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A Created Adult and the Ideal Childhood: Genetic Technology, Childhood, and Class in Anne Charnock's *A Calculated Life*

Jani Ylönen

Abstract: Science fiction has discussed questions of ethics and reproduction since its birth. This article demonstrates how Anne Charnock's *A Calculated Life* (2013) contributes to these discussions by connecting questions of genetic technology and reproduction to discourses on class and childhood. The analysis of the novel demonstrates how childhood as a social construct is connected to social class and to ethical questions that carry over to the discussion on the possibilities of reproductive technology. The interaction between the protagonist, Jayna, a programmed lower-class human, and Alice, a child of middle-class privilege, shows how discourses of the past are always included in speculations about the future. The article shows how science fiction can serve as an important site for examining the prospects of new technologies by producing speculative yet concrete scenarios about imminent yet abstract technologies.

Keywords: class, genetics, technology, reproduction, science fiction

1. Introduction

The 20th century has been called "the century of the child" (Clarke 10). During the 20th century, the contemporary concept of childhood, born in middle-class homes in the 1800s, began to spread in the Western world and via globalization beyond (Austin 3; Clarke 10–11). Similarly, many critics argue that modern science fiction (henceforth SF) began as a reaction to the science and technology of the 19th century, which led to both industrialization and a reimagined concept of the middle-class. SF developed into its contemporary form and popularity

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during the latter 20th century alongside the technologization of Western society (Bould and Vint 1–2; Roberts 42). Indeed, SF can be metaphorically described as "a child of technological society" (Kupferman and Gibbons 7) whereas children have been a part of the genre's central discussions on the relationship between societies and technologies (Yaszek and Ellis 75–6; Bould and Vint 32–3, 39). SF has a vested interest in the progression of human society, and the child is seen as the figure of the future (Edelman 2–3). It is thus not surprising that the child has gained increased attention in science fiction when discussing genetic reproductive technologies and their social implications.

Whereas the 20th century has been referred to as the child, the 21st century has been depicted as "the century of the gene" (Herbrechter 28). The advances in gene technology, especially its prospective reproductive appliances, have significant potential and require extended ethical discussion (see, e.g., Braidotti 57–59; Habermas 13; Herbrechter 27–29). For example, Jürgen Habermas has argued that reproductive technologies produce ethical questions, such as those concerning the autonomy of a person, that the tradition of ethical philosophy in its current form is not equipped to discuss because the emerging possibilities for bodily modification were inconceivable until recently (13, 39). Advances in genetic technologies have also received significant attention in the media, discussing topics such as the plans for commercializing recent experiments (Pajunen), the public support for further gene sequencing (Davis), and the ethical implications of such modifications (Kahn). In addition, the creation of life and posthuman figures have received new consideration in recent years in the so-called mainstream literature. Notable examples include novels by award winning authors such as Ian McEwan's *Machines Like Me* (2019) and Kazuo Ishiguro's *Klara and the Sun* (2021). (Both authors have won the prestigious Booker Prize for Fiction while Ishiguro has also won a Nobel Prize in literature.) SF writers, however, have long shown an interest in genetic reproductive technology, well before this century's burst of attention to it. As Lisa Yaszek and Jason W. Ellis state, "SF writers have explored the mutability and multiplicity of the human condition," depicting the impact of developments in genetics on the changing conceptions of humanity (71). For example, feminist science fiction novels, such as Marge Piercy's *Woman on the Edge of Time* (1976) and Joan Slonczewski's *A Door into Ocean* (1986), have discussed the utopian potentials of alternative modes of reproduction and childcare, especially in connection to gender politics, through depictions of far-future or distant societies.

The beginning of the 20th century was not only marked by the emergence of the modern concept of childhood; it was also an age when eugenics had major influence in Western societies. As Promise F. Ejiofor argues, eugenics was largely discredited after the Second World War without abandoning one of its core tenets of improving humanity through science and technology (7–9). This tenet, as well as the possible ethical implications of genetic technology and its impact on children's autonomy, have been explored in the field of bioethics (see, e.g., Haberman; Glover). These philosophical discussions have often produced abstract and complicated arguments concerning the future of humanity, which have frequently bypassed questions of gender and class (see, e.g., Turner; Marway and Widdows). However, SF, whose importance to the examination of the contemporary human condition has been noted by numerous scholars of

posthumanism,[1] has elaborated on these questions. As I argue, SF has operated as an important site for putting these fields into conversation and for expanding the discussions on how science and technology have transformed humanity and the way humanity is perceived. As Yaszek and Ellis argue, "SF authors have shared a commitment to issues of ethics and social justice that have long haunted human society and that may be amplified by its posthuman successors" (75). Although Jèmeljan Hakemulder claims that SF and other genre fictions cannot operate as successfully as mainstream literature as "moral laboratories" – safe places to examine moral conundrums – I argue that SF offers an important site especially for examining the moral and ethical implications of genetic reproductive technologies (150). It has the potential, as Donna Haraway claims, to "braid" its readers "into beings and patterns at stake" (2–3), offering not only a laboratory but also a reminder of the unhygienic ways technology touches the world we inhabit and calls attention to it.

In this article, I demonstrate how SF depictions of childhood and genetic technology are intertwined with questions of class through an analysis of Anne Charnock's SF novel *A Calculated Life* (2013). Anne Charnock (b. 1954) is a British author who has won several accolades, including an Arthur C. Clarke Award, for her fiction. *A Calculated Life* is part of a cycle of stories along with the novella *Enclave* (2017) and the novel *Bridge 108* (2020), all of which take place in the same setting. Another novel by Charnock, *Dreams Before the Start of Time* (2017), also explores the possible implications of reproductive technology, demonstrating the author's continued interest in this question. *A Calculated Life* is set in a near-future Britain where advanced technologies such as brain implants and gene modification have become widely available. Despite these technological developments, life on the streets of Central Manchester resembles current reality, the society still operates under capitalistic economics, and the division of humans into different classes is not overcome. Charnock's fiction has been described as thematically cogent and level-headed, yet rarely "soothing" (Clute). The narrative of *A Calculated Life*, for example, calmly moves forward through everyday events most of the time, but the reader gradually becomes aware of the power inequalities and injustices that mark the world of the novel. Unlike many earlier dystopian or utopian novels, *A Calculated Life* explores both the utopian and dystopian potentials of technology in a society that is reminiscent of the 21st century, tying the speculative to the current world through a discussion on childhood and class.

A Calculated Life operates as a moral laboratory concerning genetic technology, childhood, and class. Although numerous SF stories have addressed questions of genetic reproductive technology, this novel, which has received little academic interest, brings new perspectives on the intersection of class, autonomy, and childhood to discussions on reproductive technologies' effects on humanity. Jayna, the protagonist, is grown to bodily maturity in an artificial womb to serve a specific role as a data analyst in society, and she is given both genetic and computerized augmentation to fulfill it. Her childhood, as is the case for all members of her class, is affected severely by technological advancements: She does not have identifiable parents, and she is completely denied the stage of childhood. This article focuses on a critical scene in *A*

[1] See, for example, Herbrechter, who has highlighted SF's "importance within the cultural representations of technoscientific capitalism" (114–5), as well as Vint, and Yaszek and Ellis.

Calculated Life where Jayna has the chance to examine her existence when she visits the home of her employer's middle-class family and encounters their daughter. Through close readings of this scene, I aim to demonstrate how discourses on childhood change in the face of scientific and technological developments and how these changes are tied into contemporary and historical discussions on class. In what follows, I will first introduce the existing discussions on childhood and class in SF and examine SF's potential to serve as a moral laboratory in the face of technological developments. I will then demonstrate the workings of this potential, whose connection to childhood and class has been understudied, through an analysis of Charnock's novel. Following an analysis of the novel's portrayal of an ideal childhood and its class dynamics, I will examine how the novel depicts the ethical implications of genetic reproductive technologies in connection to childhood and autonomy. Through this analysis, I will demonstrate that *A Calculated Life* acts as a moral laboratory by examining childhood from the perspective of class – a perspective that is often bypassed in discussions on the ethics of reproductive technologies.

2. Childhood, Class, and Science Fiction

The improvement of humankind through the cultivation of children has been central to the Western liberal humanist tradition (Häyry 66–67). This goal is often achieved through the improvement of education and parenthood to enhance the overall quality of childhood. However, as John Clarke argues, the current idea of childhood has only developed in the recent centuries (3). According to Clarke, the idea of childhood began to take shape in Western societies in the 16th century with the rise of the middle-classes and their emphasis on the family, and it continued to be associated with the middle-classes until the 19th century (3–8). Indeed, as Erica Burman and Jackie Stacey highlight in reference to earlier studies, "the model of child development inscribes an ideal-typical white, middle-class childhood that is also culturally masculine – as indicated by the normative developmental trajectory from irrationality to rationality and from dependence to independence and autonomy" (230). As such, childhood, a concept often associated with innocence, is steeped in ideologies and structures of power.

The figure of the child in this developmental trajectory was long seen as an object of attention. The Romantic ideal emphasized the innocence and purity of the child, and only since the end of the 19th century have children been envisioned more as "autonomous beings rather than mere extensions of patriarchal family" (Austin 3). Indeed, children are often conceived as possible victims who historically have needed the protection of patriarchs, adults, institutions, state, and, recently, science (Clarke 9–11; Burman 180). The conception of "the child as 'a competent social actor'" received further boost as recently as 1989 in the United Nations Convention on the Rights of the Child. Since then, the child and childhood have received increased attention, especially in the social sciences. Claudia Castañeda has discussed the innate embodied mutability of children, their potential as agents of change, and their centrality to social concerns (2–6). Furthermore, as Lee Edelman argues, concerns about the wellbeing of children are often used to uphold social policies, especially those connected to heteronormativity (2–4). In this

discourse on childhood, the child becomes a representative of current political choices and their endurance in the future. As the advances in reproductive technologies have complicated the question of what is artificial and what is not, SF has become increasingly more engaged with technology's impact on childhood. While historically the discussion on the creation of beings has centered more on entities such as robots, children have also been used to express concerns over both technological progress and societal development. SF has, for example, discussed the mutations caused by technology, environmental hazards, and the fears that societies might express against such mutated children (Yaszek and Ellis 75–6). However, few technologies, whether fictional or real, have had as fundamental and direct an effect on children as genetic and reproductive technologies.

Scholars such as Istvan Csicsery-Ronay Jr. have criticized SF for upholding historically the narrative of science as a problem-solving force at the forefront of the continuous improvement of humanity (112). Similarly, scholar and author Joanna Russ has criticized SF's unquestioning emphasis on "white, middle-class suburbia" (81). However, SF has also acted as a critique of scientific narratives and technological advancements; it has drawn attention to matters such as the connections between "global capitalism and exploitative class systems" (Csicsery-Ronay 4, Melzer 13). The critique of science has also addressed technologies concerning the creation of life as well as questions of class and other intersections of identity. As Mark Bould and Sherryl Vint summarize, "SF's fascination with artificial beings … often articulates an interest in questions of class, race, gender and sexuality" (39). SF's discussion of science and technology often intersects with class, and as *A Calculated Life* demonstrates, reproductive technology is no exception.

While in fields such as bioethics discussions on reproductive technologies have, until recently, mostly remained on a purely philosophical level, bioethics has also been criticized for its disconnect with questions of class. Turner has even argued that "the literature of bioethics seemed dominated by middle-class preoccupations and fears" (374). While bioethicist Evie Kendal acknowledges that SF has been used to promote such class-connected fears of technology in bioethics, she argues that SF has a unique potential to contribute critical forms of "engagement with existing social structures" to bioethics and philosophy through careful literary analyses. SF has speculated on the ethics of reproductive technologies not only in connection to childhood in general but also on the level of individual experiences. As such, SF has developed into, what Csicsery-Ronay describes as, an "immanent possibility (perhaps even the inexorability) of those transformations, and reflection about their possible ethical, social, and spiritual consequences" (3). In the case of gene technology and childhood, SF has continued the tradition, as Neil Easterbrook argues, of exploring "ethical moments" when "technological change alters the moral relationships and traditions" (386). In her depiction of genetic and reproductive technologies, the moral laboratory offered by Anne Charnock's *A Calculated Life* allows for an examination of moral questions such as the right to childhood, which are impacted by technological developments and may remain hidden until technology discloses them.

3.0. *A Calculated Life* and the Ideal Middle-Class Childhood

In *A Calculated Life*, the class system is prominently based on technology as the society is divided into three classes with distinct living spaces and jobs according to the level of technological modifications. The first class is "the bionics," who are genetically inoculated against afflictions such as addictions and receive a brain implant when they reach adulthood. The second class is "the simulants," who are genetically designed (not merely modified) and receive an implant at conception. The third class is "the organics," who are inoculated against afflictions but do not receive a brain implant. They are therefore confined to menial labor and to living in ghetto-like communities with no chance to progress further. This article will concentrate on the first two classes, "the simulants" and "the bionics," which are more explicitly connected to questions of childhood in the novel.[2]

Philosophical discussions on childhood have historically deemed it a necessary stage in human life that cannot be bypassed on route to an adult[3] human. Yet in SF, the possibility of bypassing childhood has been present at least since the early conceptions of reproductive sciences.[4] In *A Calculated Life*, Jayna, the protagonist, does not experience childhood and is released from the artificial womb when she reaches physical adulthood. She is, however, interested in exploring her origins by examining a catalog description:

> *Simulant Operative Version CS12.01.*
> *Maker: Constructor Holdings plc.*
> *Product description: Biological simulant, grown in vitro from a genetic master-type characterized by prodigious analytical attributes. Widespread additional genetic interventions. Extensive bionic cognitive implants.*
> (Charnock 20, italics in original)

The excerpt describes the class[5] that Jayna belongs to – "the simulants," who are the most modified of the three classes in the novel's society. This does not, however, mean that the simulants are more privileged than other modified beings. In fact, it means just the opposite. Jayna and her kind have been created by their maker company as adults and leased to institutions and enterprises to fulfill specific needs. They serve in menial jobs that require certain types of

[2] In the novel, "organic" children only appear running past the main character in the streets of the ghetto-like communities. For further discussion on them, another book in the cycle, *Bridge 108*, would be more suitable for analysis. For further discussion on simulants and organics in *A Calculated Life*, as well as the interconnections of life, capital, and biopolitics in the novel, see Vint.

[3] As Deborah Durham argues, *adult* as a concept is also historically and culturally changing and connected to class (3). Durham further discusses the concepts of "social adulthood" and "biological adulthood" (4), of which Jayna in a sense is a paradoxical combination: She has been created physically to fit the cultural conception of biological adulthood but without the lived life of social adulthood.

[4] The creation of life and adult beings without a connection to scientific theory, of course, precedes SF in myths and legends (see, e.g., Graham).

[5] Creating new social classes via genetic reproductive technologies for specific purposes is not rare in SF. Recent examples include Ian McDonald's *River of Gods* (2004), Richard Morgan's *Black Man* (2007), Paolo Bacigalupi's *The Windup Girl* (2009), and N.K. Jemisin's *The Stone Sky* (2017).

expertise, such as Jayna's skill in analyzing large amounts of data. After their workdays, they are housed by the companies in special stations where they are monitored and have limited access to personal belongings or social activities.

Jayna has a chance to glimpse the life of another class when she visits her employer Benjamin's home. Benjamin and his family are "bionics," who, like organics, are protected from afflictions, but they also gain access to a brain implant at the age of eighteen. These implants are described in the novel not as enhancements to brain capacity but as status symbols that enable their recipients to work in offices and similar middle-class environments. Such suburban living areas in the novel are defined more by security and comfort than by control or containment. By allowing instant connection to knowledge and to the ability to process it, technological modifications also take the place of education in the construction of class. As Vincent and Ball argue, middle-classes have used education to uphold the separation between them and the working class both physically and socially (5, 11). Now technology determines the lifestyles of both classes as only those of a certain stature receive the required level of modifications to work and live in middle-class areas. Although Carol Vincent and Stephen J. Ball describe the shared features of the middle class in the 21st century as "fuzzy," i.e. difficult to define, in the novel these features are clear to everyone (53).

Jayna's visit to the middle-class suburbs,[6] which are separate from the business center areas and the crowded blocks where the simulants and the organics live respectively, allows Jayna to observe the family's space as well as their life. Her main interest, however, falls on the family's child, Alice, whose first appearance underlines her different access to both technology and childhood:

> Benjamin's wife and daughter arrived in the hallway, laughing – the young girl half walking, half sliding over the wooden floor – Jayna glimpsed an intimacy, just momentarily, that they now surrendered … the introductions were interrupted by scuffling noises of five White Terriers slid into the hallway, falling over one another. Alice Shrieked with laughter … She knelt down and the dogs jumped around her. "Go to sleep," she said to them. And they vanished. (Charnock 127)

Her first glimpse of Alice is in a playful, happy mode, and while restricted by the presence of a guest, Alice is free to glide and shriek instead of following the guidelines of adult behavior. She also has quite sophisticated toys, far beyond what Jayna could afford with her meager allowance. Alice is the owner and controller of holographic pets and thus has agency over these lifelike beings, just like Benjamin has agency over Jayna. She certainly has a chance to play with her toys and enjoy them. Through the contrast between Alice and Jayna, the text does not only deem certain technologies affordable by select members of the society, but it also highlights play as an activity available only to people of affluence. Childhood, and play as an integral part of it, is thus marked as the

[6] A suburb that is reminiscent of the pictures of middle-class American suburbs in the 1950s. Durham claims that the idealized form of adulthood as an object of modern nostalgia only truly existed in that limited cultural and temporal frame of the 1950s suburb (3). Jayna therefore confronts not only the ideal of childhood but also of middle-class adulthood, both of which are denied her.

property of bionics, that is, the middle-class of the novel's society. This emphasis on class dovetails the historical development of the idea of childhood, which was first introduced to middle-class homes as an ideal in the 1600s and from there spread to other segments of the society starting in the 1800s (Clarke 8–9).

Despite the clear advances in technology, the society of the novel has degenerated in comparison to the 20th century, "the century of the child" (Clarke 10–11), as children's rights seem to be limited to fewer individuals than before, at least in Manchester. Of course, the ideal was not available to all even during the 20th century. Consider, for example, racialized and immigrant children of working-class backgrounds, to whom the novel's simulants have an allegorical connection. Working-class families' decision to immigrate is often guided by the search for an idealized childhood for their children, unavailable to them in their former homes. The children of such families may paradoxically experience a "lost childhood," if the harsh conditions of immigration lead to the loss of safety associated with parental care or expose the children to work and exploitative circumstances at an early age (Horton 2008, 929–931). Simulants who have no parents and are used as work instruments to fulfill certain tasks immediately after gaining consciousness share similarities with immigrant children as individuals who are denied childhood. Immigrant children, like many racialized children, often also lack the reassurance of a safe future. Emily Ashton argues that the aforementioned "Edelman's Child," which signifies the child as an emblem for future hopes and fears, "is a privileged figure endowed with assurances of a future that are denied to racialized children" (15). Ashton also demonstrates how racialization has often been connected to a lack of innocence, which is further used to exclude some from the category of childhood or the protective ideals connected to it (15–16). Jayna, for one, does not even have the agency to choose play as she has been created as an adult. Her agency concerning childhood is not merely limited like Alice's by courtesy to guests; it is completely removed. Jayna's case depicts an extreme removal of agency, comparable to the worst of Habermas's fears of genetic modifications as "encroachment on a child's ethical freedom" (13, 33).

Jayna has no experience of a childhood or even youth but only knows what has been installed in her and her subsequent experiences. Similarly, she has no real conception of her origins or parents, which she expands on when Alice leaves the room and Jayna is left talking with Benjamin's wife, Evelyn:

> Don't forget, there are born-humans who don't live with their biological parents. Just like them, I don't know my origins. The main difference for me is that my genetic make-up is derived from so many sources that I probably have hundreds of parents. You see, Evelyn, the master-type is the closest I have to a parent. My master-type would be someone with analytical prowess. That basic coding is then heavily modified. But I don't know if my specific master-type was a man or a woman. Basically, it would be impossible for anyone like me to be born from two parents. (Charnock 132–3)

As she states, it would be impossible for her to pinpoint, even with her superior analytical abilities, her biological parents. The closest in theory would be the scientists who oversaw the modification of her DNA. She could therefore be seen as part of a long tradition of scientists creating life in SF, where science is the father instead of the parents, and her creation is more of a group effort than

that of a couple (Lie 178–180).[7] Perhaps like those scientists, she appears to approach her origins with calmness and a detached logic. This is, of course, the ability that has been scientifically nurtured in her during the creation process. The scientists have not only denied her agency, childhood, and play but also programmed how she should approach these losses.

As Jayna realizes, Alice's creation was a significantly different process, one where chance played a greater role.

> She realized that Alice could have been a different child. She might have never existed; a boy child could be here in this room if Benjamin and Evelyn had conceived the child a few minutes later, or earlier … She imagined the room full of Alice's unrealized siblings and looked for similarities, trying to read character traits in their faces … How would you choose, if you had to? … How did they cope with such vulnerability? (131)

While Alice has already had inoculations and modifications, her creation is almost chaotic compared to Jayna's. Jayna's creation is the result of engineering from hundreds of sources while Alice is still mostly created through classical methods via hundreds of coincidences. Alice is an example of the mutability of children, their unpredictable nature and potential, which is often in contrast with "adult desires and projections" (Castañeda 2–3). Of course, there are the inoculations and other genetic enhancements that have been given to Alice, but not at the same scale as Jayna's modifications. Zygmunt Bauman discusses how having children is a jump "headlong into uncharted waters of unfathomable depth" – an obligation with unknown consequences. Such uncertainty is uncommon in modern societies where most consumption choices are controlled – consumers know what they get for their money (43). Science might help make Alice a less risky investment since she is unlikely to die of diseases, but there is still much unknown about her, especially when compared to Jayna. However, thanks to the modifications, her parents can hope with a higher probability to enjoy, what Bauman describes as, "the kinds of joys no other object of consumption, however ingenious or sophisticated, can offer" (42). Jayna has no parents, but the decision over her has been made by society and the companies instead. They have taken few risks, bypassing as much as possible the mutability and contingency underlying the conception of children.

Mutability may not be what the parents want, but like childhood, it is a privilege that only middle-class children like Alice have whereas Jayna's precise design assigns her a lower class and denies her a childhood. In her analysis of Charnock's *Dreams before the Start of Time* (2018), which also problematizes reproductive technologies, Anna McFarlane critiques the novel for offering a nostalgic view of a middle-class unaffected by technological changes (39). While in *A Calculated Life*, the depiction of the family in Benjamin's home certainly paints an idealized and middle-class picture, Jayna's perspective provides what McFarlane calls for: a critical examination of how reproductive technologies might create inequality. In this sense, this earlier novel by Charnock is more successful in asking the question that McFarlane suggested

[7] A seminal example where scholars have analyzed how science or a male scientist is seen as a father figure is Mary Shelley's *Frankenstein; or, the Modern Prometheus* (1818) (see, for example, Schmeink), which is often seen as the first modern SF novel (Roberts 42).

each utopia should ask: "Who does it exclude? (38)" The answer in *A Calculated Life* is everyone who does not belong to the middle-class.

3.1. Acclimation through Play, Autonomy by Choice

After introductions and observing Alice with her parents and conversing with their adult guests, Jayna has another chance to observe Alice during play. Marleena Mustola and Sanna Karkulehto discuss how "children … are always positioned as 'others' in a world where the adult perspective is the perpetual default" (125). In a sense, Jayna, due to her creation, has the opportunity to observe the children not from this adult perspective but from a positionality between adulthood and childhood. While all the parents are inside, Jayna wanders to the yard, where she observes a game the children play. The game is connected to the adult world and the world of commerce Jayna herself is a part of. The children seem to have chosen this theme themselves as perhaps they might choose their careers later. In the game, ordinary matter found on the yard receives abstract values and turns into objects of trade, much like the goods, stocks, and money the parents work with. The children do not perhaps see the connection but Jayna, from her liminal position between the two worlds, does:

> Jayna gazed around the small group of children fixed in their fantasy world of inanimate and deadly treasures. The rules of the game were shockingly free of any moral base … Did they think the world operated like this? Was this their attempt to emulate the adult arena in which some people did well and others did not? (Charnock 138)

The middle-class neighborhood provides a site for play, one of commerce. The area, seemingly with no businesses, stores, or people of other classes, is completely removed from public life and other children with less privilege. Michael G. Wyness highlights how during the 19th and 20th centuries the ideal of childhood moved towards children who are protected from the public until they are ready to join it in youth or even in adulthood (96–7). Alice and her friends certainly live in such a protective circle upheld by the modifications they already have and the ones they will receive in the future. While Jayna has been designed by scientists, who simply ran a short diagnostic before sending her to the public realm to work, Alice and her friends can first explore this world privately through play.

Jonathan Glover discusses how decisions concerning genetic technology and pre-natal modifications made for children limit their later autonomy as well, recalling what Feinberg calls "the right to an open future" (69–70). This idea ties into Ejiofor's discussion on how liberal eugenics, where parents make the reproductive choices as an expression of their autonomy, is seen as "conducive to human progress," especially in comparison to the older, disreputable form of eugenics (7). Ejiofor, however, argues that the results may nevertheless "exacerbate social divisions, marginalize different social groups, and engender homogeneity" (6). This is certainly true when comparing Alice and Jayna. Even though Alice is also modified prenatally to a certain extent, unlike Jayna, she at least has a chance to decide what she does with those modifications. Her future is still open, but Jayna's is closed. It is Alice's privilege

to choose how technology affects her future. Jayna, by contrast, has no past, no real future, and only a precarious present that can be taken away by the company that produced her or by Alice's father. Though it can be argued that both are affected by what Ejiofor discusses as another result of prenatal genetic modifications –undermining the autonomy of a person to participate in liberal society – one has no autonomy while the other's is only hampered (6). Because of her origins in her middle-class parents, Benjamin and Evelyn, Alice is the only one who can enjoy the advances of technology and has agency over them. Through her, both technology and the chance for an open future become issues of class.

Even if Alice is unlikely to be aware of the privilege she lives with and how this affects her future, she is aware, to a certain extent, of her freedom:

> Jayna … ventured another question: "Do you know what you want to be when you grow up?"
>
> It was Alice's reply to this second question that made her jealous: "I'm only *eight* years old." (142)

Jayna is jealous because she has never been eight years old. She will never have her future ahead of her or be unaware of what kind of future is expected of her. Unlike the ideal child, Jayna is not allowed this freedom and will never experience this aspect of life (Wyness 9–10). Researchers often discuss play as a modern social construct that is seen as an important part of how children's growth is connected to the growth of their social and emotional abilities (Wyness 9–10). Yet, Jayna is left without a chance to participate not only in play but also in the social growth and freedoms that come with it.

Whereas Alice and her family represent the middle-class ideal of family life that, as Clarke (2–6, 10–11) and Austin (3) argue, began to evolve during the modern era, Jayna represents a return to the earlier period in which childhood as we know did not exist. However, it is not merely the concept of childhood that is missing from Jayna's life but the lived period itself. In *A Calculated Life*, childhood is represented as a privilege and, to paraphrase Edelman, Alice is its "emblem" (4). Edelman discusses how social policies are built around the idea that the protection of reproduction, the figure of a future child, is regarded as having "unquestioned value" (2–4). The social policies protecting Alice are not directly discussed, but they are certainly visible in the lack of policies protecting Jayna's childhood and life in general. Certainly, some present policies, such as the ones agreed to at the Convention on the Rights of Children in 1989 (UNICEF), would include Jayna in the ideal that all humans should have the right to a balanced childhood.

Although Jayna is aware that she did not have a childhood and her rights as a human are limited, only through observing Alice does she realize the connection between the two: She was denied her right to childhood and her rights as a child. Jayna, though in existence for a shorter time than Alice, is much more aware of their differences:

> So, Alice was a much-loved child, free to play games with no concerns for the future. Jayna, though, surmised a wider narrative. This young girl was unaware that her parents were already watching for the tiniest signs of her natural talents, which they would nurture. And they would assist Alice in realizing her talents as she entered adult life so that, over the subsequent years, the rewards of professional success would fall into her lap as naturally as a fallen branch followed a watercourse to the open seas … Jayna recalled [a saying], quite puerile now that she considered it: *What you've never had, you'll never miss*. (142)

Due to the manipulation of her nature, Jayna has been denied the opportunity of being nurtured. What Jayna sees in Alice is what she has missed: the nurture, the possibilities, a childhood, and a future. All of these elements that are tied together in social life were denied to her from the very start due to the class she was created in – the simulants. As Kinga Földváry claims, a child is "often employed as an embodiment of development (or the lack of thereof) and can thus be seen as central to any creative or critical discussion of the future of humanity as well" (211). Alice and Jayna, as representatives of childhood and the lack of childhood, are thus at the center of this novel's discussion of the future of humanity, and they remind the reader of the possible ethical implications of genetic technology. One such ethnical implication, which I have examined in this article, concerns the impact of technological developments – whether utopian or dystopian – on class relations. Focusing solely on Alice or Jayna could not account for the structures of childhood that a comparative study focusing on their interactions allows us to assess. Alice highlights Jayna's lack of privilege, and without Jayna, Alice would remain, to refer to Edelman, almost a fantasy of a child instead of a depiction of privilege (2–4).

4. Conclusion

A Calculated Life calmly depicts an extreme possibility of how the future of humanity might progress and the ethical implications of technological advancements that render such progress possible. Instead of the humanist belief in constant progress led by scientific developments, the novel maintains that no future is free from the past. In addition, the text reminds us that childhood, as we know it, is only a recent development that spread from middle-class homes to the wider Western society at a time when eugenics was a widely accepted method of improving the future of humanity. It is plausible that such a method becomes relevant once more. Though the liberal eugenics of the novel has removed many afflictions, it has also been used to marginalize and create divisions (see, e.g., Ejiofor). Certainly for Jayna, the eugenics are liberal only insofar as she is a product of a liberal, capitalistic system. Reproductive technology has removed unwanted afflictions, such as addictions and diseases, but it now also determines one's social class.

In the narrative of *A Calculated Life*, human rights have become a privilege, just as some bioethicists have feared. Jayna is an extreme example of the fear of prenatal modification, which leads to the recipient's alienation from society and loss of autonomy (see, e.g., Habermas; Glover). Through the juxtaposition of Jayna and Alice, the novel however adds questions of class to this conversation, an absence for which bioethics have been criticized (see, e.g.,

Turner; Marway and Widdows). Some of this criticism was made when a widely visible sector of bioethics was concerned with discussing futuristic genetic modifications instead of the inequalities that occur in everyday medical care. Indubitably, if the discussion has moved to this territory in the world of the novel, it has not stopped the inequalities from becoming an integral part of this stage of gene technology, as Alice and Jayna present. Alice is a middle-class preoccupation of her parents and of the society with access to all possible technologies, while Jayna's inequality is determined by technology. The modern ideal of children was born among the middle-classes, and their control over technology has made them the only ones who can achieve this ideal. As such, in the novel, Alice is an emblem and a figure of the middle-classes. She has all the rights available to children as well as the future of possibilities that comes with those rights. Meanwhile, the oppression of simulants is easier when they have never been children or experienced play – this lack of childhood has been used to justify the poor treatment of marginalized groups historically and even today. Of course, the possibility of an allegorical reading should not be dismissed, but the direct message is just as important: The discourses unaddressed today can be used to justify an unjust future. A childhood that is made available only to select classes would certainly be the most significant change in the conception of childhood yet.

A Calculated Life reminds the reader that class may still play an important role in future societies. As the story illustrates, despite the technological and scientific advances in society, economic inequality continues to grow. SF can often be used to explore these borders between equality and technology. It can operate, as Hakemulder claims is possible for some literature, as "a moral laboratory" for the exploration of ethical issues (150). However, although Hakemulder made clinical trials with universal and abstract ethical ideas, the questions posed by *A Calculated Life* create a more embodied and affective moral laboratory. By turning abstract ethical questions about the future of humanity into something affective, SF does not only popularize discussions on the ethnics of technology but also offers new perspectives on them. *A Calculated Life* thus creates a tangible space for the examination of technology's ethical implications whereas philosophy might fail by simply pointing at connections between abstract ideas and earlier discourses. When Jayna and Alice meet, it is not only a meeting of two characters who are affected by the same technologies with widely different consequences but also a meeting of various ethical discussions and disciplines. Acknowledging these discussions should remind us not to examine technology as a producer of, what Haraway calls, "technofixes" that will solve problems without careful ethical examination. We should be careful not to approach speculative science fact and fiction as forms of "abstract futurism" that only lead to "sublime indifference" (3–4). Ethical examinations need to be followed by ethical actions.

As my analysis of Anna Charnock's *A Calculated Life* has shown, children are seminal to discussions on the future and the ethical implications of technology. Who else would better reflect, as Földváry considers, anxieties concerning the future (207)? Children are used to justify past actions as the ones who need protecting in the present and in the future. The choices made for Jayna and Alice may be in the past, but these choices are made only to protect the present and the future of Alice. Jayna and Alice represent the duality underlying discussions on reproductive and genetic technologies: The former,

whose earlier story is defined by markets and scientists, has no past, a limited present, and an unlikely future, whereas the latter, whose past is defined by her parents and their choices, has a free present and an open future. Children are harbingers and heralds of possible futures. In addition, if we agree with Castañeda about the mutability of children (2–3), Alice and Jayna are in many ways also posthuman since unlike most children today, they have been modified via technological means. Children evolve in strong interaction with their environments, as even the humanist theorists who conceptualized the ideals of childhood would agree, but their future – what they become – cannot be fully controlled. This unpredictability makes children an important topic of discussion for posthumanism, a continued concern for bioethics and a worthy source of speculations for SF.

Biography: Jani Ylönen is a Ph.D. candidate at the University of Jyväskylä. His dissertation examines questions of ethics, class, and gender concerning reproductive genetic technology in contemporary science fiction literature. This article is the third one to be published of his four-article dissertation. The first article, "Negotiations about Reproduction by Domestic Tables – Space, Gender, and Genetic Technology in Ian McDonald's *River of Gods* (2004) and Ken MacLeod's *Intrusion* (2012)," was published in the edited volume, *Populating the Future: Families and Reproduction in Speculative Fiction*, by Gävle University Press in 2023. The second, "I Was Filled with Horror at the Blind Imperative of Biology": Genetically Modified Children, Responsibility, and Autonomy in Ian McDonalds's 'Vishnu at the Cat Circus'," is under consideration for the journal *Extrapolation*. The final article-in-progress will discuss genetically induced infertility and designed classes in SF, concentrating on N.K. Jemisin's *The Stone Sky* (2017). For more information, contact jani.m.ylonen@jyu.fi

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