

Title: The (bio)politicization of neuroscience in Australian early years policies: Fostering brain-resources *as* human capital

Zsuzsa Millei, SPARG, University of Tampere, Finland & University of Newcastle, Australia

Mikko Joronen, SPARG, University of Tampere, Finland

Abstract:

At the present, human capital theory and neuroscience reasoning are dominant frameworks in early childhood education and care (ECEC) worldwide. Popular since the 1960s, human capital theory has provided an economic understanding of human beings and offered strategies to manage the population with the promise of bringing improvements to nations. Neuroscience arguments added new ways to regulate human beings, and thus another ‘hopeful ethos’ and investment in to the future. In this paper we examine different positive, life-improving, and hopeful takes on early childhood as forms of biopolitical government, which are closely related to the enhancement of individual capacities and the shifting problems of the neoliberal state. Curiously, this process, grounded on biological fatalism and naturalizing arguments, has led to new class categorizations and ways of social discrimination. We hence argue that even though a ‘hopeful ethos’ is offered through the (bio)politicization of neurosciences, it has led to eugenic arguments by re-inscribing social and economic differences into differences in brain architecture. Finally, we aim to demonstrate that ECEC policy offers an example of how current policies govern through scientific evidence and softer forms of ‘government by example’, at the same time moving the government of population into the home, and with that privatizing and personalizing self-investment.

Keywords:

early childhood education and care policy, neuroscience, human capital, biopolitics, governmentality, neoliberalism, Australia

Introduction

Early childhood education and care (ECEC) have gathered a renewed interest internationally since the start of the new millennia (White, 2011). Utilizing human capital reasoning, ECEC policies worldwide carry a hope for ‘expanding human potential and accelerating economic growth ... [for nations as] leaders of the global economy’ (Levine, 2005, 196). Statements about the production of an entrepreneurial and healthy future workforce and about young children’s development understood in neurological terms are almost ubiquitous in these policies (White, 2011). Neurological development requires ‘quality’ interactions with children that stimulate synaptic growth and results in optimal brain architecture, the basis for all other later development and learning (Shore, 1998; Shonkoff & Phillips, 2000). These statements about nations and children’s futures are also prevalent

in Australian ECEC policy and appear in different policy actors' statements. Independent of how their interpretations are framed and what future they aim to bring about through different kinds of investments, the economization of childhood with 'human capital' reasoning, as Foucault (2008) has convincingly argued, forms an essential part of the neoliberal logic of government (Lee, 2013). Moreover, the idea of human capital, neuroscience and neoliberalization operate as a political rationality in ECEC policy that constructs problems, goals and avenues for governing the conduct of individuals (children, educators and families) and 'provides individuals an explanatory framework for reflecting upon their identities, capacities, behaviours and relationships' (Nadesan, 2002, 403).

It is important at the beginning of this article to differentiate the politicization of neuroscience from the findings of neuroscience for three reasons. First, neuroscience findings are mostly used in a reductionist and overly deterministic fashion in social policy, health and education sciences (e. g. Baker, 2015; Edwards, Gillies and Horsley, 2015; Lowe, Lee and Mcvarish, 2015; Nadesan, 2002; Besley & Peters, 2007; Luke, 1997 etc). Second, critics, even within the field neuroscience, have challenged the interpretation of scientific data that is available through experiments (e.g. Bruer, 1999; Rose and Abi-Rached, 2013; most comprehensive review Duncan and Magnuson, 2013). Third, neuroscience never appears in purified form in societal and political processes. The foothold neuroscience has gained in recent early childhood education is an example *par excellence* of what Michel Foucault calls biopolitical government: a politicization of certain condition(s) of life that is premised on enhancement and positive improvement of human capacities (Foucault, 2007, 2008).

Policies are often shaped by taken-for-granted and implicit knowledges and assumptions producing problems and truth claims about the objects and subjects of policy, such as children, their families, educators and care an education (Ball, 2015). To critically examine ECEC policies' claims and the configurations of government they are part of (Simons, 2015), we first discuss ECEC as a biopolitical form of government and insert a short genealogy of its changing reasoning. By applying Foucault (1978; 1991) and Rose's (1999) thinking about the government of the population and individuals, we aim to decenter the idea of human capital, especially those various ways in which it has produced childhood and children in Australian ECEC. In particular, we want to show how the notion of 'human *as* capital' is connected to 'the child' and an 'increase of human capabilities' of children (Lee , 2013). Moreover, we demonstrate how different connections between the two, biopolitics and human capital theory, have paved the way for the current (bio)politicization of

neurosciences in early childhood education. It should be noticed, that our aim is not to study 'human capital theory' (HCT) for its own sake, but rather to show how current neuroscientific rationalizations in ECEC have not emerged in an empty space, but in a space that has been occupied by previous biopolitical understandings of human capital. In the main part of the analysis, we show how the recent neuroscientific reasoning in early childhood policies has been politicized within the neoliberal logic of government. The politicization of neurosciences, we thus claim, is not a completely novel idea, but more of a shift *within* biopolitical government that leads to new categorizations and forms of discrimination based on biological and naturalizing arguments. We are concerned about the uncritical take-up of HCT and neurosciences in ECEC policy and advocacy work, since they reconstruct race and class bound divisions on biological bases and easily lend themselves into eugenic or 'neugenic' reasonings in pedagogy and practice (Baker, 2015). Theory-wise, we also aim to show throughout the paper how the current framings of early childhood policy that employs neuroscientific reasoning seem to bring together biopolitical and neoliberal forms of governments in a way Foucault echoed, but was never explicit about.

Biopolitical government and early childhood education: 'human *as* capital'

Human capital reasoning first appeared in early childhood policies during the 1960s. The basics of human capital theory (HCT), as explained by Becker (1964), is that the individual is positioned to a market of behaviours and information, where s/he optimizes his or her own behaviour and knowledge by accumulating those that make him or her more desirable on the market. It is through education, human capital theory claims, the human can be perfected or his or her potentials fulfilled for the market. The take up of HCT in policies has contributed greatly to generate investments in education and ECEC historically (Luke, 1997; Millei, 2015). The most important achievement of human capital theory according to its proponents is that it has enabled a translation of human behaviour into economic terms (Besley & Peters, 2007). Thus, HCT has provided an avenue for the systematic application of an economic theory to answer various problems, such as unemployment, health, incarceration and marginalization (Besley & Peters, 2007; Peters, 2014). The subjects of these policies (young human lives) are expected to pay back the investment in their productivity, health and longevity in the longer run (Foucault 2003, 254–255). In short, the idea of investing into childhood is essentially a biopolitical project. This is also recognized by Peters (2014, 329), who aptly writes that HCT

...focuses on moulding the subjectivity of the population in line with the interests of capital both through State investments and ‘responsibilization’ strategies (ie., moral technologies of privatizing and personalizing self-investment). The biopolitical model of human capital is then pointed to by the ensuing discussion about eugenics and about which sections of the population to invest in (Peters 2014, 329).

As the discussion above indicates, biopolitics refers to a positive and encouraging mode of government – to the government that takes place through the “care for life”, to paraphrase Ojakangas (2005; see also Joronen, 2015a). In biopolitics, life – the biological capacities and skills of individuals in particular, and the conducts and properties of population in general – appears as an object of political strategies that are not negative in nature (such as punishing, disciplining, prohibiting, or about menace of death). Instead, political strategies operate as a positive force that forms, shapes, fosters, develops and administrates life in order to gain maximum benefit out of it. As Foucault (1978, 139) writes, biopolitics does contain the ‘biological processes’ of ‘propagation, birth and mortality, the level of health, life expectancy and longevity’, but also ‘all the conditions that can cause these to vary’. As we discuss next, three aspects of biopolitics should be taken into account in order to properly understand how different versions of HCT in ECEC function as biopolitical government.

First of all, what is at the stake in biopolitics is not biological life alone, neither a mere (political) ordering of biological capacities of populations. Biopolitics is rather a form of *governing the life* of bodies and populations (Foucault 1978, 140) via political economy that aims to improve, foster and secure life and its capacities (see Lemke 2011, 429-430). Biopolitics can thus emerge as a promotion of social welfare and health of populations, but simultaneously make individual bodies sites of economic profit and political control. In biopolitical government, bodies become matters of calculated investments and expenditures that simply aim at maximising, improving, fostering and increasing the benefit of the living ‘human capacity-machine’ (Foucault 2008, 227-229; more on neoliberal logic of government, see Joronen, 2013). The connection to human capital theory is obvious. As Luke (1997, 5) explains, the way in which human capital theory operates in educational policy

...is based on a conceptualisation of the human subject as a generic, infinitely perfectable industrial-era machine, with an infinitely adjustable and expandable repertoire of quantifiable

skills and competences. The school (as technological black box) is an adaptable machinery of curriculum, instruction and assessment geared to mediate and moderate quantifiable differences in behaviours, skills and competences. In this way, the human capital model itself is based on a model of educational institution as machinery in a complex local political economy of flows.

Secondly, Foucault's notion of biopolitics differs from other approaches to biopolitics through its deeply historical take on the subject (see Lemke, 2011). According to Foucault (1978), biopolitics began to emerge as the modern state(s) became concerned with the population as a commodity that needed to be governed in such a way so as to protect, preserve, and fortify it and its capacities. According to this reasoning, children need to be understood as living resources, where the aim of government is to control the health, welfare and conducts of children in such a manner that the overall productivity of life can be increased. Biopolitics (Foucault, 2007) constitute and exert a futurity in relation to children (Prout, 2005): they concern children's potentiality, their future wellbeing, and children as future economic citizens (Popkewitz and Bloch, 2001). Biopolitics is exercised over young bodies so that their productivity and individuality are constituted in certain ways and to answer the problem of government expressed particularly in economic processes. This also affects the way in which we approach the question of neuroscience, biological argumentation and human capital reasoning: we do not see them as ahistorical knowledge on human behaviour, but fundamentally entangled in the (bio)political processes, historical truth conditions and forms of government.

Thirdly, biopolitics refers to a new type of political knowledge, where modern sciences and concepts of normality inform policies and define political goals. As Miller & Rose (1988, 174) explain, '[f]or something to be manageable it must first be knowable'. Currently, knowledges produced by neuroscience and bioscience enabled the government of individuals to move into new areas (Rose & Abi-Rached, 2013). They shift the focus of government from the regulation of the population's biological processes (propagation, birth, health etc.) and conducts (skills, practical capacities etc.) *en masse* to neuro and biomolecular levels. Through the visualization of the brain's activities and by latching on to psychological methods, for example regulating emotions, and the monitoring of physiological signs, neurosciences and biosciences go beyond (or under) bodily borders and open new spaces for intervention that are located inside the skin of the individual (Rose & Abi-Rached, 2013; Stein *et al.*, 2011). In sight of these new understandings of the individual as the target of

biopolitics, Lemke (2005) proposes that we need to reconsider Foucauldian biopolitics. While in Foucault's understanding the health and productivity of the human body and practices associated with those were targeted by biopolitics, as Lemke argues (2005, 6 by citing Rheinberger (1996, S. 25): '[f]or the first time, it is on the level of instruction that metabolic processes are becoming susceptible to manipulation'.

Considering the three above-mentioned points together, when we analyze ECEC policies, we need to look at biopolitics as a government of life, which is tied around historical understandings and uses of knowledge that construct subjects and aim to improve their capacities, and conditions of life in a certain population (or portion of population). Human capital theory and neuroscience have been two of the dominant knowledges and forms of reasoning in ECEC since the turn of the new millennium that help constitute child subjects and their capacities (Nadesan, 2002; Millei, 2015). Childhood, thus, is not a natural condition or phenomenon (James & James, 2004) but produced and governed differently in particular historical moments and contexts (Millei, 2008; Joronen, 2016).

Shifting biopolitical reasoning: Genealogy of human capital in ECEC

When human capital theory was first utilized to reason for particular ECEC provisions, it aimed to enfranchise populations affected by poverty (Luke, 1997; Katz, 2008; Mitchell, 2010; Jackson, 2014). Poverty during the 1960s was deemed a national crisis for the US state, a problem that called for immediate solutions and the enlisting of expert knowledges: a 'War on Poverty'. Preschool education (High Scope) and the media (Sesame Street) were key sites to remedy this crisis (Jackson, 2014). Mostly the children of the urban black were targeted with particular biopolitical interventions. As Jackson (2014, 191) further explains, interference in the lives of these children 'contained elements of hope for the future and the nation' but 'was steeped in racist and classist fears of the time'. Jackson (2014, 193) explains that these 'populations were understood through culture or biological inheritance' and remediation sought to offer 'equality of opportunity' with the provision of different kinds of cultural knowledges. During the same period in Australia, the ideal of 'equality of opportunity' took a social democratic form and provided some of the ideological underpinnings for the welfare state. 'Equality of opportunity' in Australia aimed to create an equal starting ground for disadvantaged students by providing additional social services prior to school to cater for their needs (thus changing their cultural backgrounds) rather than to compensate for their cultural environment through preschooling (Taylor, Rizvi, Lingard & Henry, 1997). Consequently, the compensatory

education (such as Disadvantaged School Program in Australia) movement was less influential (Taylor *et al.*, 1997) as in the USA (Head Start and Perry Preschool) and in Great Britain (Nursery School) (Swadener, 1990).

From the 1980s in Australia, policy problems were formulated with the notion: 'a nation at risk' (Marginson, 1997). The population that needed investment was characterised as 'at risk' of failing. This new understanding, according to Luke (1997), repositioned 'lack' of potential more generally in the population by removing categories, such as 'race' or 'gender'. Investments aimed to secure opportunity to participate in education and acquire skills needed for the job market. Human capital was reframed as investment into job related skills. The total federal funding for pre-compulsory education fell dramatically in this period (Brennan, 1994). The decreased funding, as it is explained by Ailwood (2004), was caused by a shift in HCT focus that allocated resources to the top end of compulsory schooling to produce immediately a reliable and flexible workforce for the national economy.

HCT reasoning has changed from the late 1990s and lead to the increased funding of ECEC internationally (Dahlberg & Moss, 2005). Early investment in children through ECEC promised great benefits for societies thus provisions were extended to the general population of young children in most of the countries belonging to the OECD (Organisation for Economic Cooperation and Development, 2001). In Australia, globally circulating reasoning of human capital and strengthening discourses of neurosciences mixed with local initiatives created the possibilities for the birth of various programs and agendas. Collaborative initiatives between various governmental and non-governmental sectors saw light at both federal and state levels, such as the economic program of *National Investment for the Early Years* (NIFTeY) (National Investment for the Early Years, 1999). While global agendas of 'knowledge nation' and lifelong learning were influential among the OECD countries (Organisation for Economic Cooperation and Development, 2001), the Australian public policy area was slow to follow. Only in 2000 did the federal government publish the *Learning for the knowledge society: an education and training action plan for the information economy* paper (Australian National Training Authority, 2000). In this document, the surfacing of lifelong learning, including the importance of the early years and the techno-citizen is apparent. However, this new agenda was still not enough for the federal government to initiate more involvement in preschool education (Ailwood, 2002).

In 2003 in its third term, the Howard coalition government identified early childhood as a national priority area (Commonwealth Task Force on Child Development, 2003). A Taskforce was set up to produce a draft of the *National Agenda for Early Childhood* (Agenda) (Commonwealth of Australia, 2007) that guided decisions and future directions regarding federal early childhood policy and program development. The *Agenda* has laid down that ECEC is a solution to maintain international competitiveness for the Australian economy and offers assurances against risks by guaranteeing ‘the social and economic functioning of society into the future’ (Commonwealth of Australia, 2007, 4). Speaking in financial terms, the *Agenda* and other non-governmental programs (such as NIFTeY) addressed the early years as actual investments and returns in specific dollar amounts (see e.g. US longitudinal studies by Heckman & Masterov, 2004). Return was calculated in the form of savings on welfare spending (Commonwealth of Australia, 2007, 10), such as crime, unemployment, social and health services and so on. Policies conceptualised the child subject as a future economic citizen, a flexible subject. These policies sought to produce neoliberal subjects who continuously learn, critically analyse, and creatively respond to changing situations and see their life as ‘a continuous economic capitalization of the self’ (Rose, 1999, 161) from ‘cradle to grave’ (Jayawarna, Jones & Macpherson, 2014) (see also *The Melbourne Declaration on Educational Goals for Young Australians*, Ministerial Council for Education, Employment, Training and Youth Affairs, 2008). The increasingly influential neurosciences latched onto this conceptualization of the child with a biological understanding of the human described in neurological terms.

The problem of biopolitical government in the first application of human capital theory in the context of the ‘War on Poverty’ during the 1960s, was the lack of participation of ‘poor’ in society and in the workforce. The ‘poor’ were identified on structural terms, on one’s belonging to particular social groups of race and class (Luke, 1997). Individual capacity was constructed on “deficits” linked to group membership. Education focused on filling their lacks and to enable social mobility. Educational funding aimed toward the reorganization and redistribution of knowledge (Luke, 1997). Luke (1997) terms this kind of ‘welfare biopolitics’-based human capital reasoning as human capital with a heart. During the 1980s deficits were repositioned generally onto all human subjects and constructed in skills. The problem of biopolitical improvement of the population was framed in purely economic terms. Certain types of knowledge and skills were seen as necessary for the purposes of industry to increase economic productivity. This thinking reshaped the

understanding of the capacity of subject in terms of the possession or lack of specific skills necessary for employment (Luke, 1997). During the late 1990s, the new iteration of human capital theory sought to aid the neoliberal problem of national economic survival and competition in the global economy in terms of enterprise and the acquisition and use of so-called entrepreneurial qualities. It is the idea of competition and positioning of subjects as competing entrepreneurs that is pivotal for neoliberal government (Jayawarna *et al* 2014). Subjects are not forced, but supported, encouraged and rewarded to improve their capacities and so to help the state succeed in global competition (Joronen, 2013). This neoliberal framing of human capital constituted entrepreneurship and creativity as important capacities of the subject reflecting the context of risk and knowledge society and instituted mechanisms for risk and knowledge management.

The different shapes of human capital reasoning constructed human potential on various terms, linking to social deficit, then skill deficit and then defined it in neoliberal entrepreneurial and creative qualities. Thus biopolitical government variously targeted human potential, or as Becker (1964) defined it, 'human aptitudes'. Regulation shifted from the social to the economic and to particular set of qualities or potentials of the individual. Added to notions of entrepreneurial subjects, the concept of lifelong learning extended to birth, and even before as the final version of the *National Quality Agenda for Early Childhood Education and Care* (COAG, 2009) (hereafter *Agenda*) outlined. This new area of concern opened spaces for new expert knowledges that saw the child as a neural being. Neuroscience portrayed child learning and development in utero, baby- and toddlerhood in brain structures and capacities (Lowe *et al.*, 2015), hence conceptualized the child with neurological foundations forming the new target of regulation, investments and interventions (MacNaughton 2004; Baker 2015; Millei, 2015).

Biopolitics and children as brain-resources in current Australian ECEC policy

The policy documents we analyze in this section were written or commissioned by the previous governments (Rudd (2007-2010 and 2013), Gillard (2010-2012) and Abbott government (2013-2015)). They composed a part of the '*Building the Education Revolution*' (2007-2010) program responding to global economic crisis (Sumsion, Barnes, Cheeseman, Harrison, Kennedy & Stonehouse, 2010). The final version of the *Agenda* (COAG, 2009) outlined the overall reform tasks for ECEC. The Council of Australian Governments' (2009) *Investing in the Early Years—A National Early Childhood Development Strategy* (hereafter *Strategy*) provided the scientific and contextual

background to changes in multiple areas. The *Agenda* put forward the *National Quality Framework* (in full effect 2012) and *National Quality Standards*, new laws, the first national curriculum (*Belonging, being & becoming: The early years learning framework for Australia*, AGDEEWR, 2009), the establishment of a national monitoring and evaluation body of *Australian Child Education and Care Quality Authority*. These documents, laws and governmental body were produced and established also in relation to *The Melbourne Declaration on Educational Goals for Young Australians* (2008) and preparatory documents and white papers that provided arguments and justifications for reforms. In our analysis we take representative quotes from the above policy documents and draw up a ‘picture’ of the neurological child that these policies rationalize, frame and produce (Ball, 2015).

The *Strategy* which preceded and informed the development of the national framework uses the following reasoning:

Based on a number of landmark longitudinal cost-benefit studies of targeted early childhood education ... a number of leading economists advocate investment in early childhood development programs for *disadvantaged individuals or communities*. For example, Professor James Heckman believes investment is needed because the return ‘far exceeds the return on most projects that are currently funded as economic development’ (COAG, 2009, 9, our emphasis).

“Investments in prevention may have a large payoff in terms of future human capital accumulation, but it is important to learn what types of investments are most effective. [quote from] Janet Currie, 2008, p53.” (COAG, 2009, 21).

‘Disadvantaged individuals and communities’ are marked out as the target population for ‘investments in prevention’. It is argued that this investment brings about future ‘human capital accumulation’ for economic development. The articulation of HCT here, as evidenced by the ‘landmark’ study by Professor Heckman in the *Strategy* (COAG, 2009), mirrors the biopolitical understanding developed by Becker (1964) as applied during the ‘War on Poverty’. It targets ‘disadvantaged groups’, however in this case the outcomes are calculated on economic rather than social or cultural measures, even if inclusion is considered. When ‘social inclusion’ is concerned, as in the *Strategy* (2009, 4), it is done so to meet the challenges the country will face in the future:

National effort to improve child outcomes will in turn contribute to increased social inclusion, human capital and productivity in Australia. It will help ensure Australia is well placed to meet social and economic challenges in the future and remain internationally competitive (7).

Immediately after HCT reasoning a reference to genetics and neuroscience follows:

Our understanding of the interactions between genetics and early childhood experiences has advanced through research in neurobiology which highlights the importance of the early years in shaping the architecture of the brain.

Children who have a good start in life are more likely to develop the capabilities that will better equip Australia to compete in a global society. (7)

Between the child's genetic or neurological capacities (potentials) and competitiveness a linear relation is set up. It is here that the findings of neuroscience become politicized in terms of neoliberal dogmas of global competitiveness and human capital. The young individual's genetics and brain architecture are turned into useable resources of human capital for global competitiveness (more on neoliberalization, subject formation and education see special issue edited by Davies and Bansel in *International Journal of Qualitative Studies in Education* 2007 20(3)). This construction of the child opens spaces for brain-based learning and a certain instrumentality that creates opportunities to 'design' children according to certain ideals (to be cheery, cooperative, subsuming, attentive, high achieving etc.), to alter their dispositions and behaviours by physical means, such as drugs and procedures applied to the brain (Stein *et al*, 2011; Baker, 2015).

A particular kind of futurity emerges here – one, where environment and optimal brain architecture and brain-based learning can lead to the betterment of society via economic competitiveness. And a conclusion is drawn that those who have a good start in life will forward Australia. It also implied that the rest of society might be a hindrance and cause of an uncertain future. Rose & Abi-Rached (2013) refer to this constellation as a 'hopeful ethos', which links cognitive potential that is tied to brain architecture and a positive environment to social and economic challenges and solutions. Moreover, as Rose & Abi-Rached (2013, 14) continue to argue, (the industrial North) societies have 'moved from the risk management of almost everything to a general regime of *futurity*. The future now presents us neither with ignorance nor with fate, but with probabilities, possibilities, a spectrum of uncertainties and the potential for the unseen and the unexpected and the untoward (our emphasis).' Young children's brains are mobilized in the construction of this 'hopeful ethos' for society.

Futurity and Valuable Lives: Fatality and Societal Responsibility in Neuroscience Reasoning

In a regime of futurity, the future itself becomes uncertain or undefinable, therefore biopolitical concerns about securing the future incite forms of government that is composed of anticipatory actions at the present. Mitchell (2009) makes a differentiation between two types of anticipatory action based on the work of cultural theorists Elmer and Opel (2006). One follows a '*What/if?*' logic and outlines numerous risk scenarios and their consequences for the future. The other one is based on a '*What/then*' management of risk, which is built on a pre-defined knowledge of future events and their management at the present. The '*What/then*' logic includes 'a spirit of fatalism, a sense that certain events cannot be avoided; specific futures are preseen and pre-made and the only planning that needs to be done is around how authority figures can best handle or mitigate those necessary futures' (Mitchell, 2009, 241). This logic incites an authoritarian or sovereign form of government ('let live or die') to manage the future. As we will show in-details below, in this way the government that is based on sovereign decision regarding valuable and non-valuable lives enters to the system centered on the positive regulation of biopolitical capacities of the population. In particular, this shows the fundamental entanglement of biopolitics to eugenics, or in this case 'neugenics' (Baker, 2015) and modern racism, which according to Foucault (2003, 254) reveals that the biopolitical operations of the state can 'scarcely function without becoming involved with racism at some point'. In its extreme form racism within the system of biopolitical government consists of a 'break between what must live and what must die', but if put subtly, it denotes a break between what is considered as valuable life and what is not (2003, 254).

In a national document compiled by states (MCEECDYA) in Australia titled: *Neuroscience and early childhood development: Summary of selected literature and key messages for parenting* (Winter, 2010) (*Summary*), neuroscience constructs particular capacities and futures. 'Early experiences impact on brain development, and can have a long-term effect on wellbeing' (4) it is reasoned, so that 'early experiences either enhance or diminish innate potential' (5) and at worst 'lack of positive relationships ... associated by increased risk of behavioural and emotional problems' (Winter, 2010, 5). Those who are raised in nurturing relationships will be all right as 'the impact of early experience has a greater influence on development than heredity' (Winter, 2010, 4). According to the way this review of neuroscience literature presents findings, those who are appropriately nurtured and stimulated progress on this life course, while others, those who fail to receive 'appropriate' nurturing and stimulation, necessarily lag behind. Their brains are 'pruned' too much or too early, a deterministic and fatalistic interpretation of neuroscience indeed, that even the OECD's (2007)

Understanding the Brain: The Birth of Learning Science document warns against. Together, the neoliberal form of HCT and certain simplistic or uncritical presentations of neuroscience form *technologies of anticipation*. Thus, they seek to bring some aspects of the future about and to avoid others (Rose and Abi-Rached, 2013) by fulfilling a *'What/then'* logic that targets the 'developing subject'.

It is pivotal, that in their quest to secure the future, these forms of reasoning also produce particular lives as worthy of securing: 'valued life' and those who could be abandoned as 'surplus life' (Mitchell, 2009). This indicates the racist categorization mentioned above, now turned into neuro-political valuing of individual lives on the basis of their capacity to succeed in the neoliberal competition. Such reasoning becomes what Judith Butler (2010) calls the framing of 'grievable life': an entanglement of government into normative acknowledgement and positive recognition of certain form(s) of life as valuable, and hence as 'grievable' (i.e. as a life that is worth caring for). Biopolitical frames that apprehend, control, and administer young life hence consist of discriminatory, fatalist and exclusionary modes of power, which become part of the very definition of life itself via positive recognition of neuro-capacities and brain-resources.

For instance, in the *Summary* (Winter, 2010) it is stated that '[n]euroscience currently confirms that: the first five years last a lifetime – children's wellbeing, good nutrition, health, and exercise are critical to brain development and learning' (5). Although this statement is followed (on page 7 of the same document) with some caution to interpret evidence (for instance not to 'confuse biology and culture' and that while there are 'correlations between poverty and behavior' it is 'not poverty per se that makes the difference, but family characteristics correlated with income and parenting style' (Winter, 2010)), there is research evidence included with quite the opposite effect (for example, Figure 1. diagram below from p. 25 of the same document). This scientific statistical evidence works to re-inscribe the cultural onto neural differences. Consequently, as the diagram shows, during the first few years of the child life 'inappropriate' parenting – mostly understood as mothering in the Australian context and as part of cultures associated with 'working class' and 'welfare parents' often from particular racial background (Katz & Redmond, 2009) – results in those differences in brain architecture that will mark out different educational futures for children.

Disparities in Early Vocabulary Growth

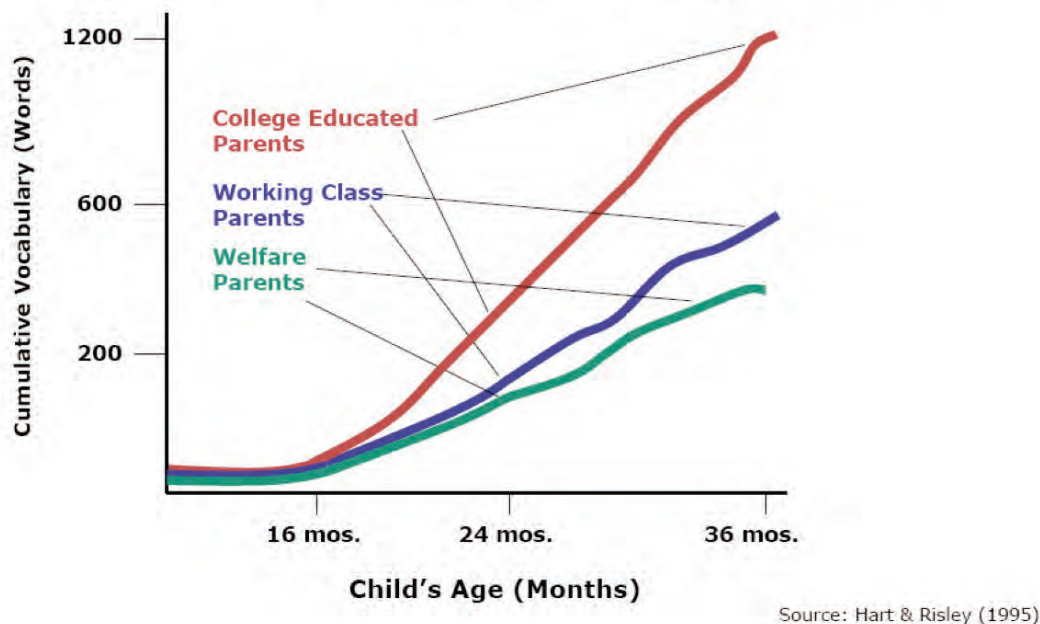


Figure 1. Evidence from neuroscience

As Einboden and colleagues (2013) illustrate, measured by the Early Development Instrument (EDI) it becomes visible that larger concentration of these children are located in disadvantaged neighbourhoods, these spaces are then (re)produced as failing environments in a mutually constitutive process. Einboden *et al.* (2013, 570) explain this further: ‘when knowledge claims conceal the conditions of their situatedness and appear to come from nowhere, taken simply that which is fact, or nature, a god-trick is performed. We see this god-trick in the claims of the EDI, where culturally prescribed expectations understood as brain architecture and serve as a ground for moral discourse (Einboden *et al.*, 2013; Nadesan, 2002; Lowe *et al.*, 2015). Having striking similarity to eugenic discourses, children with particular environments and resulting biology are constructed as ‘waste’. It is assumed that their brains, and therefore productivity, are lost due to inappropriate environments provided by inappropriate parenting / mothering. Against this background it is interesting that neuroscience claims to offer ways to overcome class differentials by moving into the biological processes of the body that seemingly equalize all humans. However, its beneficial effects are questionable for others than the middle classes who employ already neuro-training in raising their children, such as playing with brain stimulating toys or participation in brain gym or mindfulness training (see further discussion in Edwards *et al.*, 2013).

As the *Summary* literature document so eloquently elaborates: “[a]ll behaviour is mediated through the brain – our brain *determines who we are, and controls what we think, feel and do*” (Winter, 2010, 27, our emphasis):

While neuroscience cannot provide all the answers for optimal early development and later learning and success, a combination of knowledge from the neurosciences, cognitive sciences, social sciences and psychology can provide rich deductions and understandings, and in particular, broaden the understanding that learning is not just about intelligence. Social cognition, emotion and behaviour are also part of brain architecture and function (Cacioppo et al., 2003) ... With the new technologies, neuroscientists are able to study the composition, the activity, the chemicals and the response of the brain (Winter, 2010, 20).

Technological advances in neuroscience provided the ability to visualize processes of the brain and so make it amenable to government and to link personality, behavior, feelings and thought to its internal processes (See Rose & Abi-Rached, 2013). With these technological gains, neuroscience, and their sibling fields of biomedicine and bioscience, expand knowledge from the person to the internal processes of the body, for example to brain architecture, plasticity, neural pathways and brain chemicals. Most human activities and development are conceived as related to operations or characteristics of the human brain that can be identified, facilitated and modified (see discussion in Stein et al, 2011 on designing children). Moreover, by implication all these could be enhanced or damaged by in/appropriate environment in early life as the Commission’s report states: ‘Children’s experiences in the early years of their lives, when the neuroplasticity of their brains is greatest, can have profound impacts on their longer-term development. The environment within and outside the home is important’ (Productivity Commission, 2014, 147).

Dis/advantage in this way is decoded in biological terms and environmental factors where parental /mothering behaviour results in biological difference. As it is further explained by Corrie (2000), Mitchell (2009) and Einboden *et al.* (2013, 563), ‘children [are produced] as subjects of social value, figured as human capital, investments in the future, or alternatively, as waste’ as ‘irredeemable’ to society (Corrie, 2000). (Re)producing eugenic arguments they legitimize the abandonment of children whose brain lacks potential. They also help removing any societal responsibility for their position and relieve the nation from its responsibility to ‘improve’ these lives by ‘investing’ in them. Neuroscience evidence thus offers politicians new ways to avoid any acknowledgment of class

connections or categorization of people (Edwards, Gillies & Horsley, 2013; Edwards, Gillies & Horsley, 2015) and responsibility for policies that address broader social problems. At the same time, they responsibilize parenting / mothering for environments that lead to gaining or losing human brain capacity. As Nadesan (2002, 421) continues, in this way the child's brain becomes a new biological target of government. While earlier government in policy frameworks operated through parents' own values and practices, and made parents responsible for healthy and productive bodies and lives, and the future of the nation (Millei & Lee, 2007), here offspring's brain structure and activity become a new target. Brain science 'problematizes infant development [in new ways] and proposes acting upon it in order to ensure the security of state, economy, family and individual' (Nadesan, 2002, 421). So as Macvarish *et al.* (2015, 264) also argue, 'this instrumental, biologised way of thinking about the family life expands and intensifies the obligations of parents to new levels' and at the same way de-authorizes certain parents due to their lack of expertise to care properly for their children (Macvarish *et al.*, 2015, 264). While ECEC policies argue for optimal brain environments ensured by quality services, neuroscience somewhat contradictorily argues that brain architecture is formed by the age of three, which reorients the attention from institutional education and care to the home. Katz & Redmond (2009, 97) adds:

In Australia currently, the most common practice in the first year after a child's birth is for one parent (usually the mother) to remain in the home with the child, with a gradual return to work as the child grows older (Campbell and Charlesworth 2004). In 2002, fewer than half of all Australian women with dependent children aged under six were employed, considerably fewer than the average of about 60% for rich countries (OECD, 2006).

Thus, due to the importance of very early environment and the reality that child rearing is mostly mothers' responsibility and happens in the home, the responsibility of the state for early brain health is mostly lifted. In what follows, we consider parenting / mothering as an important constituent in the current configuration of the government of individuals.

Responsible neuro-parenting

Taking effect from 23 December 2014, responsibility for child care policy and programmes and co-ordination of early childhood development policy has passed to the Department of Social Services in Australia (more recently the Turnbull government again shifted it to under Education). Election promises (Coalition, 2013) and this move foreshadowed and highlight the changes in the Abbott government's approach to ECEC under austerity. In a nutshell, the Abbott government considered

ECEC only as care for working families and intervention for those who “start school with learning and developmental delays” or are from vulnerable families (Productivity Commission, 2014). The focus on ECEC’s importance as investment in the future productivity of the nation through its young, or its potential to shape children as learners from birth are especially weakened (Cheeseman, Sumsion & Press, 2015). At the same time, responsibility further shifted to parental / mother care.

The *Child Care and Early Childhood Learning* inquiry document describes early childhood period as ‘a time of rapid brain development where the brain’s circuitry or ‘wiring’ is built’ (Productivity Commission, 2014, 148). As the document continues, the consequences of inappropriate parenting are not left implied in this document as in previous documents but clearly stated: ‘This process is particularly sensitive to the nature, extent and range of experiences provided by a child’s environment. This makes early childhood a period of both opportunity for enrichment and vulnerability to harm’ (Productivity Commission, 2014, 148). It is thus the downside of the life-fostering functions of biopolitics that those neurologically ruined or no more perfectible lose their value as human capital investments. After describing how optimal interaction builds the healthy architecture of the brain and creates the foundation for later learning, the document describes ‘*what*’ happens ‘*if*’ parents from particular sections of the populations do not parent in prescribed ways and risk their child’s development, prevent their future learning and therefore annul their potential:

In contrast, harmful experiences can have severe detrimental effects on brain development and longer-term effects on physical and mental health into adulthood. Young children who experience poverty, continuous family chaos, recurrent emotional and physical abuse, chronic neglect and severe and long-term maternal depression without buffering adult support can develop toxic stress levels that impact on brain development.

...

Family characteristics play a key role in facilitating children’s learning and development. The level of income and parental, particularly maternal, levels of education have a major influence on a child’s development. More affluent and better educated parents tend to invest more time in development activities with their children and be better positioned to provide stimulating environments for their children (Sawhill, Reeves and Howard 2013). The cumulative effect of experiences and environment in early childhood makes further skill acquisition possible later in life (Productivity Commission, 2014, 148-149).

After laying out the ‘*what*’ happens ‘*if*’ logic, the document moves to bring up scientific evidence about the ways in which parents / mothers from middle class families are the providers of suitable environments for children and their brain development. Simons (2015) explains, in relation to the

ways in which governing configurations have recently changed, that scientific evidence in current education policies work as a mode of government. However, as he continues, it is not only hard evidence (statistical information based on averages and probabilities) that is proven effective but also soft or qualitative evidence, presented in the form of ‘good practice’ examples. This is what he calls ‘governing by examples’ and it accompanies ‘governing by numbers’ based on hard evidence. In government during the ‘welfare’ or ‘social state’, as the earlier review of HCT during the 1960s to 1980s demonstrated, social scientists supplied knowledge to support central reforms and decision-making ‘in relation to ideals that [were] politically advocated’ and ‘in an atmosphere of social planning’ (Simons, 2015, 5). In the new configuration of government, and as the quote above implies, reform directions are given by examples and reforms are initiated by local actors, in this case parents themselves. In this configuration knowledge on ‘what works’ replaces policy implementation. Consequently, local actors are responsible for optimizing performance by ‘learning from [example of] what works in view of self-improvement’ (Simons, 2015, 5). Parents’ competency then refers to this form of learning, to learn from good example and bring out the potentials in their children. In this form of government parents are made responsible for their children’s success or failure, so by extension for the/ir future. The initiative is limited to those environments where there is no initiative taken by local actors, as evidence provided by hard science proves. It is, however, still to be seen when discourses of ‘designing’ children take hold in ECEC policy making that are already shaping the US educational scene (see discussion in Stein *et al.*, 2011). Neuroscience knowledge and brain-based learning in US schools created possibilities for direct medical intervention through chemical and surgical means in ‘faulty’ behaviours and attitudes developed as results of ‘bad’ parenting or genetics (Stein *et. al.*, 2011).

In sum, in current policies the future is seen in actual parenting / mothering practices in the here and now, in a similar manner to ‘*what*’ happens ‘*if*’ logic (Mitchell, 2009). In this logic, ‘the activity of learning [through example] is what bridges the gap between what is actual and what is possible’ (Simons, 2015, 8). State intervention becomes limited to those cases where potential might be lost based on the supplied evidence. This, we think, nicely exemplifies the flexible functioning of biopolitical government. Not only do we have historical alteration within it, but also instances where different modes of power coexist with, or within, biopolitics. Racist exclusion enters to this constellation, as the quote of Foucault above highlights, not as a necessity but as a breaking point and logical counterpart of the biopolitical improvement of the population. A separation of valuable

and non-valuable life has thus more to do with the normative '*What/then*'-classification of objectives in ECEC, and therefore needs to be understood as a logical outcome of the fatalist view of the future pictured by '*What/then*'-politicization of neurosciences. Improving the capacities of the young portion of population as a whole does not contradict with the valuing of certain lives only. Rather, it shows how the biopolitical improvement of the neurological capacities of early lives eventually breaks into discriminatory politics: to those who had gained proper neurological childhood and thus have a value, a human capital, for Australia's race in global competition, and to those who had not.

Concluding thoughts and questions

Neuroscience has gained a lot of traction in ECEC policies and are also used and misused by professionals and activists to aid their arguments for investment in the early education of children (see also Bruer (1999) on the US case as well as Macvarish *et al* (2015) on English family policy). As these discourses multiply, they also colonize imaginations about young children. As Rose & Abu-Rachid (2013) argue, politicized visual images of the brain and graphs, such as the one we have presented earlier, have a strong hold on the imagination and constitute personhood on neurological terms. On the one hand, these images together with the idea of human *as* capital create a 'hopeful ethos' about the future of nations. The plasticity of the brain translates to great potentials in each human that form the bases for 'expandable repertoire of quantifiable skills and competences' for the global economy (Luke, 1997). On the other hand, 'bad neuroscience and the mis-interpretative rhetorical values of brain science at the policy level has implications for practice' that have quite deterministic effects (Edwards *et al*, 2015, 176). Children from 'disadvantaged' areas, people who live with long standing poverty, disability or multiple generations of unemployment and whose lives under current austerity are further pushed to precarious conditions are the ones whose lives are marked by these policies. Their lives risk the vitality of the nation in uncertain futures. In this context, neuroscience informed policies provide munitions to eugenic or 'neugenic' arguments. Some children's lives are worthy since their brain architecture is optimal, expandable and full of potentials. Others' lives are considered as 'wasted potential' or 'wasted lives' (Katz, 2008; Mitchell, 2010; Jackson, 2014). In other words, as Edwards *et al.* (2015, 184) continue, 'the hopeful discourse of brain science in early years policy ... reinforces the social inequalities it promises to overcome', it re-inscribes social disadvantage into genetic endowments and brain architecture and legitimate the abandonment of children with 'wasted potentials' (Rose & Abi-Rached, 2013, Edwards, Gillies & Horsley, 2013; Baker, 2015).

Current Australian ECEC policies are *cruel* policies, we argue. While offering a 'hopeful ethos' through the provision of differential funding (for those who are coming from disadvantaged or Indigenous families) they also explicitly state that some children's brain potential are lost already. This double move gives and takes away hope at the same time, thus cruel. While in numerical terms Australia has increased its investment in ECEC (Katz & Redmond, 2009, 105) current policies push responsibility further on to families. They work as 'moral technologies of privatizing and personalizing self-investment' (Peters, 2014, 329) in to young children's care and education. From the point of view of the ECEC professional field and services, neuroscience arguments further emphasize the importance of home environments and justify disinvestment from institutional care against the currents of professional advocacy that promote quality learning environments for each child provided by well-trained educators. When biopolitics is concerned, the state's increased emphasis on home care contributes to governing parental conduct by examples. It also extends responsibility for children's brain architecture that allows new forms of biopolitics to take shape where metabolic processes become manipulable through brain-based education and gene manipulation to design 'desirable' children (Stein *et al.*, 2015).

In the space created by this analysis, there is a need to trouble the implicit assumptions, knowledges, images and exclusions the politicization of simplistic interpretations of neuroscience and human capital reasoning in policies already produce and the worrying ways in which biopolitical government takes 'neugenic' forms: How do policies that use human capital theory and neuroscience reasonings speak about children and how those are translated to everyday practices? What existing categorizations do these arguments speak with and how do they politicize potential and lack of potential? How do politicized images of children as economic resources or 'brain capital' shape our relationships with them and responsibilities for them? When do we withdraw our investment in human potential and abandon these lives and what reasoning might we use to legitimate our decision with? How does ECEC activism that draws simplistic interpretations of neuroscience findings re/produce notions of 'brain capital' and further pushes responsibility for potential to the home? While a number of nuanced and critical readings already exist about the ways in which policies and neuroscience developments entangle, it seems the field of ECEC remains unreceptive and perhaps mesmerised by the 'hopeful ethos' its promises carry.

References:

- Ailwood, J. 2002. *Governing preschool: Producing and managing preschool education in Queensland government schools*. Unpublished PhD, The University of Queensland, Brisbane.
- Ailwood, J. 2004. "Genealogies of governmentality: Producing and managing young children and their education". *The Australian Educational Researcher*, 31(3): 19-33.
- Australian Government Department of Education, Employment and Workplace Relations [AGDEEWR] 2009. Belonging, being & becoming: The early years learning framework for Australia
https://docs.education.gov.au/system/files/doc/other/belonging_being_and_becoming_the_early_years_learning_framework_for_australia.pdf
- Australian National Training Authority. 2000. Learning for the knowledge society: An education and training action plan for the information economy. In Department of Education, Training and Youth Affairs (Ed.): Commonwealth Government. Canberra : The Authority
- Baker, B. 2015. From "Somatic Scandals" to "a Constant Potential for Violence"? The Culture of Dissection, Brain-Based Learning, and the Rewriting/Rewiring of "the Child". *Journal of Curriculum and Pedagogy*, 12(2): 168-197.
- Ball, S. J. 2015 "What is policy? 21 years later: reflections on the possibilities of policy research", *Discourse: Studies in the Cultural Politics of Education*, 36(3): 306-313.
- Becker, G. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago, University of Chicago Press.
- Besley, T. & Peters, M. A. 2007. *Subjectivity and Truth: Foucault, Education, and the Culture of Self*. New York: Peter Lang Publishing.
- Bruer, J.T. 1999. *The Myth of the First Three Years: A New Understanding of Early Brain Development and Lifelong Learning*. New York: Simon & Schuster.
- Butler, J. 2010. *Frames of war. When is life grievable?* London: Verso.
- Cheeseman, S., Sumsion, J. & Press, F. 2015. Infants of the productivity agenda: Learning from birth or waiting to learn? *Australasian Journal of Early Childhood*, 40(3):38-45
- Coalition 2013. The Coalition's Policy for Better Child Care and Early Learning. Barton ACT
<http://www.liberal.org.au/our-policies> Accessed 15 April 2014.
- Commonwealth of Australia. 2007. Draft National agenda for early childhood: Department of Families, Community Services and Indigenous Affairs: Australian Government, Canberra.
- Commonwealth Task Force on Child Development, Health and Wellbeing 2003. Towards the development of a national agenda for early childhood: Consultation paper: Commonwealth of Australia, Canberra.
- Council of Australian Governments. 2009. Investing in the early years—A national early childhood development strategy. Retrieved February 10, 2012, from
https://www.coag.gov.au/sites/default/files/national_ECD_strategy.pdf
- Corrie, L. 2000. "Neuroscience and early childhood? A dangerous liaison." *Australian Journal of Early Childhood*, 25(2): 34-40.
- Council of Australian Governments. 2009. National Quality Agenda for Early Childhood Education and Care

http://www.federalfinancialrelations.gov.au/content/npa/education/early_childhood/quality_agenda/national_partnership.pdf

- Council of Australian Governments. 2009. *Investing in the Early Years—A National Early Childhood Development Strategy*. Retrieved February 10, 2012, from http://acecqa.gov.au/storage/national_ECD_strategy.pdf
- Dahlberg, G. & Moss, P. 2005. *Ethics and politics in early childhood education*. London and New York: RoutledgeFalmer.
- Davies, B. & Bansel, P. 2007. Neoliberalism in Education. *International Journal of Qualitative Studies in Education*, 20(3)
- Duncan, G. J. & Magnuson, K. 2013. “Investing in Preschool Programs.” *Journal of Economic Perspectives*, 27(2): 109–132.
- Edwards, R., Gillies, V. & Horsley, N. 2013. Rescuing Billy Elliot’s Brain: Neuroscience and Early Intervention. Brain sciences and early intervention: Joint meeting of the BSA Childhood Study Group and the BSA Families and Relationships Study Group, Goldsmiths University London, 20th June 2013.
- Edwards, R., Gillies, V. & Horsley, N. 2015. “Brain science and early years policy: Hopeful ethos or ‘cruel optimism?’” *Critical Social policy*, 35(2): 167–187.
- Einboden, R., Rudge, T. & Varcoe, C. 2013. “Producing children in the 21st century: A critical discourse analysis of the science and techniques of monitoring early child development.” *Health: An Interdisciplinary Journal for the Social Study of Health, Illness & Medicine*, 17(6) 549–566.
- Foucault, M. 1978. *The history of sexuality, Volume I: The will to knowledge*. London: Penguin Books.
- Foucault, M. 1991. Governmentality. In G. Burchell, C. Gordon and P. Miller (eds) *The Foucault Effect*, London: Harvester Wheatsheaf, 97–104.
- Foucault, M. 2003. *Society Must Be Defended. Lectures at the College de France, 1975-1976*. Houndmills, Basingstoke: Palgrave Macmillan.
- Foucault, M. 2007. *Security, territory, population: Lectures at the College de France, 1977-1978*. Houndmills, Basingstoke: Palgrave Macmillan.
- Foucault, M. 2008. *Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. Houndmills, Basingstoke: Palgrave Macmillan.
- Heckman, J., & Masterov, D. 2004. *Skill policies for Scotland*. Glasgow: Fraser of Allander Institute.
- Jackson, P. S. B. 2014. “The Crisis of the “Disadvantaged Child”: Poverty Research, IQ, and Muppet Diplomacy in the 1960s”. *Antipode*, 46(1) 190–208.
- James, A. & James, A. 2004. *Constructing childhood: Theory, policy and social practice*. Basingstoke and New York: Palgrave Macmillan.
- Jayawarna, D., Jones, O. & Macpherson, A. 2014. “Entrepreneurial potential: The role of human and cultural capitals.” *International Small Business Journal*; 32(8), 918–943.
- Joronen, M. 2013. Conceptualizing the new modes of state governmentality: power, violence and the ontological mono-politics of neoliberalism. *Geopolitics*, 18(2), 356–370.
- Joronen, M. 2016. ‘Death comes knocking on the roof’. Governmentalities of ethical killing during Operation Protective Edge in Gaza. *Antipode*, 48(2), 336–354.

Millei, Z. & Joronen, M. The (bio)politicization of neuroscience in Australian early years policies: fostering brain-resources as human capital. *Journal of Education Policy* (Online First) DOI: 10.1080/02680939.2016.1148780

- Joronen, M. 2016. Producing Precarity: Ill-treatment of Palestinian children under the Israeli Military Order. *Geopolitics*, doi:10.1080/14650045.2015.1123251
- Katz, C. 2008. "Childhood as spectacle: relays of anxiety and the reconfiguration of the child". *Cultural Geographies*, 15: 5–17.
- Katz, I. & Redmond, G. 2009. "Investment in early childhood in Australia: International comparisons and recent trends." *Health Sociology Review*, 18(1) 94-107.
- Lee, N. 2013. *Childhood and biopolitics. Climate change, life processes and human futures*. London & New York: Palgrave Macmillan.
- Lemke, T. 2005. *Biopolitics and Beyond: On the reception of a vital Foucauldian notion*. Frankfurt, Germany. Retrieved October 14, 2013, from http://www.biopolitica.cl/docs/Biopolitics_and_beyond.pdf
- Lemke, T 2011. From state biology to the government of life: Historical dimensions and contemporary perspectives of 'biopolitics'. *Journal of Classical Sociology* 10(4): 421–438.
- Levine, M. H. 2005 Take a Giant Step: Investing in Preschool Education In Emerging Nations. *Phi Delta Kappan*, 87(3): 196-200.
- Lowe, P., Ellie, L. & Macvarish, J. 2015. Growing better brains? Pregnancy and neuroscience discourses in English social and welfare policies. *Health, Risk & Society*, 17(1): 15-29.
- Luke, A. 1997. New narratives of human capital: Recent redirections in Australian educational policy. *Australian Educational Researcher*, 24(2) 1-21.
- MacNaughton, G. 2004. The Politics of Logic in Early Childhood Research: A Case of the Brain, Hard Facts, Trees and Rhizomes. *The Australian Educational Researcher*, 31(3): 87-104.
- Macvarish, J., Lee, E. & Lowe, P. 2015. Neuroscience and family policy: What becomes of the present? *Critical Social Policy*, 35(2): 248-269.
- Marginson, S. 1997. *Educating Australia: Government, economy and citizen since 1960*. Cambridge: Cambridge University Press.
- Millei, Z. 2008. *A genealogical study of 'the child' as the subject of pre-compulsory education in Western Australia*, Doctor of Philosophy in Education .PhD in Education, School of Education, Murdoch University, Perth, Western Australia
- Millei, Z. 2015. Governing the Brain: New narratives of human capital in early childhood education. (pp. 47-70) In T. Lightfoot & R. Peach (Eds) *Questioning the Discourses of Human Capital in Early Childhood Education: Reconceptualizing Theory, Policy and Practice*. New York: Palgrave
- Millei, Z. and Lee, L. 2007. 'Smarten up the parents': whose agendas are we serving? Governing parents and children through the Smart Population Foundation Initiative in Australia. *Contemporary Issues in Early Childhood* 8(3), 208-221.
- Miller, P. & Rose, N. 1988. "The Tavistock programme: The government of subjectivity and social life". *Sociology*, 22(2): 171-192.
- Ministerial Council for Education, Employment, Training and Youth Affairs [MCEETYA]. 2008. Melbourne Declaration on Educational Goals for Young Australians , December 2008. Retrieved from http://www.curriculum.edu.au/verve/resources/National_Declaration_on_the_Educational_Goals_for_Young_Australians.pdf
- Mitchell, K. 2009. "Pre-Black Futures." *Antipode*, 41(1) 239–261.

- Nadesan, M. H. 2002. "Engineering the entrepreneurial infant: Brain science, infant development toys, and governmentality." *Cultural Studies*. 16(3): 401-432.
- National Investment for the Early Years. 1999. National investment for the early years. Retrieved 18 May 2007, 2007, from <http://nifey.cyh.com>
- Ojakangas, M. 2005. "Impossible Dialogue on Bio-Power: Agamben and Foucault". *Foucault Studies* 2: 5-28.
- Organisation for Economic Cooperation and Development. 2001. *Starting strong: Early childhood education and care*. Paris: OECD.
- Organisation for Economic Cooperation and Development. 2006. *Starting strong II: Early childhood education and care*. Paris: OECD.
- Organisation for Economic Cooperation and Development. 2007. *Understanding the brain: The birth of a learning science*. Paris, France: OECD Publishing.
- Peters, M. 2014. "Introduction: Giorgio Agamben's Homo Sacer Project." *Educational Philosophy and Theory*, 46(4): 327-333.
- Popkewitz, T., & Bloch, M. 2001. Administering freedom: A history of the present -rescuing the parent to rescue the child for society. In K. Hultqvist & G. Dahlberg (Eds.), *Governing the child in the new millennium* (85-118). New York & London: RoutledgeFalmer.
- Productivity Commission 2014. *Childcare and Early Childhood Learning*, Inquiry Report No. 73, Canberra.
- Prout, A. 2005. *The future of childhood*. Abingdon, UK: RoutledgeFalmer.
- Rose, N. 1999. *Powers of freedom: Reframing political thought*. Cambridge, UK: Cambridge University Press
- Rose, N. & Abi-Rached, J. M. 2013. *Neuro: The new brain sciences and the management of the mind*. Princeton, NJ: Princeton University Press.
- Simons, M. 2015. "Governing education without reform: the power of the example" *Discourse: Studies in the Cultural Politics of Education*, 36(5), 712-731.
- Shonkoff, J. P., & Phillips, D. A. 2000. *From neurons to neighbourhoods: The science of early childhood development*. Washington, D.C.: National Academy Press.
- Shore, R. 1998. *Ready schools*. Washington, DC: The National Education Goals Panel.
- Stein, Z., della Chiesa, B., Hinton, C. & Fischer, K.W. 2011. Ethical issues in educational neuroscience: Raising children in a brave new world. In J. Illes and B.J. Sahakian (Eds), *Oxford handbook of neuroethics* (803-822) Oxford, UK: Oxford University Press.
- Sumsion, J., Barnes, S., Cheeseman, S., Harrison, L., Kennedy, A. M., & Stonehouse, A. 2010. "Insider perspectives on developing belonging, being and becoming: The early years learning framework for Australia." *Australasian Journal of Early Childhood*, 34(4), 4-13.
- Swadener, B. B. 1990. "Children and families "at risk:" etiology, critique and alternative paradigms." *Educational Foundations*, 4(4): 17-40.
- Taylor, S., Rizvi, F., Lingard, B., & Henry, M. 1997. *Educational policy and the politics of change*. London and New York: Routledge.

Millei, Z. & Joronen, M. The (bio)politicization of neuroscience in Australian early years policies: fostering brain-resources as human capital. *Journal of Education Policy* (Online First) DOI: 10.1080/02680939.2016.1148780

White, L. 2011. "The internationalization of early childhood education and care issues: Framing gender justice and child well-being." *Governance: An International Journal of Policy, Administration, and Institutions*, 24(2): 285–309.

Winter, P. 2010. *Neuroscience and early childhood development: Summary of selected literature and key messages for parenting*. Education Services Australia Ltd.