

Title: How Toy Design Contributes to Overpopulation

Name: Sivan Schechner

Student Number: 2004529

Course: Product and Furniture Design (BSc)

Word Count: 4515

Tutor: Matthew Archer

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Introduction

This essay aims to find potential solutions to government-enforced population control through design. Enabling citizens to make informed decisions through family planning without coercion. This dissertation starts by looking at the apprehension of overpopulation, previous government actions and consequences. From this we look at studies from various countries on the effects education has had on birth rates. Understanding correlations between birth rates and education, I hope to open areas that designers can target to help stabilise birth rates without government coercion.

Population and Government

The human population has been a controversial topic for the past two centuries; over time, these problems have escalated and declined but have always been present when fluctuating. This chapter will look at the history of debating overpopulation, the results of these debates, and the following consequences.

The book, 'Building the Population Bomb' (Merchant, 2021), shows the initial concerns of overpopulation, where resources and food supply are insufficient to meet the growing population. While the alternative, population decline, was seen as a political weakness and a concern for the economy. These arguments were then used as political propaganda to promote fascist ideals—including eugenics by many 19th and 20th-century scientists, including Pearl, and later used by the Nazi government to promote an Aryan race.

The book follows the theme of people's conceptions of overpopulation and the various governing parties that have deceived their citizens, placing blame on targeted minorities. Chapter 6 shows the UN's funding and advertising campaign to bombard the western population with scare tactics to

instil family planning in the growing population. These government-funded adverts were instrumental in projecting blame on those deemed of little quality to the government.

The book shows examples of political abuse and misconceptions used by governments. They used population to scare civilians into agreeing to policies that often target minorities, unwanted by the specific political parties. These actions caused ethnocentrism and economic discrimination, eventually giving power to the ideals of a superior race.

Emily's work shows the cause and effects the topic of demography has had on a concerned government. This essay hopes to create a discrimination-free solution to these problems, removing the fear factor used in governments.

5.408 million (2021)

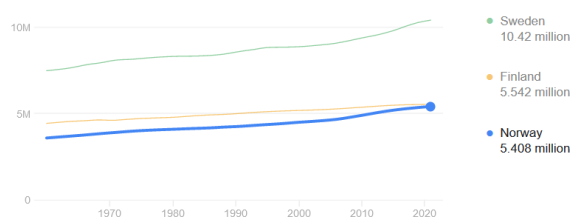


Figure 1. Scandinavian population.
1960-2021 (World Bank, 2021)

1.412 billion (2021)

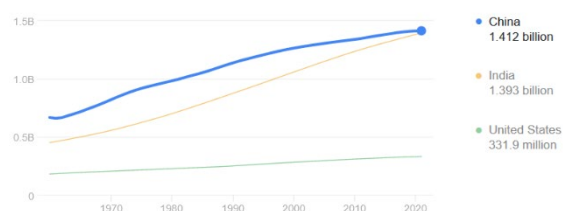


Figure 2. China, India, USA population.
1960-2021 (World Bank, 2021)

Alternatively, countries with declining birth rates have created favorable policies in hopes of increasing birth rates. These policies include family allowances, maternal leave, and baby bonuses to name a few (United Nations, 2017). Nordic countries are among this cohort, their historically stable growth has allowed the pronatalist policies and government funding to working mothers and children. These policies are suggested to be one of the critical reasons for their fertility replacement level, being around 2.0 children per woman in the 70s. Figure 1 shows a very stable increase for Finland and Norway; much of the observed increase is in life expectancy.

Further factors for the Scandinavian country's population stability come from social and gender equality policies. This gender equality translates into fertility, as both the father and mother are obliged to engage in caregiving roles during the child's development stages. There have been arguments that these stable countries could pose a risk to collapse if fertility rates continue dropping. A study to dispute this was done and found that this is mainly due to increasing childlessness and later-age pregnancies, which are considered childbearing after 30 years old. This study recognises that the recent decline is possible due to gender equality, increasing the fathers' responsibilities, and reductions or abolishment in cash-for-care policies (Hellstrand, et al., 2021).

Comparing Figures 1 and 2, the general method used by Scandinavian countries has shown a more modest and predictable population growth. Their policies have created solutions to family planning, encouraging and enforcing gender equality. This is one of the most significant factors that set them apart from the countries in figure 2. China has created a 'Three Child Policy', and the child-rearing costs are left to the family or single mothers (Gao & Li, 2021). Similar policies in India leave mothers relying on family for child support, which has led to India contributing to the most significant number of child deaths and malnourished children worldwide (Raman, et al., 2014). India's state of population tragedies creates a problematic argument, when would government childbirth control policies be a better alternative?

Previous solutions to overpopulation include China's 1979 'One Child Policy'. The policy was enforced to create economic strength in the country. This strategy contrasts with the early western views in 'Building the Population Bomb'; a population decline was seen as an economic strain. Both of these arguments had a degree of validity. An unbalanced ratio of retirees to those employed could create financial instability, especially in the early ages of technology. It could pose challenges in providing resources to the disproportionate number of pensioners. Today, China is facing this unbalance in pensioners and employed. Due to their legal policies from 1979 to 2016 Chinese civilians are at risk of aging without social security.

'Only One Child' argues the effectiveness of China's 'One Child Policy', and the trauma it inflicted on its people. The 1st Chairman of the People's Republic of China, Mao Zedong, discussed that education and population were linked. Moreover, when they can increase the education of their people, it will increase their practice of birth control and family planning. In the same 1958 campaign, the 'Great Leap Forward', Mao praised the sizeable Chinese population. Stating he previously believed they could manage 800 million, but now he believes China could support 1 billion. He believed that population would solve any problems that arose, as there would be more people to create solutions to these emerging problems (Greenhalgh, 2008, p. 58). Twelve years later, Mao would change his mind, believing that the Chinese population was too numerous, writing a report in 1974 about intermittent population control.

It is evident through reading the documented events of Maos' discussion of China, recited in Greenhalgh's book, that governing population through enforcement has not been effective. They are often swaying from one extreme to another and creating economic stress and the stress of the country's citizens. This book was written before the denouncing of the One Child Policy; the effects of a hasty reduction of fertility were seen over a decade prior to the policies termination. Maos' contradiction of population views also shows that demography is incredibly hard to predict and control through legal enforcement. Even many modern population predictions have been remarkably inaccurate.

The United Nations World Population Prospects have been published since 1951. The estimates of the world population are revised every two years. Prospects report from the year 2000 estimated a population of 8 billion by the year 2050, while its current population was 4.9 billion (United Nations, 2001). They were adjusted in their 2022 study, the key messages estimated, "The world's population is projected to reach 8 billion on 15 November 2022". Furthermore, their prediction for the year 2050 grew to 10.4 billion (United Nations, 2022).

This demonstrates the current unpredictable nature of the population. An estimated change of 2.4 billion people which is an increase of 30% from the previous prediction. These adjustments are significant; in the 22 years, around one generation, we reached the estimated population in almost half the predicted time.

Educations effect on birth rates

Mao mentioned that when the cause is to increase people's education, the effect is family planning. If this is true, why did China create its 1979 policy? This section is dedicated to testing this theory by engaging in several studies on education and birth rates.

A recent Chinese study shows female education's effects on fertility (Chen & Guo, 2022). The study uses data from the 2010 Chinese Census of women aged 15 and above and regional child enrolment in high school. Then made comparisons to the birth rate in women, where there are compulsory schooling laws in each region. The study found that increased women's education permanently reduces fertility.

This study creates a strong argument for female education and its effects on influencing child control. At the same time, the study considers the One Child Policy that was in action during this period. They mention it was during the period the government relaxed the policy. To be sure this doesn't obscure the results, surveys from other countries without birth rate laws should be examined.

Researchers also observed the history of French gender-specific choice from the mid-19th-century to early 20th-century, where the social standards for both genders differed. The paper concluded that these differences effects of female education and fertility. A key point was women's human capital potential: "Girls invest more in their own education and limit their fertility because of a greater

opportunity cost of having children". The study also showed that areas investing in female literature showed a lower birth rate (Diebolt, et al., 2021).

This contributes to the validity of Chen and Guo's research. Equality in education appears to have a profound influence on female birth rates. Furthermore, when a female can provide their own capital, instead of relying on older systems of marriage and husband for financial support, they focus on education first, creating greater opportunity. These articles have both focused on the mother's education; it would appear to be a more extensive matter of equality in education rather than education itself. Does fathers' education pose significant value to the birth rate of the mothers?

An Indonesian study suggests that there is little value in the father's schooling (Breierova & Duflo, 2004). Their study looked at school construction programs from 1973 to 1978 and compared that to the age gap between mother and father. In cases where the father was older than the mother, they were likely to miss out on the education that the state provided in the construction scheme, and vice versa. This was due to them being past the enrolment age upon the schools opening. Concluding that female education mattered significantly more, especially in a number of children born while the mother's age was 15-25. Also, strengthening the previous studies further, stating that education for women leads to lower births per mother.

Studies that have researched education and birth rates agree that schooling affects fertility. These women who receive an education, earn higher wages and have fewer children. Having fewer children is also more affordable, allowing these children a higher quality of life and governments less likely to impose sanctions. While governments may take away rights to bear children or create a child cap, it is far less likely, and far more unethical to create policies creating a minimum requirement of births per woman. Instead, the government's only capability is to provide each child with higher, more affordable care. Such as free education, more outstanding medical care, and financial services; here the benefits of underpopulation, far outweigh the impact overpopulation poses not only to freedom, but to the well-being of civilization.

As mentioned in the previous paragraph, How do educated mothers affect their children through their development stages?

Many of these studies mention the child Quality-Quantity argument of Becker and Lewis. Their argument proposes that parents can invest heavily in fewer children, creating children of 'higher quality' or having more children, where investment per child is diminished. While increased education of mothers often produces increased quality of children and decreased quantity (Becker & Lewis, 1973).

The research indicates that education is fundamental for people to create informed decisions. Educated mothers are shown to create educated children and children of 'quality'. A cycle is then formed where the generations of offspring from these educated and successful women follow in similar steps. This article is highly theoretical, and while important and interesting to the topic, especially when determining the cost of raising a child in the current day, Becker and Lewis do not take part in a field study.

To back up Becker and Lewis's theory of the 'Quantity and Quality of Children'. A study of a book containing 30 mother and daughter interviews. All mothers had professional managerial roles and were highly educated. This book, 'Like mother, like daughter', separately interviews the daughters. A common theme was attributing their early success to their mother's influence (Armstrong, 2017).

While many countries are experiencing slowing birth-rates, likely due to the changes in education systems placed over the past century, what can we do to help further the progress without creating the need for greater government policies? While children with educated mothers are born with a role model, how can we pass on this figure to children without? There is one area that has not caught up with recent modernization trends in equality. This area is toys for children.

Toys and Education

Roland Barthes, a French philosopher wrote a book of short essays titled 'Mythologies'. These essays look at the social values in France at that time and discussing the semiotics of these values. One of these essays, translates to 'Toys'. Barthes describes toys as reflections of objects or social norms in the adult world. He names toy soldiers and transport such as toy train sets. He discusses how girls' toys are dolls, mentioning ones that specifically urinate and you need to change their diaper. He shows this as a form of conditioning girls for their roles as mother (Barthes, 1957).

These points are well-spoken, and while times have moved on in society from the writing of Mythologies in 1957, toys have not. In fact, Baby Alive doll is one that also requires nappy changing, and is available to buy today. The toy comes with reusable food and a mould where you create snacks. Hasbro's 'Baby Alive' doll may have changed slightly; the webpage claims the doll is a "gift for girls and boys" (Hasbro, 2022). Nevertheless, out of 18 of their Baby Alive products, only one shows one image of a young boy engaging with the toy.



Figure 3. Two images from Hasbro's website, advertising Baby Alive (Hasbro, 2022)

Looking through Hasbro's collection, they create Baby Alive dolls for children aged 18 months+ and dolls with more advanced features for ages 3 and up. Figure 1 shows one of these the dolls, 'Tinycorns Doll'. The image on the left shows the diaper changing quality of the doll as advertised on

the webpage. The image on the right further reinforces the argument that this toy was made for girls. This product is one of the 17 dolls which show no boys engaging in play with the toy.

These toys may not be enjoyed by boys; this could be the reason they are not marketed to them. An argument was made that this is not the case, stating that gender separation of toy catalogues has been widespread since 1945, western countries created strict gender roles for boys and girls. Blue for boys, pink for girls, these colours were used in many toy catalogues to create this gender separation. This study demonstrates how 27 children aged 5 to 10 react to toy catalogues presented to them. These catalogues were modified to show gender-incongruent images in the blue and pink sections. All children in the study understood the gendered structure immediately and only looked at their gendered section (Ulrich & Ezan, 2016). Only two children, both girls aged 9 and 10 recognised the gender-incongruent images. Also, when shown images of toys designed for their target market, with the opposite gender playing with it, their opinions varied. At ages 5 and 6, they rejected the toy, and at ages 7+ children often appreciated it.

This study has shown that while society has affected these children by correlating colour with a gender, also shows the gender rigidity or flexibility at different ages. While the marketing of the object was the only reason for the genders to accept or reject the toy for being appropriate for them. This closes the argument that boys only like one type of toy, and girls only like another, especially from ages 5 to 8. The study creates a proven counterargument to boys like cars, and girls like dolls, as this study has shown that marketing has the largest impact on a child's choice. This marketing tools used to create gender stereotyped toys, the format of where it appears in the catalogue, colours used to depict the image and the gender of the character playing with the toy in the image.

If toys are still marketed to gender-stereotypically standards today, does this impact the children's future aspirations? Observing a few UK toy retailer webpages, there were no filters by gender, or categories by gender. This was true for Argos, The Entertainer, and Smyths. While gender-

stereotypical colors were used in the branding of specific products, this is an issue with the brand and not the retailer. Upon typing 'girls toy' or 'boys toys' into the search bar suggested results were similar to the themes seen in physical catalogues.

Best results for

girls toy

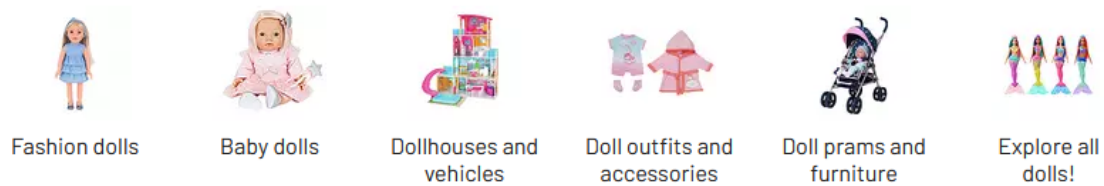


Figure 4. Argos search for 'girls toy' (Argos, 2022)

Best results for

boys toys

[Shop all toys offers](#)

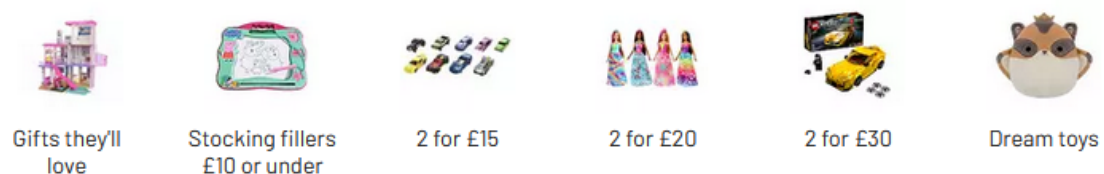


Figure 5. Argos search for 'boys toys' (Argos, 2022)

Above in figure 2 and three an obvious distinction between the gender and toy suggestions is clear. While boys' toys are not limited specific genres, girls' toys are focused on care giving roles, fashion and house layouts and furniture. The difference in the search, both 'toy' and 'toys' was to generate a 'best results for' section, 'boys toy' and 'girls toys' did not bring up this category on the webpage.

Looking into how these gender-stereotype toys affect the child, a study was done on the effect Barbie has on girls. The study considers the effects a sexualised perception of Barbie has on young girls. Findings included that girls who played with Barbies felt they had more career limitations than girls who played with a Mrs. Potato Head toy. They believed boys had more possibilities in terms of

profession. Furthermore, doctor Barbie posed no change in this belief system, suggesting that the focus on the doctor barbie outfit was still on make-up and aesthetics rather than occupation (Sherman & Zurbriggen, 2014).

Suppose girls are targeted with these toys at young ages, and sexualisation of toys is creating a subconscious doubt of career pathways. In that case, it is reasonable to consider these effects on their later in professional life goals. In addition, toys reinforcing motherhood, such as strollers and dolls, are expected to affect the subconscious further. Like in Barthe's Mythologies essay, these conditioning methods follow the social norm. Even when this social norm died out in adult society, it lives on in the toys gifted to children. It could be comparable to semantic satiation but of objects instead of words. If these girls were affected by these career restrictions later on, and through the toys that alter their motivation, where mothering is within their perceived capabilities, but some career pathways are not. They may choose to start a family at a younger age. If more careers were conceivable, there would be a greater chance of being drawn towards further education.

How can we change 70+ years of gender-stereotypical toys? To begin reversing the movement that has become stable in western society, do we need to focus on the next generation of toys, or change the marketing of the toys out there? While dolls have been argued to educate children about emotional intelligence, their overall effect may be removing them from education systems, pre-empting them towards maternal care. Breaking these gender-bias bonds that marketing has placed on children is crucial, allowing them to make unbiased decisions about toys.

An article in the Journal of Experimental Psychology revealed that counter-stereotyping, where children are told contrasting information to current marketing campaigns and social norms. Such as 'Boys like dolls', and 'girls like trucks'. These phrases were also assigned images of girls smiling or boys frowning beside an image of a toy truck. These conditions showed that this counter-stereotyping was effective compared to the control group. The authors acknowledge and state,

"These beliefs can limit children's exploration of gender-counterstereotypical behaviors and prevent the development of broad skills and interests". (King, et al., 2020).

Therefore, adapting marketing techniques currently used could begin reversing gender-bias toys, without need for redesigning the toy itself. It is understandable that from industry perspectives, this will negatively impact company sales. An example of this is in families that have one girl and one boy, these gender-stereotyped toys mean the boy wants his own set of toys targeted at male markets, and the girl wants their set of toys targeted for them. This creates a problem where the parents feel obligated to provide their children with different toys, contributing to purchasing more toys. However, the idea this essay is addressing is overpopulation, and that as a society we should strive for underpopulation and allow governments to ensure the increased quality of life. In this case, most families would have less than two children, so marketing a doll to boys, or a truck to girls increases the potential sales per unit by widening the target market.

To ascertain whether this targeted behavior has discouraged girls from further education, we must recognize how STEM toys have failed to engage this market sector. It is well established that in current STEM jobs, men are highly represented. A study interviewed 343 high school girls; it found their enrolment in a STEM subject was due to their anticipated belonging in that subject and its comparison to alternative STEM fields (Veldman, et al., 2021). Could this feeling of belonging and not belonging result from STEM toys creating boundaries for girls?

Mothers are much more likely to purchase a masculine packaged STEM toy for their sons, than a feminized STEM toy for their daughters, but have a higher chance of buying a gender-neutral toy for either child (Coyle & Liben, 2020). While mothers do show some gender-bias against stem toys in this article, they were almost as likely to buy a non-gendered STEM toy for their daughter as they would their son. While the reason could be that more STEM toys have masculine packaging, making mothers more likely to provide their sons with the product, there is yet to be further research on this.

Finally, one study compared the gender differences between STEM and non-STEM students. They compare sport as a potential factor in creating interest in STEM subjects. The theory was sports increased spatial task performance such as mental rotation. The researchers note a scientific debate on hormonal influence. While mental rotation, the ability to visualise the rotation of 2-D and 3-D objects, is often naturally better in people with higher testosterone levels, this was regarded as unimportant for most STEM tasks, yet it may help people get into the subject. The authors say, "biological, strategic, social and experiential factors can explain this gender gap" (Angelica, et al., 2018).

While lower testosterone may put people at a slight disposition to engaging in some STEM activities, this ruling seems small and to only specific areas where mental rotation is beneficial. The following study results compare the childhoods of those with STEM education and those with non-stem education. Those who choose to carry STEM subjects through to education were more likely to play with spatial toys as a child. A sentence was chosen from the conclusion this study on upbringing and influences on STEM subjects.

"An interesting point is that toy preferences seem to matter more than childhood sports preferences." (Angelica, et al., 2018) - Conclusion to 'Childhood preferences for spatial toys'.

This section of the essay has explored the impact our current marketing techniques have on children. How gender-bias marketing has led to a pseudo societal norm imposed on children. Where subconsciously through the adult and parents, girls are unfavourable treated towards future prospects in education and career. The fault has been bestowed by marketing agencies and industry alike, and while reversible through counterstereotyping, it would require new marketing strategies and adoption through parents. A number of these gender-bias marketing tools have been removed during the movement from large paper toy catalogues to online webpages. Yet, still reminiscent through search suggestions.

Conclusion

Toys have an impact on education, especially on females. There is empirical evidence to support this statement. Through gender-stereotypical adverts, toy manufacturers over-sexualization and exploit of gender-specific toys, like that of STEM learning toys. Society has failed to include females, creating the mindset of unobtainable career prospects, thus reducing educational enrolment in various fields. As the areas of academic departments lessen, it can be assumed this translates into females feeling excluded from further education.

This leads to studies showing the link between education and fertility. While educated mothers often have fewer children by choice. This allows more money to be invested in their children and, in return, creating 'higher quality' children. Furthermore, children with educated working mothers often use their mothers as role models and inspire to complete fulltime education, often going onto surpass their mothers in terms of professional achievement. This creates a generational cycle of educated women with lower birth rates. While non-educated mothers often have more children who do not have the same role models or financial investment in education.

Finally, this leads to the government's actions when overpopulation occurs. If population and birth rates are low, the government finances education, child health and helps financially support families. These policies create an excellent opportunity for children of less fortunate, non-educated mothers to break out of this cycle. It is creating a healthy, stable population that is vastly easier to predict and has greatly improved mental well-being, for example, Scandinavian countries.

Alternatively, high populations and spikes in birth rates can lead to enforced policies of family planning. These policies suppress people's rights and have a negative impact on the countries civilian lives. When no actions are taken to support families with multiple children, child mortality rates increase greatly. For the mental well-being of the country, long term economic growth and population stability, these governments should increase education for both genders equally.

How can designers help stabilise population growth? Designers can affect the determination of children's future career paths through two vital ways. Education and inspiration through toys have both shown to be effective in allowing girls to take specific professional directions. Educating, such as toys that may increase spatial awareness for these girls, or inspiration and ensuring these toys are not limiting these children's prospects, this has been shown by relying less on gender specific toys and heavily feminised and sexualised toys. The future of toy designers and manufacturers should look at gender neutrality throughout their portfolio.

Designers in graphics and advertising can create impact much sooner, creating less gender-stereotypical advertisements and incorporating gender-neutral characters, colours and branding. This has shown to create more gender flexible children, who are more open to playing with a variety of toys outside society's gender norms. In turn relieving the peer judgmental values children currently have of gender-incongruent toy play. Through enabling children to play with a larger variety of toys, an increased skill set is likely learned from toys not marketed at specific genders. Such as caregiving for boys and dolls, and certain special skills from girls and STEM toys.

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