



## IS PRODUCT DESIGN EVIL?

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### Abstract

Product design presents an ethical dilemma. Despite increasing awareness of limited resources the majority of product design endeavours contribute to unsustainable over-consumption. Is the product design industry self-fulfilling; creating products in order to create more products and manufacturing demand to follow suit? Through complacency has product design become unintentionally harmful and morally questionable, has it become the greatest “evil” of our time? This paper intends to provoke thought and reflection over the role of the designer and their responsibilities. Literature on the subject of ethics, morality and responsibility in product design is reviewed and discussed, the key agents who possess responsibility in design are also explored. It is proposed that designers, while aware of sustainability concerns, possess a diminished sense of personal responsibility for these concerns. A study was conducted to assess the level of empathy possessed by product designers in this regard, it is concluded that while on the whole product designers are empathetic they are complacent with respect to environmental concerns to the extent that it may be considered harmful and damaging.

**Keywords:** Ethics, Human behaviour in design, Social responsibility, Sustainability

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## **1 INTRODUCTION**

“There are professions more harmful than industrial design, but only very few... by creating the tawdry idiocies hawked by advertisers... designers have become a dangerous breed. And the skills needed in these activities are carefully taught to young people.” - Papanek V. (1985).

Viktor Papanek’s book “Design for the real world”, which wasn’t published for many years due to its controversial nature, is a scathing indictment of design. The book explores not only the environmental consequences of wanton and irresponsible design but also the social, political and economic implications.

Product design creates an ethical dilemma. Despite increasing awareness, or at the very least increasing debate, of diminishing natural resources and alterations in the global climate (UNEP, 2012; ISDR, 2011; Marcott et al., 2013) there remains a lack of culpable responsibility in the field. Keirl (2015) raises the point that “real sustainable change seems as elusive as ever”.

Is the product design industry self-fulfilling; creating products in order to create more products and manufacturing demand? With each new product evolution comes the need to create more demand, more fervour for products. Steve Jobs famously decreed to Business Week that “people don’t know what they want until you show it to them”. At best a mischievous comment about customers not understanding their own needs but at worst a maxim for design at all costs; even if people don’t want or need a product, the product will be created and the want manufactured. Are designers guilty of engineering want? Has design lost its way, fallen out of touch with what people need, become a self-fulfilling exercise, to the detriment of our societies, economies, environment and well being? As such is product design the greatest “evil” of our time?

This paper intends to provoke thought and reflection over the role of designers, and their approaches to their products. In order to characterise the nature of the contemporary product design industry a review was conducted on various related subjects within this field; sustainability, ethical conduct in product design and who is responsible for such ethical conduct. The paper then further explores the current concerns and attitudes of the present generation of product designers by means of a survey based experiment concerned with characterising the level of empathy or responsibility product designers experience.

## **2 SUSTAINABILITY**

'Sustainability' is a word that evokes conflicting opinions and conflicting definitions. Sustainability is often only associated with the environment. However, it also encompasses ecological, societal and economic factors, referred to as the Triple Bottom Line (TBL) by Elkington (2004). Chick and Micklethwaite (2011) interpret these areas as three concentric circles to be considered in a sustainable undertaking; environment, society and economy. Within these circles the economy is included within society, whilst the environment is the context for both society and the economy. This interpretation identifies the importance of viewing the environment as the context in which society and the economy are influenced – if the environment is not protected, societal and economic factors will not be able to survive independently. This further suggests that the improvement of economic factors does not necessarily correlate with the improvement of environmental or ecological factors.

‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs,’ (Brundtland, 1987). While this often cited statement provides a general summary of sustainable development it does not provide prescriptive guidance on how this can be achieved. The unsustainable consumption of resources for economic purposes ultimately compromises the needs of future generations. In order to avoid or mitigate such consequences a conscious move towards sustainable development must be made, but who or what is accountable for ensuring such steps?

## **3 ETHICS, MORALITY AND RESPONSIBILITY**

'Ethics' is considered as a societal approach to right and wrong, defined by Keirl (2015) as “a collaborative effort towards co-existence”. ‘Societal’ in this setting does not refer explicitly to the

geographical society of a city or area; it can be countries, continents or planets as well as professions or organisations (Meffert, 2009), accordingly ethics can be defined by a group.

Looking at ethics regarding technology, Grunwald (2013) states that technology is not independent of the societal dimension, it is morally relevant and should be included in the design process. This sentiment is shared by Von Schomberg (2014) who states that ethics should not be a constraint on innovation and advancement, including ethics in the design process can lead to greater acceptance of designs and technologies. Traditionally ethics were guidelines of best practice, often resulting in a 'Code of Conduct' or 'Standards'. However, they are developing to include consideration of responsibility to society and environment (Wilms, 2013).

'Responsibility' is an everyday word that needs to be defined in terms of technology and product design (Grunwald, 2013). Responsibility evokes notions of an individual or a group's moral duty to do something. When referring to moral duty, this refers to the ethical right to make decisions that will result in beneficial consequences. Where ethics are societal, morals are seen as the approach to right and wrong by an individual.

In the context of sustainability, responsibility is therefore directly linked with the expectations an individual or a group holds to better sustainable development. These expectations will be based on the potential impact an individual or a group could make to progressing sustainable development. In a PhD thesis on the responsibility of product designers, Birkett (2010) identifies 3 levels of responsibility:

1. Minimalist View: Designer does the minimum amount to meet standards set by relevant bodies.
2. Reasonable care: Designer assumes roles of consumer/someone potentially at harm regarding their design.
3. Good works: Designer goes 'above and beyond the call of duty' in taking responsibility to prevent negative outcomes.

The argument is that product designers should look to achieve level 3, taking complete responsibility for their designs and ensuring no harm. Pesch (2014) suggests it is a 'societal responsibility to develop and implement technologies that do not consume non-renewables or create large scale damage.' A sentiment shared by Esslinger (2011) suggesting the promotion of "socially and environmentally responsive innovation". Is this the current stance of the product design industry? Who possesses such responsibilities, or lack thereof?

#### **4 PRODUCTS AND AGENTS**

What effect do products themselves have upon the world? Verbeek (2011) details that while products have function, they do not have beliefs and that the outcomes of a product are defined by the product designer. The product designer is considered to be an agent in this context. Agents have the ability to act and affect a situation or activity, either as an individual or group. Importantly such agents may act guided by their personal or collective ethics, morality and responsibility. Verbeek (2011) argues that while products cannot make moral or immoral decisions, they can have morality as they mediate human behaviour. A product can determine how someone should act when interacting with it. A speed bump is an example he often cites. It beneficially alters someone's behaviour. Whilst a product can be used for an action other than that which it was intended for, the morality of a product is created by the designer.

Industry has produced sustainable products in the past. During the Second World War, the bottom line wasn't simply profit; industry designed products to meet the needs of people. Papanek (1972) claims this kind of design (design-in-use rather than design-in-sales) is 'honest design' – war time limitations forced designers to design products for the industry that were as durable, re-usable and cheap as possible. However, following the war, 'honest design' declined. Papanek (1972) cites the example of the post-war release of the ballpoint pen, which was desirable despite being expensive and inefficient, but was seen as a status symbol of being 'post-war'; a telling example of industry designing to exploit the consumer.

In the pursuit of profitability design in industry can often result in unsustainable products. Planned obsolescence is when a product is designed to be purposefully discarded or replaced after a predetermined amount of time, on a physical or technical basis (Guiltinan, 2008). It may break or become unfit for repair earlier than required. Equally it may become obsolete when superseded by a newer version. The practice of intentional planned obsolescence originated as a means of addressing a stilted economy during the Great Depression (Cooper, 2010). By designing products to be replaced earlier than required, more products were sold accelerating the generation of profit and in turn fuelling

the economy. Following the recession however, planned obsolescence continued to be employed by companies. This has influenced the creation of the 'throwaway society' of today (Cooper, 2010; Slade, 2006) generating unprecedented amounts of waste. Indeed, Slade (2006) asserts that the global economy is based on planned obsolescence. Companies claim that planned obsolescence is justifiable, as it is a result of consumer demand (Wieser, 2016). Cooper (2010) believes that the responsibility to change this economic system is shared between the consumer, the government and industry. Planned obsolescence is a direct consequence of design. However, were the demand for planned obsolescence reduced, then perhaps the demand for sustainable design could be increased.

It therefore appears that products can cause harm through an agent, either in the execution of their design or their use. It was previously mentioned that responsibility, in the context of sustainability, is linked with the expectations an individual or a group holds to improve sustainable development. Four main categories of agents considered most relevant to this discussion and their influence on sustainable development are; industry, the consumer, governmental organisations and the designer.

#### **4.1 Industry**

In this paper, 'industry' is a term for a company or enterprise seeking to make profit through selling manufactured goods to a consumer; legislated by the social and economic powers of governments operating free market principles. Companies generally operate with a principle goal overriding every other: profit. However a great many organisations in recent years have made attempts to reconcile their profit making operations with growing ethical concerns. Corporate Social Responsibility (CSR) is a term that emerged in the 1990s as a result of the increasing popularity of environmentalism; a resultant lack of the consumer's trust in industry (Carrasco, 2007); and, a rise in prominence of anti-Capitalist and anti-globalisation attitudes (Eschle and Maignascha, 2005). Many believe that CSR should be integrated into a company's practices, rather than being 'bolted on'. It has also been proposed that companies could work in partnership to define CSR legislation (Morrison, 2012). Bakan (2004) believes that CSR can be dangerous when companies merely wish to be regarded as sustainable, rather than actually being sustainable. CSR is a means for industry to recognise the responsibilities they have towards society. However, given that it is voluntary, and that companies themselves define what they deem socially responsible, it does not necessarily drive sustainable development. Archie Carroll's (1991) famously cited 'Pyramid of Corporate Social Responsibility' portrays industry's views on CSR. In the pyramid, the economic responsibility of "be profitable" is the foundation progressing incrementally to legal, ethical and finally philanthropic responsibilities. This argument falls short, however, when companies affect non-economic aspects of life through the pursuit of profit (Thielemann, 2000). This can be deduced from Carroll's pyramid, which suggests that even the law can be transcended in pursuit of the bottom line, such activity could be considered irresponsible or harmful.

#### **4.2 The Consumer**

Here 'the consumer' refers to a term for the individual, or group of individuals, who purchase products or goods for use. Product design is directly influenced by the demands of the consumer. Many consumers now wish to purchase ethically. However, a significant number do not actually purchase according to this attitude; a phenomenon referred to as the "ethical consumption gap". A study in 2012 reported that 30% of UK consumers had ethical purchasing intentions. When the consumer actually came to buy a product, however, only 4% actually purchased ethically (Davies et al., 2012). There are various reasons for this. Carrington et al. (2015) state the consumer's willingness to consume ethically dissipates when actually faced with purchasing decisions due to expense or manipulation. Carrington et al. (2015) go on to quote Smith (1987) to relate how independent the consumer is to make his/her own purchasing decisions: "consumers are not really sovereign under capitalism; they only think they are. Marketing fosters this belief." This suggests that although consumers may want to make ethical purchasing decisions, they are psychologically manipulated into purchasing products they do not need, through advertising and planned obsolescence (Guiltinan, 2008; Papanek, 1972; Malachowski, 2001). Lunds et al. (2015) further believe that consumers would purchase and consume responsibly if sustainable products did not sacrifice functional features for social and environmental ones. Given the ethical consumption gap, and the argument that industry controls the malleable mind of the consumer (the illusion of consumer sovereignty), it could be argued that the consumer does not have a responsibility to drive the progress of sustainable development.

### 4.3 Government

In this paper 'Government' is a term for the people responsible for legislating and administrating corporate trade within the boundaries of their powers and market principles. While industry's main regulator is the market within which it operates, governments may also regulate their undertakings. According to Knudsen et al., (2015), there are four types of regulatory policy that governments are able to implement: Endorse, Facilitate, Partner and Mandate. The most influential of which is mandating a company's operations and outputs. It is possible that mandating companies would create a significant change in the output of industry; however, this may not be reasonable to expect. If a government enforces a political policy controlling the output of a company, at what point does the industry become fully state controlled? This could fall in line with the ideals of the extreme left and right of the political spectrum. Consumerism may be damaging to the environment; however, it still represents the basic human right of freedom of choice. Thus it could be argued that the responsibility of the government is not to take control of industrial output. Consumer sovereignty, or freedom of choice, could however be regarded as an illusory concept, as previously discussed.

### 4.4 The Designer

'The designer' is a term for those who create and make i.e. designers in mass manufacturing, an individual designer, an editor of high-end goods, a craftsman, or a student designer (Lerrberg et al., 2010). Papanek (1985) believes that the designer is responsible for addressing society's needs. He states designers should be responsible for preventing design's misuse as "an ego trip for the rich and a profit trip for industry".

In the context of sustainability and designers' responsibilities, the concept of good, or 'honest', design has been mentioned in section 4. Design should be inherently sustainable, without function and cost being affected (Chick and Micklethwaite, 2011; Szenasy, 2012). Generally sustainability is currently regarded by the designer within the context of design. According to Fletcher and Dewberry (2002) designers should make the shift to integrate design within the context of sustainability. This perspective also promotes sustainability as an ethos, rather than as an add-on to design (Pritchard, 2013); in short a change of perspective is required. "Design thinking", which promotes the idea of utilising reflection and innovation to resolve sustainable development issues (Brown and Katz, 2011) enacted through "Design activism" (Chick and Micklethwaite, 2011) may also be a valid approach to progressing such an agenda. Design for sustainability (DfS), a process consisting of tools and sets of guidelines which designers can use to create more sustainable designs, may also be implemented (Spangenberg et al., 2010). Such approaches can be considered attempts to promote a responsible attitude towards design. It could be argued that a designer who implements these fundamentals into his/her designs, has a responsible attitude with respect to the evolution of sustainable design.

However this may be limited by the designer's "aesthetic space", a term that describes a designer's constraints on a project that are influenced by the context that they are working within (Lerrberg et al., 2010). The designer does not have complete control of the constraints he/she is working within. Arguably, the most restrictive aesthetic space for a designer is industry. Papanek (1985) states designers are used as 'tools in the hands of industry'. Spangenberg et al. (2010) admit that designers have limited power in industry, comparing the designer's role to 'useful dwarfs of marketing'. The designer is often restricted by company or client specifications. In these cases, it is the company or the client that decides whether the product is sustainable or unsustainable; the designer is merely a tool to realise the end product.

## 5 IN THE ABSENCE OF RESPONSIBILITY, IS PRODUCT DESIGN EVIL?

Whilst the remit of responsibility in product design and where it lies is the subject of debate and further investigation, this work is curious about characterising the current sense of responsibility and moral consequences of current product design practices, or lack thereof. In the absence of morality and ethics in sustainable product design, is product design a force for wrongdoing more so than good, is product design in fact a destructive force, is it evil?

Defining evil is problematic and is the subject of several philosophical papers. Joel Feinberg (2003) suggested that there are four criteria to be met that define an action as evil. Evil should be an act of wrongdoing, undertaken by a moral agent, causing considerable harm to a victim and be incomprehensible to an onlooker. However, there are different views; Luke Russell (2007) discusses

‘evil sceptics’ – those who do not believe in evil. According to Baron-Cohen (2011) the concept of evil has no explanation when examined and instead proposes the term evil be considered in terms of empathy. Baron-Cohen developed a tool referred to as the Empathy Quotient (EQ). This is a series of statements where participants record their agreement or disagreement, with each response being allocated a score, providing the benefit of a measurable metric. Baron-Cohen suggests that at the bottom of the scoring spectrum, low empathy, is where evil lies. He proposes that when people are solely focused on the pursuit of their own interests, they possess a lack of empathy and through their inaction have the potential to perpetrate evil. Do designers fall into this category? Through their lack of concern and empathy for sustainability and sustainable concerns are they unknowingly morally blameworthy? Card (2002) argues that often people who commit acts of evil are not malicious but in fact “inexcusably reckless, callously indifferent, amazingly unscrupulous”. It would not be the first time a normalisation or disassociation from ones responsibilities could be considered such (Arendt, 1976).

The prioritising of one’s self can lead to lack of empathy and evil by both of these definitions. It could be suggested that lack of empathy and evil are synonymous. At this point it is appropriate that focus is placed on the overlap of the topics of product design and evil. It is proposed that designers, while aware of sustainability concerns, will possess a diminished sense of personal responsibility for these concerns. A study, using an adaptation of Baron-Cohen’s (2011) Empathy Quotient (EQ) test will be undertaken to assess the level of empathy possessed by product designers.

## 5.1 Experiment

It was considered that the EQ test could provide a suitable means of determining the level of empathy or consideration for sustainability and general morality possessed by product designers. The sample population for the experiment was students and recent graduate product designers (77 participants in total). A revision of the EQ test adapted specifically for the area of product design was developed. The result is a 30 statement questionnaire, divided into 4 categories, demonstrated in a summarised table shown in Appendix I, which was distributed by means of an online questionnaire. Each participant was asked to record how strongly he/she agreed or disagreed with a number of statements—using a 4-point scale (strongly disagree, slightly disagree, slightly agree, strongly agree). The EQ test score is interpreted as a percentage, with 100% indicating complete empathy and 0% indicating a complete absence of empathy.

## 5.2 Results

The results from 77 participants are displayed in Figures 1 and 2 below.

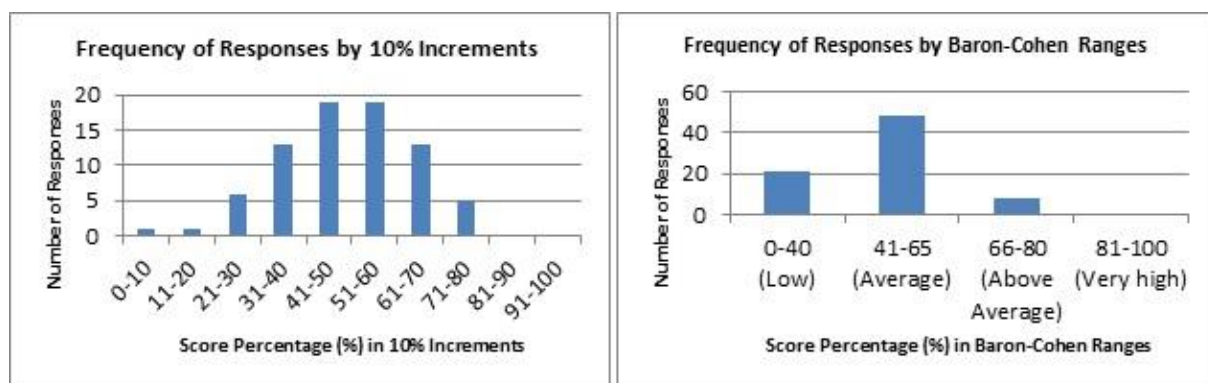


Figure 1. Frequency of responses by 10% increments (left) and Baron-Cohen ranges (right)

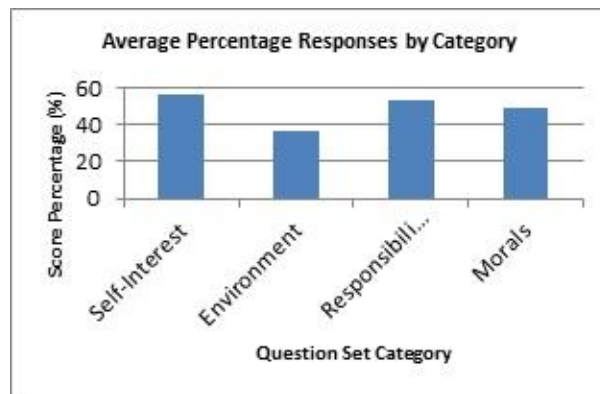


Figure 2. Average percentages responses by category

There is a distinct bell curve when viewing responses to all questions as shown in Figure 1(left). The average score is 49.48% and the standard deviation (SD) is 14.53. There is a considerable spread of results, from 8.33-78.33% but as Figure 1 shows, there are clusters of around the 40-60% range.

Figure 1 (right) shows the same responses but broken into the empathy ranges defined and outlined by Baron-Cohen – ‘Low’ (0-40%), ‘Average’ (41-65%), ‘Above Average’ (66-80%) and ‘Very High’ (81-100%). The results show that, as Baron-Cohen suggests, the majority of participants (49) fall into the ‘Average’ range. However, over a quarter of participants (21) fall into the ‘Low’ range associated with a lack of empathy and evil.

Figure 2 shows the average score percentages broken into the question set category. Interestingly the environmental question set achieved the lowest score; Self-interest (56.4%), Environment (37.01%), Responsibility (52.78%) and Morals (49.49%).

## 6 DISCUSSION

The results indicate that environmental issues do not register high in the priorities of most student product designers. The environmental category falls within the low range associated with a lack of empathy and evil. The highest scoring category is self-interest, meaning their views in relation to team mates and peers are positive. The data suggesting that participants are sociable and empathic towards their peers and colleagues is perhaps unsurprising given the career stage of participants. While the averages suggest that product design students on the whole are empathetic to the concerns discussed in the paper, it raises questions about what may be considered an acceptable level of empathy. It could perhaps be argued that an average score of 49.48% in the experiment may not be sufficient, as this could perhaps be interpreted as empathetic ambivalence, indicating in no clear way if participants possess an overall sense of empathy or lack thereof. Would this perhaps indicate that their personal ethics, morals and responsibilities are adaptable, as to whether or not this would be a benefit or detriment would depend upon the context. It is also notable that more participants fell into the ‘low’ range than the ‘above average’ range, indicating a greater predisposition towards a lack of empathy. This is especially true for the environmentally orientated question category and particularly concerning when considering the length of time the profession has been aware of various environmental concerns. Using student participants there is cause to suggest that education may be a considerable source of the problem. Knowing an issue lies here provides the foundation for further research in determining the problem and planning to address the morals and ethics of product designers at a ‘grass roots’ level. The research suggests that product design students may be partly involved in the lack of progress regarding sustainable change. It seems rational to suggest that a problem may also lie in the education of these students. Stables (2012) discusses a ‘teach to test’ mind-set where students are taught enough in order for them to pass the outcomes set before them rather than developing a personal set of responsibilities. This ‘box checking’ mentality is also apparent in students according to Birkett (2010). Undertaking this research appears to highlight that students do not feel a sense of responsibility regarding the environmental impact of the profession, and in a more general sense appear to be more inclined toward a lack of empathy. In highlighting these issues steps may perhaps be taken to address them.

Lerrberg et al. (2010) state that responsible design is an attitude towards the role of the designer for sustainable development. A responsible designer should take concerns of sustainable design into account when designing, regardless of the aesthetic space they are working within. Even if the designer is

prevented from creating a sustainable design, they should still possess an underlying attitude towards driving the progress of sustainable development. The designer must not be naive to the reality that in most cases the goal of design in industry is to generate a profit. Equally though the goal of generating profit should not impact on the designer's attitude towards design.

## **7 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK**

The purpose of this paper was to take a slightly different view to the concerns of sustainability and provoke discussion. Further work in the area would be beneficial to build upon and investigate some of the ideas presented. The adapted Baron-Cohen EQ test could be refined; as mentioned the experiment had a series of statements which were worded so that the participant was dealing with two degrees of severity, 'slightly' and 'strongly' which could evoke some unconscious preferences. The questionnaire did not consider the work experience of the participants. It would be interesting to investigate this at various career stages. The questionnaire expects participants to be honest, however, there is no way to ensure an answer is true or not, whether unintentional or deliberate. A person may believe they have answered truthfully, however, their actions in a practical setting may differ to their response. Another form of unintentional deception may be personal delusion through short term thinking. It would also be interesting to investigate other agents in addition to designers themselves.

Lastly participants had no means of justifying why they selected their response. A semi-structured interview upon completing the questionnaire may have provided more insight into a participant's rationale regarding responses. This might have removed some of the speculation in the discussion of the results. While this work addresses the concepts of responsibly and ethics in product design in terms of sustainability specifically, it would be a worthwhile exercise to address other aspects of the profession in a similar manner.

The literature shows that design can have a harmful impact on society. Of the agents involved, industry, consumers, governments and designers, all have some degree of responsibility which is not currently being delivered. Industry uses the designer as a tool in the product delivery process. Given a lack of control over products, the designer cannot always be expected to be the catalyst towards the progress of sustainable development. However, he/she will always have control over their attitudes towards design and could be expected to drive incremental changes towards the progress of sustainable development by possessing a positive attitude; a will to do no harm; not to be guilty of evil acts through a lack of empathy or complacency.

## **REFERENCES**

- Arendt, H. (1976), *Eichmann in Jerusalem: a report on the banality of evil*. Penguin Books.
- Baron-Cohen, S. (2011), *The science of evil*. New York: Basic Books.
- Birkett, Stacey. *The development of responsibility in product designers*. Diss. Ph. D. thesis, The Open University, Milton Keynes, UK, 2010.
- Brown, T. and Katz, B. (2011), *Change by Design*. *Journal of Product Innovation Management*, 28(3), pp.381-383.
- Brundtland, G.H., (1987), *Brundtland Report. Our Common Future*. Comissão Mundial.
- Card, C. (2002), *The atrocity paradigm: A Theory of Evil*. New York: Oxford University Press.
- Carrasco, I. (2007), *Corporate Social Responsibility, Values, and Cooperation*. *International Advances in Economic Research*, 13(4), pp.454-460.
- Carrington, M., Zwick, D. and Neville, B. (2015), *The ideology of the ethical consumption gap*. *Marketing Theory*, 16(1), pp.21-38.
- Carroll, A. (1991), *The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders*. *Business Horizons*, 34(4), pp.39-48.
- Chick, A. and Micklethwaite, P. (2011), *Design for sustainable change*. Lausanne: Ava Pub Sa.
- Cooper, T. (2010), *Longer lasting products*. Farnham, Surrey [England]: Gower.
- Davies, I., Lee, Z. and Ahonkhai, I. (2011), *Do Consumers Care About Ethical-Luxury?*. *Journal of Business Ethics*, 106(1), pp.37-51.
- Elkington, John. "Enter the triple bottom line." *The triple bottom line: Does it all add up* 11.12 (2004), 1-16.
- Eschle, C. and Maiguashca, B. (2005), *Critical theories, international relations and 'the anti-globalisation movement'*. London: Routledge.



- Esslinger, H. (2011), Sustainable Design: Beyond the Innovation-Driven Business Model. *Journal of Product Innovation Management*, [online] 28(3), pp.401-404. Available at: <http://onlinelibrary.wiley.com.proxy.lib.strath.ac.uk/doi/10.1111/j.1540-5885.2011.00811.x/full> [Accessed 17 Oct. 2016].
- Feinberg, J. (2003), *Problems at the roots of law*. Oxford: Oxford University Press.
- Fletcher, K. and Dewberry, E. (2002), Demi: a case study in design for sustainability. *International Journal of Sustainability in Higher Education*, 3(1), pp.38-47.
- Grunwald, A. (2013), Technology Assessment for Responsible Innovation. In: Van Den Hoven, J. Doorn, N. Swierstra, T. Koops, B. Romijn, H. Eds. (2014), *Responsible Innovation 1: Innovative Solutions for Global Issues*. Dordrecht: Springer, pp. 15-31.
- Guiltinan, J. (2008), Creative Destruction and Destructive Creations: Environmental Ethics and Planned Obsolescence. *Journal of Business Ethics*, 89(S1), pp.19-28.
- International Strategy for Disaster Reduction (ISDR), (2011), *Global Assessment Report on Disaster Risk Reduction: Revealing risk, redefining development*.
- Keirl, S. (2015), Global Ethics, Sustainability, and Design And Technology Education. In: K. Stables and S. Keirl, ed., *Environment, Ethics and Cultures: Design and Technology Education's Contribution to Sustainable Global Futures*, 1st ed. Rotterdam: Sense, pp.32-52.
- Knudsen, J., Moon, J. and Slager, R. (2015), Government policies for corporate social responsibility in Europe: a comparative analysis of institutionalisation. *policy polit*, 43(1), pp.81-99.
- Lunds, M., Phipps, M. and Hill, T. (2015), Exploring consumer responsibility for sustainable consumption. *Journal of Marketing Management*, 31(13-14), pp.1449-1471.
- Marcott, S., Shakun, J., Clark, P. and Mix, A. (2013), A Reconstruction of Regional and Global Temperature for the Past 11,300 Years. *Science*, 339(6124), pp.1198-1201.
- Malachowski, A. (2001), *Business ethics*. London: Routledge.
- Meffert, J. (2009), Ethics? Morals? Values? *Clinics in Dermatology*, 27(4), pp.327-330.
- Morrison, J. (2012), Business responsibility for its social impacts: moving beyond CSR. [online] *the Guardian*. Available at: <https://www.theguardian.com/sustainable-business/business-responsibility-social-impact-beyond-csrs>
- Papanek, V. (1985), *Design for the real world: Human ecology and social change* (2nd ed.). London: Thames and Hudson.
- Pesch, U. (2014), Sustainable Innovation, Learning and Responsibility. In: Van Den Hoven, J. Doorn, N. Swierstra, T. Koops, B. Romijn, H. Eds. (2014). *Responsible Innovation 1: Innovative Solutions for Global Issues*. Dordrecht: Springer, pp. 199-218.
- Pritchard, O. (2013), Designers have an obligation to make sure their work is truly sustainable. [online] Available at: <https://www.theguardian.com/sustainable-business/sustainable-design-sustainability> [Accessed 17 Nov. 2016].
- Russell, L. (2007), Evil-Revivalism Versus Evil-Skepticism. *The Journal of Value Inquiry*, 40(1), pp.89-105.
- Slade, G. (2006), *Made to break*. Cambridge, Mass.: Harvard University Press.
- Smith, N. (1987). Consumer Boycotts and Consumer Sovereignty. *European Journal of Marketing*, 21(5), pp.7-19.
- Spangenberg, J., Fuad-Luke, A. and Blincoe, K. (2010), Design for Sustainability (DfS): the interface of sustainable production and consumption. *Journal of Cleaner Production*, 18(15), pp.1485-1493.
- Stables, K. (2012), Designerly well-being: Can mainstream schooling offer a curriculum that provides a foundation for developing the lifelong design and technological capability of individuals and societies? Paper presented at the The PATT 26 Conference: Technology Education in the 21st Century, KTH, Stockholm, Sweden. [Online] Available at: <http://www.ep.liu.se/ecp/073/050/ecp12073050.pdf> [Accessed 15 Oct. 2016].
- Thielemann, U. (2000), A brief theory of the market – ethically focused. *International Journal of Social Economics*, 27(1), pp.6-31.
- United Nations Environment Programme (UNEP), (2012), *Global Environment Outlook GEO 5: Environment for the Future We Want*. United Nations Environment Program.
- Verbeek, P. (2011), *Moralizing Technology: Understanding and Designing the Morality of Things*. 1st ed. London: University of Chicago Press.
- Von Schomberg, R. (2014), The Quest for the 'Right' Impacts of Science and Technology: A Framework for Responsible Research and Innovation. In: Van Den Hoven, J. Doorn, N. Swierstra, T. Koops, B. Romijn, H. Eds. (2014). *Responsible Innovation 1: Innovative Solutions for Global Issues*. Dordrecht: Springer, pp. 33-50.
- Wieser, Harald. "Beyond Planned Obsolescence: Product Lifespans and The Challenges To A Circular Economy". *GAIA - Ecological Perspectives for Science and Society* 25.3 (2016), 156-160.
- Wilms, H. C. (2013), The Assumption of Scientific Responsibility by Ethical Codes – An European Dilemma of Fundamental Rights. In: Van Den Hoven, J. Doorn, N. Swierstra, T. Koops, B. Romijn, H. Eds. (2014). *Responsible Innovation 1: Innovative Solutions for Global Issues*. Dordrecht: Springer, pp. 89-96.

## APPENDIX I

<i>Questions Set</i>	<i>Variables Required</i>	<i>Questions</i>
Do product designers put their self-interest before teams and peers?	Opinions of product designers regarding relationships with team members and peers.	<ol style="list-style-type: none"> <li>1. It doesn't bother me too much if I'm late for a team meeting</li> <li>2. In group projects, the overall outcome for the team is more important than my personal performance and achievements.</li> <li>3. In a group project I will 'peer assess' other team members in order to improve my grade.</li> <li>4. In a group project, if a team member is struggling I won't help <u>them</u>. I have my own section to work on.</li> <li>5. If I see someone struggling with a task I am comfortable with I will help them.</li> <li>6. In group projects my ideas are usually the best and I try to have the team side with me.</li> <li>7. In group projects I listen to and consider everyone's opinion equally.</li> <li>8. If a team member is not performing to my standard they need to be told regardless of their feelings.</li> </ol>
Do product designers consider environmental effects of their products?	Opinions of product designers relating to sustainability and relevant design tools.	<ol style="list-style-type: none"> <li>9. I consider the environmental effects of my chosen manufacturing process.</li> <li>10. I will use a manufacturing process regardless of energy consumption in order to achieve the physical form I want.</li> <li>11. I use Design for Sustainability in all of my projects.</li> <li>12. I consciously try to reduce material waste when prototyping.</li> <li>13. I consciously try to reduce material waste in my final design.</li> <li>14. In my projects I consider recycling in depth.</li> </ol>
Will product designers disregard their morals for a company or client?	Views of product designs relating to employment decisions.	<ol style="list-style-type: none"> <li>15. I exhaust all patent research to ensure I do not infringe a company's designs?</li> <li>16. In a project I ensure my design adheres to all relevant standards by thoroughly researching them?</li> <li>17. I undertake thorough Failure Mode and Effect Analysis (FMEA) on my designs?</li> <li>18. I use Design for Assembly in all of my projects.</li> <li>19. How a product is manufactured isn't my problem, I just make the designs.</li> <li>20. To design the best product it's important to fully understand the user needs.</li> <li>21. I use empathic modelling in projects to put myself in a user's shoes.</li> </ol>
How much responsibility does a product designer take for their projects?	Opinions of product designers relating to responsibility and relevant tools.	<ol style="list-style-type: none"> <li>22. I would work for a company that produced products aimed to cause harm?</li> <li>23. My ideal job would involve redesigning everyday objects to make them look cool.</li> <li>24. I want to design products to improve people lives regardless of salary.</li> <li>25. A company's values don't interest me as long as they pay well.</li> <li>26. Maximising the product lifetime is more important than company profits.</li> <li>27. There are enough 'sexy' chairs in the <u>world</u>, designers should be improving function and performance.</li> <li>28. I would not work for a company who was reported to practice poor social responsibility.</li> <li>29. In selecting a company to work for, the prestige of the brand is more important than their environmental policy.</li> <li>30. Form is secondary to function.</li> </ol>