New Genetics and Society», XXXIV, 2 (2015), pp. 177-195.

<sup>97</sup> C. MALABOU, *One Life Only*, cit., p. 438.

<sup>98</sup> M. MELONI, *Impressionable Biologies*, cit., p. 2.

<sup>99</sup> Ivi, p. 28.

is “to press in”, calling to mind ancient writing techniques, such as using a metal stylus to impress marks on a wax tablet.

The maternal body has long been perceived in this way, and as a line of approach to the question of how the epigenetic imaginary is currently being impressed upon maternal bodies, the next section approaches the present via the past. The main focus is an historical juncture where the mechanical philosophy associated with Hobbes and Leibniz was becoming enfolded in political thought. Moreover, the implications of this particular imbrication of science and philosophy have been profound, and are arguably an integral part of the (his)story concerning the legacies and current trajectories of feminist philosophies. By way of prefacing that issue, the next section begins with a few insights from Meloni’s genealogy of plasticity as applicable to the maternal body.

### 3. *Maternal bodies and normative fictions*

Meloni provides some intriguing examples of the theory of “maternal impression” from the ancient world<sup>100</sup>. Circa 125 CE, the physician Soranus of Ephesus wrote that the tyrant of the Cyprians had compelled his wife to look at beautiful statues during intercourse so that he would become the father of well-shaped children. In an earlier racialized version of the theory, Hippocrates is said to have come to the aid of a white princess accused of adultery. The predicament facing this woman was that she had given birth to a child “as black as a Moor”, but Hippocrates provided the explanation when he noted that the cause of the dissimilarity was a picture of a Moor that hung on the wall of the princess’s bedroom. These examples set the scene for an examination of what Meloni calls the «doctrine of maternal imagination»<sup>101</sup>. During the 17<sup>th</sup> and 18<sup>th</sup> centuries, older teleological views of embryonic development were gradually superseded by mechanistic theories, so that, in Meloni’s words, «with the fading of Aristotelian immaterial powers, the role of the imagination shifted from being predominantly negative, as a source of degeneration, monstrosity or

<sup>100</sup> M. MELONI, *Impressionable Biologies*, cit., pp. 53-54.

<sup>101</sup> See also R. BRAIDOTTI, *Signs of Wonder and Traces of Doubt: on Teratology and Embodied Differences*, in *Feminist Theory and the Body: A Reader*, ed. by J. Price, M. Shildrick, Routledge, New York 1999, pp. 290-301.

defective births, to offering an explanation for the transmission of traits *tout court*»<sup>102</sup>. In his treatise *The Female Physician* (1724) for example, John Maubray wrote that when the soul is «elevated and inflamed with a fervent imagination, it may not only affect its proper body, but also that of another», and thus pregnant women were advised to suppress anger, passion, and «other perturbations of mind», as well as overly serious or melancholic thoughts, since this would «impress a depravity of nature upon the infant’s mind, and deformity on its body»<sup>103</sup>. Preformationism, which I touched on earlier, posed a challenge to the doctrine of maternal imagination, but the latter persisted in the theories of epigenesists, and here we encounter the oscillation between stability and change noted above which, by the end of the 19<sup>th</sup> century, played out through the competing theories of hard-hereditarian eugenicists and supporters of what Meloni refers to as «prenatal culture», which was a “nurturist” theory then emerging in the field of antenatal pathology<sup>104</sup>.

Before examining how the maternal body figures within the contemporary epigenetic imaginary, I am going to make a strategic insertion into Meloni’s genealogy and move his analysis sideways, thereby connecting a strand of the doctrine of maternal imagination (sensory impression) to the work of John Locke. This is not to suggest that Locke should be written into Meloni’s genealogy. Rather, it is to grasp the broader significance of ideas in circulation at that time – the ways in which the thinkable is bedded down in a variety of discursive spheres, thereby sedimenting as a sense-making apparatus. Further to this last point, in reflecting upon the legacies of feminist philosophies for this issue of «P.O.I.», it is important also to consider the legacies of liberalism – not liberalism as a political/moral philosophy, but how the liberal stance of neutrality and universality is implicated in gendered and racialized power relations. What I propose is that in the context of Locke’s texts, the one voice that matters is the author as an authority in possession of truth, a voice moreover which is haunted by other subjects that it simultaneously summons’ in order to make itself heard, and silences so that it secures its own audible presence.

<sup>102</sup> M. Meloni, *Impressionable Biologies*, cit., p. 55.

<sup>103</sup> Ivi, p. 56.

<sup>104</sup> Ivi, p. 58.

The story penned by Locke would gradually become the history of liberal property rights, capitalism, and modern mass democracy, and to borrow from Hayden White's book of the same name, this "metahistory" incorporates a multiplicity of histories of cruelty and violence which are constitutive of the historical arc that generates the imaginary of a liberal "West"<sup>105</sup>. The maternal body has a part to play in assembling this regime of truth.

In Locke's *An Essay Concerning Human Understanding* (1689), the maternal body appears alongside his thoughts on childhood, with the unborn child and the new-born child providing a readily-available and intuitive means of presenting his case against the notion of innate ideas and principles. In the larger and more politically salient sense, as argued by Joanne Faulkner, Locke figures the child as «humanity's *tabula rasa*, signifying the point from which we can start anew, with a hope for a better future»<sup>106</sup>. This is the import of Locke's treatise on education (1693), where he uses images from non-human nature to portray the impressionable nature of the developing child:

The little, or almost insensible, impressions on our tender infancies have very important and lasting consequences; and there it is, as in the fountains of some rivers, where a gentle application of the hand turns the flexible waters into channels, that make them take quite contrary courses; and by this little direction, given them at first, in the source, they receive different tendencies, and arrive at last at very remote and distant places...I imagine the minds of children, as easily turned, this or that way, as water itself<sup>107</sup>.

This passage gestures towards the practical application of Locke's *Essay* as well as his *Two Treatises of Government* (1689), and for ease of presentation I treat these three texts as an inter-related whole. For Locke – and let us not forget that this is a philosopher who also studied medicine – the infant child is a means of imagining the human mind as being equivalent to «white paper, void of all characters»<sup>108</sup>. As

<sup>105</sup> H. WHITE, *Metahistory: The Historical Imagination in Nineteenth-Century Europe*, John Hopkins University Press, Baltimore-London 1973.

<sup>106</sup> J. FAULKNER, *The Importance of Being Innocent: Why We Worry About Children*, Cambridge University Press, Cambridge-Melbourne 2011, pp. 70-71.

<sup>107</sup> J. LOCKE, *Complete Works of John Locke*, Delphi, East Sussex 2017, pp. 1567-1568.

<sup>108</sup> Ivi, pp. 87, 93, 104-105.

a representation of humanity's *tabula rasa*, this figuring of the child applies also to the unborn child who, in the womb, acquires «faint ideas of hunger, and thirst, and warmth, and some pains», though these do not qualify as «settled ideas», or ideas that settle in the mind through the acquisition of language, the growth of reason, and the capacity to reflect upon what has been sensed<sup>109</sup>. The maternal body is present throughout these passages from the *Essay*, even though Locke only occasionally makes this presence explicit. Yet this shadowy presence is sufficient to suggest an analogue to the state of nature in his *Two Treatises*<sup>110</sup>. Otherwise put, if, as Locke argues, the mind is an «empty cabinet» which is «furnished» and «imprinted» with ideas and principles acquired through sensory experience, and if the human capacity to reason reveals the «natural law» which is the basis of the social contract<sup>111</sup>, then the maternal body is a place-holder for the birth of reason and the liberty to «consent» to membership of a political society.

To stay with this transition from the *Essay* to the *Two Treatises* momentarily, it is apparent that Locke employs childhood – and by extension, the maternal body – as a device in the service of imagining the most fundamental form of property: ownership of one's self. Here we encounter the full significance of the elision in Locke's discourse, for the shadowy presence of the maternal body is a complex corporeality that troubles his claim that «Though the earth, and all inferior creatures, be common to all men, yet every man has a property in his own person: this no body has any right to but himself»<sup>112</sup>. Really? Even Locke himself notes that the womb is a time and a place of sensible experience, and that new-borns can communicate pain and hunger, pleasure and contentment, and in this way reach out to others, thereby acting upon their actions, suggesting that interdependence is

<sup>109</sup> Ivi, pp. 75, 93.

<sup>110</sup> Ivi, p. 1263. Locke: «all men are naturally in that state, and remain so, till by their own consents they make themselves members of some politic society».

<sup>111</sup> Ivi, p. 1258. Locke: «The state of nature has a law of nature to govern it, which obliges everyone: and reason which is that law, teaches all mankind who will but consult it, that being all equal and independent, no one ought to harm another in his life, health, liberty or possessions».

<sup>112</sup> Ivi, p. 1271.

prior to the leap in imagination required to conjure the individual as a stand-alone form of property. The maternal body is life-within-life: more than one yet not quite two, that is, if measured against the standards of Lockean liberalism. To suggest otherwise is to begin from the assumption of separability – the maternal body must undergo the mental arithmetic of subtraction and extraction as a pre-condition for the individual to appear. Although Locke did have some things to say about the parental rights of mothers relative to patriarchal authority, the maternal body is otherwise incidental, like scenery that provides the backdrop to his argument.

Let us return momentarily to the subject of self-ownership. The faculty that distinguishes those who consent to be subject to power (the constraints of the social contract) is possessed by a self who stands apart, who is endowed with language and reason, and who is encapsulated within a body distinct from all other bodies. However, if viewed not from the perspective of the encapsulated self and the internal sense-making that Locke attributes to reason and reflection, but from the vantage point of the sensible world, then it could be suggested that the subject figured by Locke would be better described as porous, relational, entwined, and enfolded. After all, the impressionable material that Locke figures as an inviolable form of property first appears as a blank sheet of paper (and here we have a version of the plasticity argument), in which case the formative sensory encounters he describes in such detail – encounters with and within a material world that includes human and non-human others – must be constitutive of the subject that claims ownership over its self. Additionally, as acknowledged by Locke himself, this generative process commences in-utero, in which case does it not trouble the assumption of separability as the distinguishing feature of the properly human?

If we take Locke not as *the* beginning but rather as one of the ways in which the liberal subject originates, then we see how the margins of this normative fiction are constitutive of the apparatus it spawns<sup>113</sup>. The maternal body is simultaneously incorporated and remaindered, positioned at the margins of Locke's text, yet also immanently subversive of its central claims. This ambiguous textual position also tells us

<sup>113</sup> See C. MOUFFE, *On the Political*, Routledge, London-New York 2005, p. 15.

something important about how a fundamentally relational body – life-within-life which is more than one and not quite two – would later become the raw material of biopolitics. I am admittedly taking a very large historical step here, moving suddenly from Locke to where I ended the earlier brief review of Meloni’s genealogy of maternal impressions, but the connecting thread is already apparent in Locke’s thoughts on education quoted above. In other words, and to defer to Foucault’s remarks on the «threshold of our modernity», as biological existence was gradually folded into political existence in the form of biopower, the maternal body would become a means of programming the future<sup>114</sup>. This has been the case in the past, and as will be demonstrated below, it remains the case in the present. As we transition from Locke’s philosophy to post-Darwinian science, and from the fiction of the social contract to the theory of evolution, so the maternal body summons’ a technical and practical undertaking on the part of the architects of the future, the strategic objective of which can be expressed as a question: what if life can be acted upon *before* the separable child qualifies as a sovereign individual?

Among the more notorious chapters in this particular history are eugenic interventions aimed at breeding “mental defect” out of a population. The most extreme form of eugenics is of course associated with Nazi Germany, yet eugenic techniques – or to be more specific, the selective sterilization of women – was practised in Scandinavia<sup>115</sup>, continuing into the 1970s in Sweden, and also in the US, commencing in 1927 with the sterilisation of 21 years old Carrie Buck after her illegitimate child was taken from her and placed with foster parents. The significance of what was done to Carrie Buck was captured by the words of Supreme Court Judge Oliver Wendel Holmes Jr. in his ruling on *Buck v. Bell*, which was a challenge to test the Virginia Sterilisation Act of 1924: «three generations of imbeciles are enough»<sup>116</sup>. Holmes was referring not only to Carrie and her daughter Vivian, but also to

<sup>114</sup> M. FOUCAULT, *The Will to Knowledge: The History of Sexuality*, vol. 1, Penguin, London 1998, pp. 141-142, 148.

<sup>115</sup> *Eugenics and the Welfare State: Sterilisation Policy in Denmark, Sweden, Norway, and Finland*, ed. by G. Broberg, N. Roll-Hansen, Michigan University Press, Ann Arbor 1996.

<sup>116</sup> Quoted in P. LOMBARDO, *Facing Carrie Buck*, in «The Hastings Center Report», XXXIII, 2 (2003), p. 14.



Carrie's mother Emma, and what he meant by these words was that it would be «better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind»<sup>117</sup>. It transpired that Carrie had become pregnant as the result of being raped by a relative of her foster parents, but the facts of the case were swept aside by the biopolitical imperative of addressing the social cost of crime, vice and “mental defect”. Eugenics would go to the source: the reproductive organs of “feeble-minded” women as the place from which future criminals and “socially inadequate” persons would originate, i.e. unless degenerative procreation was halted in its tracks.

The liberal fiction of self-ownership was of little help to Carrie Buck and the 60,000 other women who were sterilised under the eugenic laws of the US<sup>118</sup>. To recall Faulkner's observation concerning Locke's figuring of childhood as “humanity's *tabula rasa*” – or childhood as a way of hitting the reset button and programming the future – if this was the thrust of eugenics as practised in the past, it is also what is at stake today, though with the crucial difference that the mode of prevention has been reconfigured: from enforced birth control to a mode of quality control that aims to ensure optimal “outcomes” for children.

#### 4. *The Maternal body and the epigenetic imaginary*

In an article titled «Don't blame the mothers» published in *Nature* in 2014, Richardson and colleagues issue a warning concerning «careless discussion on epigenetic research»<sup>119</sup>. I've mentioned Carrie Buck as one extreme case of mother blaming. This was a situation where individual mothers were made to shoulder the burden of social “problems” as perceived by the guardians of order. But there are also other

<sup>117</sup> *Ibidem*.

<sup>118</sup> Extending also to Puerto Rico. See L. BRIGGS, *Reproducing Empire: Race, Sex, Science and U.S. Imperialism in Puerto Rico*, University of California Press, Berkely 2002, pp. 142-161.

<sup>119</sup> S.S. RICHARDSON, C.R. DANIELS, M.W. GILLMAN, J. GOLDEN, R. KUKLA, C. KUZAWA, J. RICH-EDWARDS, *Don't Blame the Mothers*, in «Nature», XIV, August (2014), pp. 131-132.

less extreme forms of mother blaming, framed by the imperative of protecting children, thereby shifting the focus of attention away from moral judgements directed at women in general and pregnant women in particular. Arguing that epigenetics research may inadvertently facilitate this form of mother blaming today, Richardson and colleagues critically examine «the long shadow of the uterine environment»<sup>120</sup>.

An example from the recent past concerns the issue of foetal alcohol syndrome (FAS). During the 1970s, FAS research examined physical and mental problems among children born to women who were heavy drinkers during pregnancy. By the 1980s, the consensus view was that there was no safe level of alcohol consumption for a pregnant woman, and what followed was a trend that stigmatised and even criminalised women who were deemed to be harming their unborn child<sup>121</sup>. As the risks associated with alcohol extended to drugs such as crack cocaine, the resulting moral panic played out through draconian measures in the US, including rescinding welfare benefits, removing children from their biological mothers, and in some cases, prosecuting and imprisoning women for endangering their foetus.

Addressing the problem of FAS has entailed attempting to act upon the actions of mothers with a view to protecting the unborn child. A concern here is that remedial interventions that target the mother exclusively – acknowledging that such interventions can be supportive as well as punitive – may well leave the prevailing social conditions intact<sup>122</sup>. To present this is a question: what of the conditions these mothers must endure, cope with, or struggle against in the context of everyday life, such as racism, discrimination, exploitative labour practices and crippling debt, and this on top of exclusion from the opportunities associated with social security and upward mobility? For Richardson, this is what is at stake as a burgeoning field of research examining the developmental origins of health and disease (DOHaD) is adapted for public consumption, thereby fashioned into stories that, through a process of diffusion and iteration, become what I have referred to earlier as a normative fiction<sup>123</sup>.

<sup>120</sup> Ivi, p. 131.

<sup>121</sup> Ivi, pp. 131-132.

<sup>122</sup> See B. MANSFIELD, *Race and the New Epigenetic Biopolitics*, cit.

<sup>123</sup> S.S. RICHARDSON, *Maternal Bodies in the Postgenomic Order*, cit.; see also M. KENNEY, R. MÜLLER, *Of Rats and Women: Narratives of Motherhood in*

An example of how this research is packaged as a portable grain of scientifically validated truth is a message promoted by the *Begin Before Birth Foundation*<sup>124</sup> – that «what happens in the womb can last a lifetime». This is simultaneously a pedagogical story of «foetal programming» («how we turn out depends on both our genes and our environment...the influence of the environment begins in the womb») and a warning about the implications of prenatal maternal “stress”, which can epigenetically mark the developing child and – apparently – lead to heightened anxiety, reduced attention, learning deficits and increased likelihood of maladaptive developmental outcomes such as criminal behaviour<sup>125</sup>. This is precisely where the imperative of “early intervention” in the form of policy prescriptions acquires traction. Again, to reiterate a point made above, early interventions may well be supportive<sup>126</sup>, but an important question concerns the *target* of intervention, which might be the behaviour of mothers (such as the response to FAS), the health and wellbeing of children, the intrauterine environment, the family (including fathers, who are often written out of the stories crafted from the science), the matriline (as was the case with Carrie Buck), the socio-economic environment, or any combination of these features of the complex biosocial corporeality encompassed by the maternal body. However, and notwithstanding this

*Environmental Epigenetics*, in *The Palgrave Handbook of Biology and Society*, cit., p. 808.

<sup>124</sup> See <https://www.beginbeforebirth.org/>. The Begin Before Birth Foundation website has no information on who is behind the initiative. Richardson and colleagues however note that it is a resource produced by researchers at Imperial College London. See S.S. RICHARDSON *et al.*, *Don't blame the mothers*, cit., p. 132.

<sup>125</sup> See “Charlie’s Story” as narrated by the Begin Before Birth Foundation on Youtube: <https://www.youtube.com/watch?v=LxXLHpt0iEo>. Charlie is portrayed as a nineteen year old male with a criminal conviction, prefacing the claim that «perhaps his problems stretch right back to the womb». Maternal care is explicitly framed as a mode of crime prevention in the video.

<sup>126</sup> A recent study by Ruth Müller and Martha Kenney for example uses the concept of «narrative choreography» to examine how the «epistemic authority» of the science can be enrolled to support practices such as restorative justice. R. MÜLLER, M.A. KENNEY, *A Science of Hope? Tracing Emergent Entanglements between the Biology of Early Life Adversity, Trauma-Informed Care, and Restorative Justice*, in «Science, Technology, & Human Values», XLVI, 6 (2020), pp. 1230-1260.

complexity, Richardson notes that interventions proposed by DOHaD researchers aim to ensure «developmentally optimal outcomes for the *foetus*»<sup>127</sup>. In other words, «the maternal body is a transducing and amplifying medium necessary to get to the foetus, an obligatory passage point, not a primary endpoint or subject of DOHaD research»<sup>128</sup>.

By way of underlining the importance of what is being imagined and projected upon the maternal body here, the next section turns to the scientific research underpinning the message that “what happens in the womb lasts a lifetime”, specifically with respect to the problems attributed to “stress”.

### 5. *Maternal care, stress and the new biology of social adversity*

Earlier I referred to Michael Meaney, who is based at McGill University and whose research on “maternal care” among rats is at the cutting edge of what has been called the «new biology of social adversity»<sup>129</sup>. The central thesis is that naturally occurring variations in maternal care, which are reproduced in the lab, alter the expression of genes in offspring that regulate responses to stress. The specific behaviours studied in the lab are the licking and grooming (LG) of pups as well as arched-back nursing (ABN) during the first eight days after a dam gives birth to a litter<sup>130</sup>. A key finding reported in the published research is that early-life experiences result in epigenetic programming of glucocorticoid receptor gene expression in the hippocampus,

<sup>127</sup> S.S. RICHARDSON, *Maternal Bodies in the Postgenomic Order*, cit., p. 223, emphasis added.

<sup>128</sup> *Ibidem*.

<sup>129</sup> T.W. BOYCE, M.B. SOKOLOWSKI, G.E. ROBINSON, *Toward a New Biology of Social Adversity*, in «PNAS», CIX, 2 (2012), pp. 17143-17148.

<sup>130</sup> M.J. MEANEY, *Maternal Care, Gene Expression, and the Transmission of Individual Differences in Stress Reactivity across Generations*, in «Annual Review of Neuroscience», XXIV (2001), pp. 1161–192; I.C.G. WEAVER, M.J. MEANEY, M. SZYF, *Maternal Care Effects on the Hippocampal Transcriptome and Anxiety-Mediated Behaviors in the Offspring that are Reversible in Adulthood*, in «PNAS», CIII, 9 (2006), pp. 3480-3485; F.A. CHAMPAGNE, M.J. MEANEY, *Stress during Gestation Alters Postpartum Maternal Care and the Development of the Offspring in a Rodent Model*, in «Biological Psychiatry», LIX (2006), pp. 1227–1235. By comparison to what is called the “blanket” posture, ABN enables pups to switch nipples.

which has a bearing on stress-response<sup>131</sup>. What this means in lay terms is that the offspring of high LG-ABN mothers exhibit decreased startle responses and increased open-field exploration<sup>132</sup>. In other words, they are less anxious and fearful by comparison to the offspring of low LG-ABN dams<sup>133</sup>. These effects, which are shown to be stable during the lifetime of individual rats, are transmitted inter-generationally, which raises a question as to how traits are passed from parent to pups. Studies in cross-fostering – placing pups from low LG-ABN mothers with high LG-ABN dams and vice versa – provides evidence of non-genomic transmission, i.e. pups born to low LG-ABN mothers can become high LG-ABN mothers depending on how they are nurtured during the first week of life, indicating a behavioural mode of transmission<sup>134</sup>. This in turn opens out the question of how to explain variations in maternal care. The answer to this puzzle is “environmental regulation”. According to Meaney:

Under natural conditions, and the sanctity of the burrow, rat pups have little direct experience with the environment. Instead, conditions such as the scarcity of food, social instability, low dominance status, etc, directly affect the emotional state of the mother and, thus, of maternal care. The effects of these environmental challenges on the development of the pups are then mediated by alterations in maternal care. Variations in maternal care can thus serve to transduce an environmental signal to the pups. The environmentally driven alterations in maternal care then influence the development of neural systems that mediate behavioral and HPA [hypothalamic-pituitary-adrenal] responses to stress. Animals that are more fearful and anxious, such as low

<sup>131</sup> See I.C.G. WEAVER, M.J. MEANEY, M. SZYF, *Maternal Care Effects on the Hippocampal Transcriptome*, cit.

<sup>132</sup> M.J. MEANEY, *Maternal Care, Gene Expression*, cit., p. 1169.

<sup>133</sup> I.C.G. WEAVER, N. CERVONI, F.A. CHAMPAGNE, A.C. D’ALESSIO, S. SHARMA, J.R. SECKL, S. DYMOV, M. SZYF, M.J. MEANEY, *Epigenetic Programming by Maternal Behaviour*, in «Nature Neuroscience», VII, 8 (2004), pp. 847-854.

<sup>134</sup> See I.C.G. WEAVER, M.J. MEANEY, M. SZYF, *Maternal Care Effects on the Hippocampal Transcriptome* cit; C. CALDJI, J. DIORIO, M.J. MEANEY, *Variations in Maternal Care Alter GABAA Receptor Subunit Expression in Brain Regions Associated with Fear*, in «Neuropsychopharmacology», XXVIII (2003), pp. 1950–1959; See I.C.G. WEAVER *et al.*, *Epigenetic Programming by Maternal Behaviour*, cit.

LG-ABN mothers, are more neophobic and lower in maternal responsivity to pups than are the less-fearful animals<sup>135</sup>.

What this boils down to is that stress imposed on the mother as a result of environmental conditions is epigenetically impressed upon her offspring. In evolutionary terms, this is said to be adaptive in preparing pups for what is to come – pups raised by low LG-ABN mothers are equipped with a defensive response to threat or adversity. Things look different from the point of view of health science however, because the effects of stress correlate with negative health outcomes, which is the point at which the research with rats crosses over to implications for human populations<sup>136</sup>. To quote Meaney once more, «individuals who show exaggerated HPA and sympathetic responses to stress are at increased risk for a variety of disorders, including heart disease, diabetes, anxiety, depression, and drug addiction»<sup>137</sup>. Additionally, and significantly in terms of how this body of research frames maternal care, the mother is figured as a “mediator” or “transducer” of the effects of environmental adversity on the neural development of her offspring.

Kenney and Müller call this the «mediating mother», i.e. the mother’s environment programmes the way she programmes her offspring, and thus the mother is a mediating factor in the G x E relationship<sup>138</sup>. The implications of this become apparent as the research findings move beyond the study of rats, thereby used to model maternal care among human mothers. Framed by the “biology of social adversity”, the mediating mother is the source of preventable developmental problems for her child and yet also more or less void of agency. The scene is thus set for a mode of mother blaming that justifies paternalistic interventions, though this is ultimately contingent on how the cross-talk between laboratory and policy arena is fashioned into a narrative. With this in mind I will examine an article by paediatrician Jack Shonkoff, Director of the Center on the Developing Child at Harvard University and Chair of the National Scientific Council on the Developing Child. I hasten to add that the significance of what is

<sup>135</sup> M.J. MEANEY, *Maternal Care, Gene Expression*, cit., p. 1178.

<sup>136</sup> See ID., *Epigenetics and the Biological Definition*, cit.

<sup>137</sup> ID., *Maternal Care, Gene Expression*, cit., p. 1163.

<sup>138</sup> M. KENNEY, R. MÜLLER, *Of Rats and Women*, cit., p. 811.

presented in this article extends beyond the time and place of its publication<sup>139</sup>. My wager is that Shonkoff's words are firmly anchored in a normative fiction which has been gaining traction over the past three decades and that speaks in a language of axioms (of which more shortly).

Written for a special section of *Child Development* on “the effects of early experience and development”, Shonkoff refers to «epigenetic modifications» before explaining that:

In an effort to educate policy makers about the biology of adversity and its consequences...the National Scientific Council on the Developing Child (2005) proposed a conceptually guided taxonomy based on three categories of stress experience – positive, tolerable, and toxic – to differentiate normative life challenges that are growth promoting from significant threats to long-term health and development that warrant intervention...Although the underlying biology of these distinctions awaits empirical validation, their conceptual basis is grounded in well-established scientific principles<sup>140</sup>.

Again, and as noted earlier, here we see certainty concerning the biology of adversity and its consequences freely mixing with conjecture (the taxonomy of stress awaits empirical validation) and assertion (the conceptual basis of the taxonomy *is* grounded in well-established scientific principles). What is also happening here is that the generic notion of “stress” as applicable to the research on rats is finessed and fashioned into a technical and practical problem. In other words, “toxic stress” is the target of interventions. What is toxic stress? Shonkoff explains that

[...] the defining characteristic of toxic stress is that it disrupts brain architecture, adversely affects other organs, and leads to stress management systems that establish relatively lower thresholds for responsiveness that persist

<sup>139</sup> For a recent iteration of the argument see J.P. SHONKOFF, W.T. BOYCE, P. LEVITT, F.D. MARTINEZ, B. MCEWAN, *Leveraging the Biology of Adversity and Resilience to Transform Pediatric Practice*, in «Pediatrics», CXLVII (2021), pp. 1-9.

<sup>140</sup> J.P. SHONKOFF, *Building a New Biodevelopmental Framework to Guide the Future of Early Childhood Policy*, in «Child Development», LXXXI, 1 (2010), p. 359.

throughout life, thereby increasing the risk of stress-related disease or disorder as well as cognitive impairment well into the adult years<sup>141</sup>.

This is not quite the whole story however. Toxic stress is also a metaphor, one of several produced through a partnership between the Center on the Developing Child at Harvard University, and the Washington-based FrameWorks Institute<sup>142</sup>. The objective was to design «simplifying models» with a view to assembling a «core story» of child development that could be used to communicate «complex scientific principles» to «non-scientists», meaning «ordinary citizens» and policy-makers<sup>143</sup>. In short, the metaphor of toxic stress is part of a strategic exercise in translation and persuasion.

There is an additional and significant feature of toxic stress worth mentioning. Toxic stress as Shonkoff presents it is grounded in the axioms of the “first thousand days” movement, as is the claim noted earlier (what happens in the womb can last a lifetime): that the first three years of a child’s life are a “window of opportunity” in terms of shaping the “brain architecture”<sup>144</sup> of the future adult; that “the early years last forever”; and that as a society we either “pay now or pay later”, i.e. invest in the early years or deal with the consequences further down the road<sup>145</sup>.

Toxic stress thereby becomes a keystone in building what Shonkoff refers to as a «roadmap for a new era in early childhood policy focused on specific foundations of health and sources of adversity that offer promising targets for innovative intervention strategies,

<sup>141</sup> Ivi, p. 360.

<sup>142</sup> The FrameWorks Institute is a Washington-based think-tank that studies the “cultural models” informing the public’s understanding of science (<https://www.frameworksinstitute.org/>).

<sup>143</sup> J.P. SHONKOFF, S.N. BALES, *Science Does not Speak for Itself: Translating Development Research for the Public and Policymakers*, in «Child Development», LXXXII, 1 (2010), pp. 17-32.

<sup>144</sup> “Brain architecture” is another metaphor produced through the partnership between the Center on the Developing Child and the FrameWorks Institute. See J.P. SHONKOFF, S.N. BALES, *Science Does not Speak for Itself*, cit.

<sup>145</sup> J. MACVARISH, *Neuroparenting: the Expert Invasion of Family Life*, Palgrave Macmillan, London 2016, pp. 2-3; K. RYAN, *Refiguring Childhood*, cit., pp. 118-126.



beginning as early as the prenatal period»<sup>146</sup>. We have now moved very far from the rats in the Meaney lab. As for what is projected through the lens of “promising targets”, what begins as the notion of “maternal care” in the work of Meaney’s team expands to become an encompassing biopolitical apparatus. Armed with the plasticity-affirming science of epigenetics, and coupling this to the metaphor of toxic stress and the axioms of the first thousand days movement, Shonkoff adds substance to the idea of a «roadmap for a new era in early childhood policy », which encapsulates:

[...] adult outcomes in educational achievement and economic productivity (high vs. low), health-related behaviors that are enhancing (e.g., nutritious diets, frequent exercise, and use of condoms to prevent sexually transmitted disease) versus those that are threatening (e.g., smoking, alcohol abuse, illicit substance use, unprotected sexual activity, antisocial behavior, and violent crime), and health status (well-being vs. disease or disorder). Although greater details regarding precise causal sequences remain to be elucidated, increasing evidence supports the conclusion that many aspects of these domains of adult competence and health can be influenced by early life experiences that are amenable to intervention<sup>147</sup>.

It seems that this roadmap would not be complete without the last sentence, the first part of which reads almost like a legal disclaimer, underscoring the fragility of a vision which is nevertheless assertive in the scope of interventions it projects onto childhood. Working backwards from the future in cost-benefit terms, the guiding assumption is that children either become an asset or a burden depending on their developmental trajectory<sup>148</sup>. This is the biopolitical imperative that quilts the maternal body and the epigenetic imaginary into a normative fiction that echoes Lockean liberalism as discussed earlier, with the maternal body fading into the background as the figure of the child is extracted and operationalised as moral justification for a constellation of normalising interventions. It is also worth noting the contemporary significance of Faulkner’s remark that Locke figures the child as humanity’s *tabula rasa*, because this too has a bearing on the political

<sup>146</sup> J. P. SHONKOFF, *Building a New Biodevelopmental Framework*, cit., p. 360.

<sup>147</sup> Ivi, pp. 360-361.

<sup>148</sup> J.J. HECKMAN, *Skill Formation and the Economics of Investing in Disadvantaged Children*, in «Science», CCCXII (2006), pp. 1900-1902.

project driving the first thousand days movement – the maternal body is again framed as a means of programming the future. By way of concluding this article, I want to return to my admittedly partial (in the sense of incomplete) remarks on how feminist new-materialists are thinking with and through epigenetics. While it is without doubt important not to overlook how «matter comes to matter»<sup>149</sup>, it is also crucial to keep a critical eye on how the science is fashioned into normative fictions. The shift in focus from genome to epigenome is also a shift in emphasis from programming to plasticity, but this does not mean that plasticity is not also programmable. Philosophy has a part to play in this game of power/knowledge, and the stakes are high, because the epigenetic imaginary could well become yet another way of figuring, framing and policing the properly human.

<sup>149</sup> K. BARAD, *Getting Real*, cit., p. 91.