
Open Analysis Addressing Slavery in Supply Chains



OAASIS



Visualising the weakest link: Modern slavery and supply chain education using the medium of virtual reality

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Julia de Sterke

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“Visualization is the main bridge between the quantitative content of the data and human intuition [...] we cannot really understand or intuitively comprehend anything that we cannot visualize in some way.”

(Donalek *et al*, 2014, p.609)

This report

Report aim: This report identifies specific strategies that can be employed to change stakeholder behaviour on modern slavery, and the potential role that virtual reality (VR) can play in eliciting that behavioural change.

Report structure: Following an introduction to modern slavery, this report provides with a comprehensive review of literature around pro-social behaviour, to conceptualise the learner model required to both educate stakeholders and induce behavioural change. There is then an exploration of the background and present challenges associated with VR technology. The report concludes by presenting the case for the use of VR in modern slavery education.

Report conclusions: VR is best placed to educate stakeholders on both the scale of modern slavery (using supply chain visualisation), and provide more individual stories of those impacted by it (through immersive storytelling). Embodied experiences (physically experiencing the situation) of modern slavery are counterproductive, and VR is an effective alternative to other less immersive media to elicit the emotions of empathy and guilt required for behavioural change.

Main findings

1. Storytelling is a powerful way to effectively elicit behavioural change, through harnessing empathy and guilt. Virtual reality can effectively tell stories due to its highly immersive qualities.
2. The problem of modern slavery meets (and exceeds) the criteria set by Bailenson (2018) for when VR can add value. VR is best placed to tell the story of modern slavery, as real embodied experiences are counterproductive.
3. A central purpose of VR in modern slavery education must be in connecting consumers to the production process to ensure they consider the life of their product *prior* to its purchase and use.
4. VR is best placed to provide insights into both the scale of modern slavery and the way in which it impacts individuals. Emphasising both of these aspects of modern slavery through VR will provide a means of stakeholder education not yet seen in this space (to the author's knowledge) and elicit effective behavioural change.

I. Executive Summary

Modern slavery is considered a *wicked problem*, as it is a dynamic and complex problem, involving multiple stakeholders and without a single concrete solution. Changing stakeholder behaviours and attitudes towards modern slavery can be generalised as an approach to induce pro-social behaviour. Three major factors can explain the lack of adoption of pro-social behaviours:

1. Information asymmetry or absence
2. Economic and mental costs of behavioural change
3. Inability to tie individual behavioural change to broader social change

Several strategies already exist to promote pro-social behaviour in the social marketing sphere; largely relying on inducing emotions of empathy, guilt and responsibility. These strategies include storytelling, relevant framing, encouraging and rewarding first-movers, and feedback.

Virtual reality (VR) is a communication medium that provides users with a three-dimensional, 360° computer-generated virtual environment. The market for virtual reality is growing rapidly, thanks to improved user experience, more practical headsets and falling costs. VR uses tracking, rendering and display to create presence and improve user immersion in a virtual world, with significant and emerging applications in education and training, healthcare, commercial and consumer spheres. Charities, too, see VR as a means to promote empathy through storytelling, both inducing donors to donate and enabling them to understand how their funds are being used. Limited literature exists on how to evaluate the efficacy of VR as a communication medium and behavioural motivator, because a suitable comparison group to VR is not always clear. VR is more effective than non-immersive visual media, such as 2D films and images, but VR has been found to be equally as effective as embodied experiences, indicating that that it has scope to substitute real experiences when they are Dangerous, Impossible, Counter-productive or Expensive (Bailenson's DICE Criteria: Bailenson, 2018).

Embodied experiences of modern slavery are problematic, as modern slavery involves possible physical, emotional and/or financial harm upon the person. VR could provide an alternative way to understand modern slavery without these risks. In understanding modern slavery, the education mechanism must aim to connect the consumer and other stakeholders to the production process, to remind them of the life of the product prior to its purchase or use. Virtual reality is well placed to both provide insights into the scale of modern slavery and its ability to impact supply chains, as well as the individual stories of people who have lived through it, while providing a novel immersive experience. Virtual reality is thus an effective medium for modern slavery education as it can improve:

1. **Self awareness:** allow the participant to understand and critique their own behaviour
2. **Social presence:** allow the participant to engage in the issue and with those experiencing it
3. **Empathy:** allow the participant to understand more deeply the stories of those affected
4. **Understanding:** provide an educational tool to recognise the problem and its magnitude
5. **Emotional response:** induce a reaction from the participant, to promote behavioural change
6. **Interactivity:** create an immersive medium to motivate behavioural change and improve engagement.

A VR approach to modern slavery education offers the ability to span the multiple scales of the problem. Stakeholders can understand both the prevalence of the problem (promoting responsibility) and how individuals experiencing modern slavery are affected (promoting empathy and guilt).

II. What is modern slavery?

Section II is an extract from **Literature and Policy Review** by **Julia de Sterke** (2020). Read the **full report** on the OASIS website for details on the commercial and legal foundations of modern slavery.

Modern slavery is a form of labour exploitation (Chesney *et al*, 2019), and can be differentiated from other lesser forms of labour abuse based on four main characteristics: (Weissbrodt, 2002)



Modern slavery often cannot be defined by a single indicator, but rather by a plurality of indicators (Fair Labor Association, 2018).

Crane (2013) classifies modern slavery as a practice operating under illegal deception and power relations, as opposed to the formal legal title associated with traditional chattel slavery. Indeed, modern slavery has emerged in recent times as the foundation for new business models, seeking not only to reduce labour costs, but to achieve other ends. Crane outlines four further ends:

1. **Risk reduction:** Firms employ workers illegally to cover up either illegal labour practices or illegal business and industry practices (sometimes both). Restrictions on workers' freedoms therefore reduce the risk of malpractice detection.
2. **Asset leveraging:** Employers often use their existing assets or those of their workers to maximise returns on their resources to generate additional revenue. This may be through renting of accommodation they own at an inflated price, or through leveraging workers' rights or identities to claim fraudulent benefits.
3. **Evading legal minimums:** Like traditional slavery, a driver of modern slavery is labour cost-cutting. Firms often employ intermediary labour suppliers, who are paid by the firm and then redistribute their funds to their workers at their discretion. They often exploit regulatory loopholes through fraudulent employment schemes allowing them to bypass labour regulations
4. **Workers as consumers:** Employers no longer conceptualise slaves as labour, but as consumers to maximise returns to the employer. Slaves can generate additional revenue through services charged at an inflated rate, through accommodation and meals, generating sustained indebtedness, leading to the situation of debt bondage and criminal dependence.

III. Behavioural change strategies in social marketing

a. Social marketing

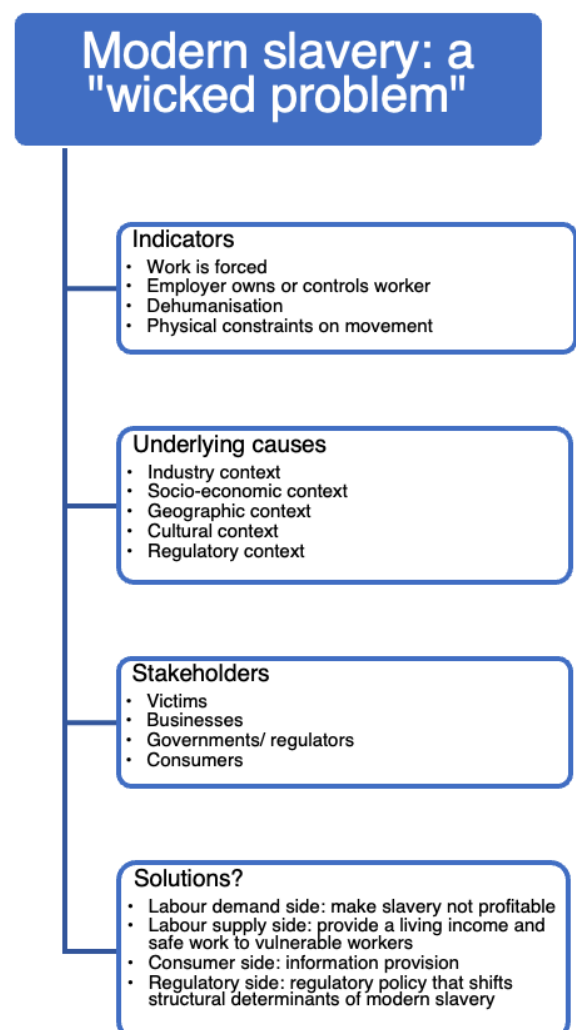
Social marketing encompasses marketing that aims to promote social change rather than benefiting a specific commercial brand (Lefebvre, 2011; Carvalho & Mazzon, 2019, p.2). In this report, social marketing includes charitable advertising, including eliciting donations of time and money, as well as awareness campaigns to promote pro-social behaviours. Social marketing has been used in contexts including road safety (Duong & Parker, 2018; Lemarié *et al*, 2018), healthy lifestyles (Carins *et al*, 2017), and blood and organ donation (Holdershaw *et al*, 2011). In literature, several metrics have been explored to quantify the efficacy of social marketing, this report will focus on donations of money as the most simple quantified metric measuring behavioural change.

Social marketing has been applied as one possible solution to "wicked problems", or social problems that are dynamic, complex, involving multiple interdependent stakeholders, and with no concrete solution (Rittel & Webber, 1973). Modern slavery occurs due to a patchwork of existing structural dynamics, including economic and social inequality, political considerations, as well as other cultural, regulatory and industry factors (Crane, 2013). It affects governments, consumers, businesses as well as the victims themselves, and is a problem that is difficult to solve but possible to manage (Bogdanova, 2015). Social marketing is limited in efficacy when wicked problems are involved due to their inherent complexity and scale (Kennedy *et al*, 2016, p.52).

b. Determinants of pro-social behaviour

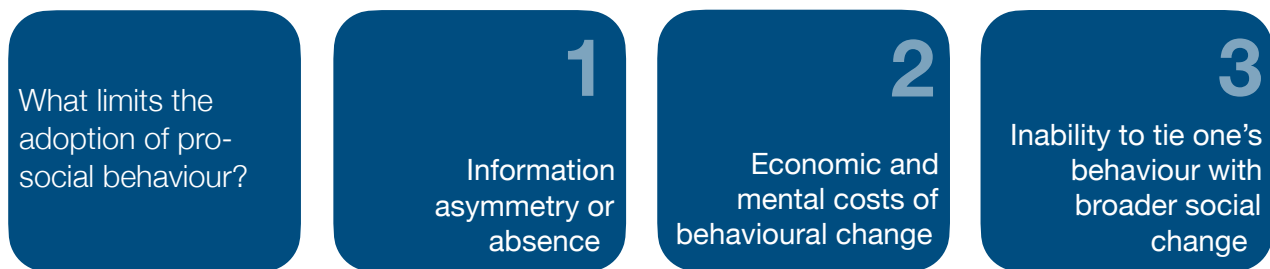
Modern slavery, as a *wicked problem*, lacks easy consumer solutions, and is in fact so difficult for consumers to address that some advocates tackling modern slavery focus projects solely on labour supply and commercial operations, with no focus on consumers at all. For example, consumers deciding which smartphone to buy will face a difficult decision when they realise that 60% of the world's cobalt, a metal found in every lithium-ion rechargeable battery, is mined in the copper belt of DRC, known for frequently using child labour (Kara, 2018). Furthermore, awareness and understanding of the social issue through social marketing does not always create meaningful behavioural change. The *intention-action gap*, defined as the difference between agreeing to take action and actually taking action, has been found to be large and significant in consumer decision making in charitable donation: *ex-ante* belief in the cause and understanding of the dynamics are still not enough to promote *ex-poste* donation (Parbhoo *et al*, 2018, p.2; Fosgaard & Soetevent, 2018; Andreoni & Petrie, 2004).

Pro-social behaviour can be costly and consumers often lack complete information, leading to confusion, ignorance or lack of motivation to



change behaviour (Kennedy *et al*, 2017, p.61).

I propose three potential reasons for lack of adoption of pro-social behaviour:



1. Information asymmetry or absence

Understanding supply chains and modern slavery in consumer products is complex, and information on occurrences is often difficult to understand and inaccessible. In 2019, half of all fashion companies surveyed in the 2019 Ethical Fashion Report did not have a complete list of their suppliers (Baptist World Aid Australia, 2019, p.8). The UK's *Modern Slavery Act 2015* compels companies to report on their efforts to measure, mitigate and provide transparency on modern slavery risks (Bloomfield & LeBaron, 2018). These reports are sometimes incomplete and often lack detail and readability, so the average consumer is unlikely to read and respond to them (Stevenson & Cole, 2018).

2. Economic and mental costs of behavioural change

Even when consumers want to make ethical purchases, the mental costs of processing negative information can promote purposeful ignorance of the ethical practices behind their purchase (Ehrich & Irwin, 2005; Reczek *et al*, 2016). Further, understanding and acting on the realisation that we are complicit in markets that use slave labour is inherently unpleasant, and consumers may justify continued complicity through neutralisation tactics such as rationalising behaviour through moral relativity and trivialisation (Carrington, 2020). Economic costs may exist when shifting to pro-social behaviour. For example, a 2019 UK and US consumer survey finds that 50% of consumers want brands to act more sustainably but only 30% are prepared to pay extra for it (Nosto, 2019). Indeed, ethical fashion is expensive: "It simply costs more money to make a product responsibly" says Courtney Sanders, co-founder of ethical fashion retailer Well Made Clothes (Singer, 2019). Other forms of pro-social behaviour: including more sustainable, ethical, healthier choices are often expensive, particularly for first-movers when the behaviour has not yet been widely adopted (Rangan *et al*, 1996).

3. Inability to tie individual behavioural change to broader social change

Wicked problems are by definition large in scale, and inaction is more likely when there is a lack of direct mental link between individual action and larger societal change. When this link is unclear or non-existent, individuals have difficulty feeling guilty or taking responsibility for their behaviour, as there are no direct benefits of good behaviour and no direct harms of bad behaviour.

Harnessing empathy and guilt

Kandaurova & Lee (2019) theorise **empathy**, **guilt** and **responsibility** as the three main determinants of pro-social behaviour. Responsibility and guilt are inextricably tied, as guilt is only created through the creation of responsibility: linking individual action with consequences for others (Miceli, 1992).

First, **Empathy**, or the “sensitivity to, and understanding of, the mental states of others” (Smith, 2006, p.3 in Kandaurova & Lee, 2019, p.572), is considered to be an effective emotional tool to encourage pro-social behaviour (Basil *et al*, 2006; Lee & Chang 2007). Empathy can be mediated through situations observed or experienced. For example, an observer can witness an observed person being harmed (a situation) or an observed person crying (emotion) (Paiva *et al*, 2005, p.237), and can then adopt the emotional state fitting with their observations, which in turn increases their desire to take action and remedy the problem. The severity of the appeal impacts persuasion (Key & Csaplewski, 2017).

Second, Social marketing can leverage **guilt** to stimulate pro-social behaviour. Guilt implies the existence of the feeling that the individual has broken a social norm, ethical principle or legal regulation (Basil *et al*, 2006, p.1036). The feeling of guilt thus presupposes that the individual has an existing notion of what they *should* do. Anticipatory guilt, or the guilt that precedes an action (or inaction) will be discussed here (Basil *et al*, 2006, p.1036). Evoking guilt requires two ingredients: responsibility and the feeling that their initial action (or inaction) causes harm (Miceli, 1992). First, responsibility can be created through the sense that an individual *caused* something to happen, or *failed* to avoid it happening. Responsibility is created when failing to act is explicitly tied to harm befalling others. Second, guilt can be created by directly linking the failure to change behaviour and the harm brought on to other people as a result of that behaviour (Miceli, 1992; Basil *et al*, 2006). However, negative emotional appeals, including guilt and fear, have been shown to promote inaction (Brennan & Binney, 2010). Schneider *et al* (2017), for example, find that anticipated negative emotions in environmental decision-making reduce pro-environmental behaviour. Negative emotional appeals can also create ethical methodological issues (Brennan & Binney, 2010).

c. Strategies for pro-social behavioural change

Several strategies exist to elicit behavioural change, often involving mechanisms that create empathy, guilt and responsibility (Kandaurova & Lee, 2019). While many such strategies exist, four relevant options that have been evaluated positively are discussed below.

Pro-social behaviour through storytelling

Storytelling plays a large role in communicating facts and narratives about our social world (McGregor & Holmes, 1999; Nguyen, 2021). Storytelling is a more effective communicator of information than facts as it combines reality with symbols and narratives (Goodman, 2006). Stories used by charities are designed to take participants through different emotional stages (McKee, 2003; Merchant *et al*, 2009). Storytelling, by definition, involves a premise or situation, followed by a problem. The problem can use synecdoche, often used in social marketing, where individual stories are harnessed to represent the experiences of a larger group. For example, the story of a victim of modern slavery can personalise the experience of others experiencing modern slavery (Nguyen, 2021).

Merchant *et al* (2009) measure the efficacy of storytelling in eliciting charitable donations. Following a problem statement, which evokes negative emotions (Merchant *et al*, 2009, p.760), participants given the opportunity to donate are more likely to donate, as this directly gives them the opportunity to change their negative moods. Indeed, Isen *et al* (1987) find that people will attempt to remain in positive emotional states and will immediately shift away from negative emotional states when given the opportunity. The donation, framed to remedy the proposed problem, not only promotes pro-social behaviour, but is an automatic mechanism to correct the negative emotional state created by the story.

Creating motivation through relevant framing

Framing the problem to be personally relevant to participants can increase the responsibility they feel for correcting the problem, and thus their motivations to act pro-socially. The Climate and Energy Project, a non-for-profit organisation focusing on reducing our carbon footprint, sponsored a yearlong competition, the Take Charge Challenge in six Kansas communities to lower their energy consumption (Torline, 2009). Less than half of the American midwest 'believes' in climate change (Houser & Webster, 2018), so the organisation chose to frame their call to action not in terms of "climate politics" (Kaufman, 2010), but instead in terms of economic savings, creating green jobs to preserve communities, and encouraging the Christian values of Earth Stewardship — with no mention of climate or Al Gore (Lefebvre, 2011). Some communities cut their energy consumption by up to 5% compared to those not participating in the competition, a large margin on a community scale (Kaufman, 2010). Framing the benefits of pro-social behaviour in simple and accessible ways creates tangible and relevant reasons to change behaviour.

Encouraging first-movers to adopt behaviour

Individual motivation is enhanced when benefits of behavioural change are maximised and the costs involved (whether time, economic or mental costs) are minimised. These costs may be especially large for *first-movers*, or those who first adopt the pro-social behaviour. Many social-change initiatives involve a benefit that is incurred only when a large proportion of the target population changes behaviour (Rangan *et al*, 1996). Those who move first thus face the costs of behavioural change, without the benefits that come when change occurs on a macro scale (Rangan *et al*, 1996). Emphasising the short run individual benefits of behavioural change can incentivise more early movers so that the broader societal benefits arrive earlier. This can manifest through making behavioural change easier and more accessible.

The role of feedback after behavioural change

Merchant *et al* (2010) explore the role played by feedback, post behavioural change, in increasing the emotional payoff of pro-social behaviour and in inciting further action for the cause (2010, p.756). Feedback also bridges the gap between the participants' behavioural change and the positive outcome of their prosocial behaviour, further increasing the responsibility (Tolli & Schmidt, 2008). Merchant *et al* (2010, p.760) find that not only does intention to donate to charity increase after receiving feedback from the charitable organisation, but that a lack of feedback decreases intention to donate, indicating that donors are highly sensitive to this messaging. Tolli & Schmidt (2008, p.698) find that feedback on job performance caused upward goal revision, indicating that feedback created long-term stable behavioural change. Providing feedback thus links behaviour to outcomes, and a lack of it may actually decrease long run behavioural change.

IV. The past, present and future of virtual reality

a. What is Virtual Reality?

Virtual reality (VR) is a communication medium that provides users with a three-dimensional, 360° computer-generated virtual environment (Kandaurova & Lee, 2019, p.571). While VR replaces the participant's sensory perception, Augmented Reality (AR) adds to it, creating an interactive experience of a real world environment where real objects are enhanced by computer-generated information (Greenwald, 2021; Porter & Heppelmann, 2017). VR is not a new technology, but recent improvements in storage, user experience, graphics processing and computational power have justified the larger scale rollout of VR technology into commercial and educational applications (Cappemini, 2018). As the VR user experience improves, so too does its accessibility. The prices of fully-mounted VR headsets, such as Sony PlayStation, Oculus and HTC, have fallen, and low-cost low-tech headsets have become available (Green, 2018). The Google Cardboard is a foldout cardboard viewer, requiring only a smartphone to access VR. The software development kit (SDK) powering the Google Cardboard technology was made open-source in late 2019 (Chen, 2019).

The virtual reality market was worth almost US\$16 billion in 2020 and is expected to grow strongly over the next decade (Grandview Research, 2021), thanks to gaming, more efficient supply chain visualisations and R&D, more effective education tools, and emerging applications in healthcare training (PWC, 2019, pp.9-13). 15 million units of the Google Cardboard have been sold. The Oculus Quest 2, a popular mounted VR headset model has already sold 5 million units (Malik, 2021).

“You know that the events you see, hear and feel are not real events in the physical meaning of the word, yet you find yourself thinking, feeling and behaving as if the place were real, and as if the events were happening. You see a deep precipice in front of you, your heart races and you are frightened enough to be reluctant to move closer to the edge. From a cognitive point of view, you know that there is nothing there, but, both consciously and unconsciously, you respond as if there is. This paradox is at the root of the concept of presence”

(Sanchez-Vives & Slater, 2005, p.332)

One of VR's most important characteristics is psychological presence: the “sensation of being there” such that the participant's senses, movements and interactions work in the virtual world in the same way as in the physical world (Bailenson, 2018, p.24). VR has been labelled as the “ultimate empathy machine” (Milk, 2015; Herrera *et al*, 2018) because of the ability of VR to present and engage with the deep emotional, sensory and physical experiences of others (Hargrove *et al*, 2020, p.1) and to promote *embodied cognition*, where cognition is shaped by bodily movement and sensory experience (Saltz *et al*, 2017, p.3, Schneegans & Schöner, 2008, pp.241-242). The immersive quality of VR also supports the development of VR games, allowing participants to engage with and manipulate the virtual space (Saleme *et al*, 2020). The gamification of VR has widened its appeal and user base. Games are one of the largest communication media in use: the UNEP estimates over 2.6 billion people play games, disproportionately comprising people under the age of 21 (United Nations Environment Programme, 2020).

VR uses tracking, rendering and display to create presence (Bailenson, 2018 pp.27-28, Chem, 2019)

1. **Tracking** — measuring body movements, such that a movement in the physical world corresponds to an equivalent movement and corresponding sensory change in the virtual world. (e.g. changing line of sight or sound as the user moves within a space).

2. **Rendering** — changing the 3-dimensional scene every time there is a movement or change to the setting, e.g. changing angle of head changes the angle by which virtual objects are seen in the virtual world.
3. **Display** — replacing physical senses with digital information

If any of these three elements are not sufficiently addressed, participants can experience nausea or confusion (Bailenson, 2018, p.28; PWC, 2019, p.15).

b. How is VR used today?

The cost of VR has dropped considerably, widening its accessibility to commercial and education audiences. A mobile VR headset can be purchased for \$400 all-inclusive, down from \$1,000 for a headset that required a \$3,000 PC for continual operation a decade ago (Barnard, 2019).

The massive cost cuts, accompanied by improved technology capabilities and user experience have rendered VR more than just a “marketing ploy” (DHL Trend Research, 2014, p.6), and usage has increased steadily over the past decade in enterprise, gaming, entertainment, military and healthcare. In 2019, 77% of the 577 organisations surveyed by the US-based Consumer Technology Association were engaged in AR and/or VR initiatives, and over 80% were using or planning to use VR technology for training and design (Mileva, 2019)



Source: Mileva, 2019

VR in **commercial enterprise** drives higher productivity and efficiency through applications in quality control and production for companies in the automobile, manufacturing and utilities sectors (Capgemini, 2018, pp.8,24). Industry leverages VR technology in four main areas (Capgemini, 2018, p.10)

1. **Design and assembly:** test and model prototypes before final completion
2. **Education:** Immersive training of an employee in a new environment
3. **Inspection and quality assurance:** more efficient monitoring
4. **Repair and maintenance:** real time visualisations and information on failures.

Virtual reality has the unique ability to transport the user to the “frontlines” of new experiences where traditional video and print mechanisms fall short (Swant, 2016). Charities make use of VR for its storytelling power (Green, 2018). VR also avoids face-to-face fundraising, which may have negative perceptions (IIAA & Give2Asia, 2018, p.49).

Charities are leveraging VR technology in four main ways:



1. Empathy: Walk in their Shoes

VR allows perspective-taking: people can understand more closely the experiences of someone else by walking in their shoes (Formosa *et al*, 2020). This promotes a cognitive form of empathy as the observer imagines the causes of another person's behaviour and actions, based on their understanding of the person's background (Rueda & Lara, 2020, p.5).

- **EDIE - Educational Dementia Immersive Experience: Dementia Australia.** Alzheimers Australia designed a VR experience to allow users to experience life as someone with dementia. The app allows users to experience forgetfulness, spatial navigation difficulties, anxiety and other common symptoms in the supermarket, on the street and at home. This is primarily targeted to carers to better understand what someone affected is going through, and how their carer can best help. [360° video, non-responsive] (Dementia Australia, 2021)
- **Too Much Information: National Autistic Society (UK).** Too Much Information provides a VR experience of autism and its associated sensory overload in a shopping centre. [2 mins, 360° video, non-responsive] (Reynolds, 2016).

2. Storytelling

VR can tell stories in a sensitive and immersive manner. Consumers and donors think narratively rather than argumentatively (McKee, 2003). Allowing participants to play a role in the stories through VR, by helping the person in need or learning about the problem, is key to engaging new audiences and differentiating the work of an organisation from that of others (Merchant *et al*, 2010, p.754).

- **The Source: 'Charity: Water' and Within.** The Source documents the daily life of a 13-year-old girl in Ethiopia as her family is given access to clean water for the first time by the charity (Within, 2015). Created as an autobiography with immersive diegetic sounds and 360° video, the film shows their fight to access clean water, and the benefits when they finally access it, thanks to the support of donors. Played at a charity fundraiser, The Source raised \$2.4 million for the Charity: Water in one night. [9 mins, 360° video, non-responsive] (Sherrington, 2018).

3. Learning tool

VR allows charities and NGOs to educate consumers and individuals around safe and responsible pro-social behaviours. The immersive quality of VR allows real-world skills to be taught, including emergency response and healthy and sustainable behaviours.

Experiencing carbon footprints in VR: UN and Sony PlayStation. In 2020, The UN worked with Sony PlayStation to develop an immersive virtual reality experience around climate change and carbon footprints. The experience creates a 3D carbon ball to scale, representing the emissions of an individual consumer as they navigate through daily activities. Participants are then challenged to undertake these daily activities consistent with the carbon footprint associated with 1.5°C warming. [5 mins, 360°, responsive] (United Nations Environment Programme, 2020)

- **Lifesaver VR: the Resuscitation Council (UK) and Unit9:** Lifesaver VR is an interactive VR experience that teaches users how to undertake effective CPR and the steps involved in alerting authorities. The video was nominated for a 2017 BAFTA award in the learning category. [3 min, 360° video, responsive] (Green, 2018; Resuscitation Council UK, 2020)
- **Beach Builder Challenge: Royal National Lifeboat Institution (RNLI).** This virtual game is designed for participants to learn about beach safety and emergency procedures. Trials indicate that individuals who played the game were better able to identify hazards than those who read a manual with equivalent information. [30 min, 360° video, responsive] (Jiang *et al*, 2018, p.137).

4. Supporting beneficiaries

VR can be used to support the beneficiaries of charity, to allow them to better understand their surroundings and to familiarise them with the services they have access to.

- **My trip to Hospital: Queensland Children's Hospital and Google.** This 360° VR tour aims to reduce feelings of anxiety and apprehension for children and their families attending the hospital, by showing them their new surroundings, the services they can access and introducing them to staff. The video has an added feature for children to find hidden easter eggs throughout the hospital, to improve engagement and invoke positive feelings (Queensland Government, 2017) [15 mins, 360° video, non-responsive]

c. What are the current limitations of VR?

While VR technology has improved considerably in recent years, several hurdles remain. Quality VR equipment remains expensive and bulky headsets can be awkward, causing eye strain and motion sickness (Bailenson, 2018, p.14). More crucially however, is that widespread VR uptake is still relatively new, and its benefits are still largely unknown, with few long-term studies exploring its effects on human behaviour.

VR is not always the most appropriate medium for communication and information transfer. Bailenson (2018, p.260) sets out the DICE criteria; “Dangerous, Impossible, Counter-productive, or Expensive” as necessary but not sufficient criteria to judge when VR should be used. If the application satisfies one or more of the conditions represented by the acronym, VR may be appropriate. Some examples below:

Use virtual reality if the situation is...	
Dangerous	<ul style="list-style-type: none"> • Flight simulators, military manoeuvres • Going into zoo enclosures and behind the scenes. • Beach and swimming safety
Impossible	<ul style="list-style-type: none"> • Experiencing the sensations of those with medical conditions • Visualising individual carbon footprints and emissions
Counter-productive	<ul style="list-style-type: none"> • Experiencing the effects of climate change and natural disasters • Experiencing the effects of modern slavery
Expensive	<ul style="list-style-type: none"> • Medical and surgical training • Decision-making and technique in sports • Virtual meetings to limit air and car travel

If the application does not satisfy the DICE criteria, then using VR to create an embodied experience will be no more effective at inducing empathy than other embodied experiences.

In a 2020 survey, 27% of VR experts believed that the biggest obstacle to mass adoption of VR and AR were content offering and user experience respectively (Perkins Coie, 2020, p.22), and over 75% expected AR and VR technology to become mainstream among consumers within the next five years, indicating significant growth potential and trust in the technology (Perkins Coie, 2020, p.29).

Incorporating physical sensations into VR is still a work in progress. According to Dr Thomas Bohné of the Cambridge Cyber-Human Lab, “One big challenge in virtual reality still, from an engineering point of view, is how to enable users to interact with the virtual environment and enable them to feel virtual things, because physics doesn’t apply” (Brackley, 2019). As the technology improves, so too will the subjective sense of presence, and that combined with effective storytelling and production is expected to considerably improve the participant’s emotional and tactile investment in the experience (Marín-Morales *et al*, 2020 p.3).

Hidden ideology: VR and the false perception of objectivity

Virtual reality is an immersive medium, affording the participant the perception that they have full control over how they navigate through a virtual environment and how they perceive their surroundings. With VR, the participant no longer feels like a spectator but instead becomes an actor within the space. Because of this perception of control, it is easy to assume that VR offers a more objective form of media, due to this perception of control. However, this masks the inherent subjectivity within the stories told through the headset. Irom (2018, p.4287) questions the potential of VR to “usher in a new level of immersive engagement”, as it is still inherently tied to “the constraints of ideology and power hierarchies that permeate other

representational tools”, demonstrating several examples of the entrenchment of racial, gender and religious stereotyping of refugees in VR experiences of refugee camps. VR is thus a powerful immersive tool, but choices made in the storytelling and creation of VR experiences must acknowledge the specific choices that were made of how to depict its subjects. Whether it is 2D or 360°, there are always stories not told, and there are always events going on behind the camera...

A cautionary note on data security

Under the EU’s General Data Protection Regulation (GDPR), VR data is a “behavioural biometric”, as it is “personal data resulting from specific technical processing relating to the physical psychological or behavioural characteristics of a natural person” (Carter, 2021). Enormous quantities of data are collected from VR, and 5 minutes on a headset has been found to provide enough data to confirm the unique identity of a person with 95% accuracy (Carter, 2021). This data is rich and has the potential to provide exciting insights into the way people connect with and respond to technology and its stories: understanding what visuals attract VR participants, how they respond to stimuli and how they engage with information are all possible using the data collected by VR. Indeed, a survey of VR experts in 2020 found that consumer privacy and data security was seen to pose the highest legal risk to the development of immersive technology, with the most popular mitigation mechanisms being privacy policy updates and limiting the collection, sharing and usage of personal information (Perkins Coie, 2020, pp.23-24). These complexities are still being resolved.

d. How can we evaluate the efficacy of VR?

Archer & Finger (2018) investigate the link between VR formats and longer-term behavioural change. Participants in the study were exposed to one of a few similar VR videos with prominent narrators, and then completed a survey before and after treatment, and then two and five weeks later. The authors find that immersive and non-immersive virtual reality treatments generate higher levels of empathy for a cause than text-based treatments, with no significant difference between immersive and non-immersive VR (Archer & Finger, 2018, p.52). Participants are more likely to recall the stories in the long run, and have a higher perceived likelihood of “political and social action” after viewing. However, most crucially, different VR experiences yield different immersion scores, indicating that not only the *format* of delivery impacts empathy and immersion, but the *narrative quality* of the story is important too (Archer & Finger, 2018, p.52). The knowledge of and trust in the narrator appears especially impactful here (Archer & Finger, 2018, p.52).

These findings raise two important questions for the evaluation of VR:

- I. How can we effectively and fairly evaluate the effectiveness of VR as a learning format?
- II. How can we differentiate the effectiveness of VR as a format from the quality of the narrative that it communicates?

Clearly, VR is more immersive than static text-based communication (Archer & Finger, 2018; McClinton, 2019). Since there are few credible alternatives to VR, it becomes difficult to evaluate its efficacy and thus justify its investment.

Hargrove *et al* (2020) compare the use of VR to that of embodied experience in inducing empathy for a charitable cause. The experiment recreates the experiences of the target group to bring the participant closer to the lived experiences, in the experiment asking participants to carry heavy water jugs for 10 minutes. The authors find that both treatments significantly change participants’ attitudes towards the cause. This finding however does not prove fault with VR. Indeed it is notable that VR can mimic and elicit similar effects to “real-life” physical experiences, indicating that VR can be useful when the DICE criteria are satisfied.

e. Emerging trends in VR

5G network applications. 5G can provide high quality, high bandwidth VR experiences, allowing for greater immersion and detail within the virtual framework (Sherr, 2020). Providing up to 100x the speed of today's internet, 5G has the ability to lower latency for greater precision. This could have important applications in super-precise remote surgeries and engineering tools including self-driving cars (Kanowitz, 2021)

Inside-out tracking. Outside-in tracking, a mature technology, operates using external sensors and hardware, relying on the headset's position relative to the sensors to determine its precise location. While this provides the lowest possible latency, it is limited in that the playing area must be small and external objects cannot be used, as they disrupt line of sight between the sensor and the headset. Inside-out tracking remedies this problem by constructing a series of cameras and sensors on the headset, that can then map the 3D area around the headset and determine its position within it. While this can increase latency due to high processing requirements, it increases user immersion by removing external hardware and allowing for larger and more heterogeneous playing areas (Bloomfield, 2021).

Mobile computing power advancements. Technical improvements in mobile computing power have allowed headsets to be completely wireless, removing the need for external computers, improving the affordability and mobility of the headsets. Today's headsets have built in processors, cutting costs by up to 10 times (Kugler, 2021)

Big data visualisation. Virtual reality is being used to visualise big data, particularly in the areas of commercial production and healthcare. An immersive virtual environment that visualises the highly complex networks of the brain resulted in a better understanding of the data and a more dynamic user experience (Arsiwalla *et al*, 2015). This technology is still being developed. The visualisation of highly complex supply chains is also leading to improved efficiency and the easy identification of potential problems and future synergies.

V. Modern slavery and VR

a. Connecting the consumer to the production process

Kevin Bales, Professor of Contemporary Slavery at the University of Nottingham, writes in his book *Blood and Earth: Modern Slavery, Ecocide, and the Secret to Saving the World*

“Whether we are grilling shrimp for our friends or buying T-shirts for our children we generally think of these things as beginning where we first encountered them, at the shop, at the mall, in the grocery store. But just as each of us is deeper than our surface, just as each of us has a story to tell, so do the tools and toys and food and rings and phones that tie us together. [...] Slaves are producing many of the things we buy, and in the process they are forced to destroy our shared environment, increase global warming, and wipe out protected species”

(Bales, 2016, p.16)

Indeed, a potential explanation for consumers' apparent apathy towards modern slavery concerns in their purchases is simply the lack of attention paid to the life of the product prior to its purchase. Marx's *alienation of the worker* arises when the worker is disconnected from the products they produce due to the assembly-line production methods used to create the commodity (Marx, 1844). There is alienation of the consumer here, as the consumer is disconnected from the products they buy, and as such they lose meaning to the consumer. A key educational tool could be in creating an appreciation for the life of a product prior to purchase: products do not begin their lives when they are bought by a consumer, but go through countless hands, systems, factories and processes to become the final product.

Forgetting these stages means forgetting that modern slavery is likely to have existed somewhere along that supply chain.

To be successful, VR must be capable of bridging the gap between consumers' perceptions of and the realities of the products that they buy — connecting the consumer to the products they buy by educating them about the exact nature of the production process that made them.

b. Virtual reality for scale, feasibility and novelty

Jeremy Bailenson's DICE (Dangerous, Impossible, Counter-productive, Expensive) (Bailenson, 2018, p.260) criteria were discussed in section II. c., and provide a framework to determine whether using VR would add value. Since VR mimics the embodied experiences of participants (Hargrove *et al*, 2020), VR is preferred in situations where embodied experiences are not possible or practical under the DICE criteria. Modern slavery involves physical, emotional and financial harm upon the person, and real embodied experiences of this would not be feasible, indicating a strong potential use case for VR in the area.

VR is also useful in comprehending the sheer scale of modern slavery today. Donalek *et al* (2014) argue that big data visualisation using virtual reality can lead to the discovery of hidden patterns and the broader comprehension of the scale of the data. They state:

“Visualization is the main bridge between the quantitative content of the data and human intuition, and it can be argued that we cannot really understand or intuitively comprehend anything that we cannot visualize in some way.”

(Donalek *et al*, 2014, p.609)

Finally, Archer & Finger (2018, p.55) find that participants unfamiliar with the story and context of their VR experience record the highest empathetic responses to the material, indicating the efficacy of VR in introducing new topics to viewers in an accessible and sensitive way. The average individual's knowledge of modern slavery is minimal, and VR thus offers the opportunity for a novel way to introduce an unknown topic to participants.

Virtual reality thus offers the ability to span multiple scales—understanding both the micro-level individual stories and experiences of those who survive in precarious working conditions, and the macro-level data visualisation to understand the extent of the problem globally, whilst accessibly attracting audiences unfamiliar with the issue.

c. Putting it all together: VR as a tool to induce pro-social behaviour

Prosocial behaviour is highly malleable (Shriram *et al*, 2017, p.308), and priming, framing and feedback all significantly influence people's attitudes and behaviours. Virtual reality provides a plausible tool superior to artificial stylised experimental settings and to generalised field experiments. VR can thus provide a platform to accurately measure and evoke positive behavioural responses (Rovira *et al*, 2009, p.1).

VR is also uniquely positioned to provide data-driven visualisations of the stages of development of the product. Supply chain visualisation is already an established VR tool in commercial enterprise, and stylised versions of this can be used to educate the consumer about how, where and when their product was made and by whom.

VI. The case for VR in humanitarian action

a. Improving self awareness: critiquing our own behaviour in racial bias training

Racial bias training uses VR to place individuals in the shoes of others in workplace training scenarios. This training significantly lowers implicit racial biases and changes decision-making behaviour among participants in the treatment group.

VR allows participants to take on the perspectives of others in difficult scenarios. A study was conducted on the effect of VR in racial bias training on participants' conduct in mock courtroom settings as judges and jurors in ambiguous legal cases (Salmanowitz, 2018). The study measured the effect of embodied VR experiences on racial bias, using non-embodied VR experiences as a control group: where participants had no connection to the avatar in the virtual world. The study found that implicit racial biases were significantly lower among participants in the embodied VR group, and this effect was more pronounced when participants embodied a black avatar and then evaluated a black defendant. This result suggests the presence of the "body ownership" illusion, as physically embodying an avatar may enforce "self-regulation, perspective-taking and stereotype reduction" (Salmanowitz, 2018, p.181). It is important to note that other studies of racial bias training have yielded mixed results, and there is not yet consensus that VR training can successfully change race attitudes and behaviours. This may be an example of "tech solutionism", where tech is used to address a problem with deeply-rooted causes that require a range of solutions to fix.

b. Improving social presence: going behind the scenes with Victorian zoo project

Virtual reality can improve the social presence of participants in zoos. Intimate settings where participants are socially-isolated and directly referred to within the virtual world can improve accountability.

Carter *et al* (2020) explore the effect of virtual reality in zoos on participants' cognitive and emotional immersion, and understanding of animal welfare. Using 180° film via a VR headset, participants explore penguins up close and watch zookeepers prepare food behind-the-scenes. The zookeeper uses direct eye contact into the camera, and speaks directly to the participant, creating a form of intimacy, social presence and accountability that disappears when there is a crowd. The authors find evidence that the VR experience improves presence and participation, with some participants stating that the experience felt "collaborative", as if they were preparing the meal with the zookeeper (Carter *et al*, 2020, p.243). Further research can explore the impact of socially isolating participants for the duration of the experience and understanding if there is longer-term behavioural change (Carter *et al*, 2020, p.244).

c. Improving empathy: stories and interviews in *Travelling While Black*

VR can situate the viewer as an active participant of conversations and experiences happening in the virtual world that they may not be privy to in the real world. Immersing the viewer within these situations forces them to critically engage with these issues.

Travelling While Black is an embodied virtual reality experience. With the narrative and feel of a documentary, the VR serves to enhance the presence of the viewer within the experience. Indeed as *The Guardian* notes, "there is nowhere to turn away from the horrors of racism. It besieges the viewer in its inescapable cage" (McClinton, 2019) The film intertwines interviews with archival footage, allowing the viewer to feel like they are a part of these historical situations, from sitting on a segregated bus to sitting with a group of girls in Ben's Chili Bowl in Washington DC. One participant remarked after watching the movie "In VR, you get to

actually feel like they are there in front of you, much more strongly than by watching them on a flat 2D screen. So that really changes how receptive you are to anything that is presented to you” (McClinton, 2019). However, while VR presents a compelling case to improve empathy, VR experts are less sure. VR has been praised as an “empathy machine” (Carter, 2021) to assist in corporate diversity training. However, there is no clear evidence that this method is effective at changing attitudes and behaviours, according to VR expert Nicolás Rivero (Rivero, 2020).

d. Improving understanding: connecting consumers to supply chains in Onda Origins coffee

VR, combined with blockchain technology, can be used to educate the consumer about the origins of the product that they buy, while also enabling sophisticated technology allowing them to pay directly the producer of the product.

US-based Onda Origins Coffee was built on a model of sharing sales revenue directly with the coffee farmers who produced the product (Levy, 2018). The brand uses Blockchain technology to securely track their coffee supply chain, to improve accountability and accurately measure quality. Also using this blockchain, Onda Origins recently released a VR experience allowing consumers to tour the producer’s coffee plantation, at which their coffee was grown while also being able to tip the coffee producer directly. This experience is one means by which companies can “de-alienate” the consumer from the products they buy: creating a “glass pipeline” (Helm, 2018) for consumers to understand how, where and when their coffee was made, and by whom.

e. Inducing an emotional response: intimate experiences in *Waves of Grace*

VR can heighten the emotional power of stories, bringing the audience closer to the setting and issue.

Waves of Grace is a short VR film made in 2015 by Vrse.works in collaboration with Vice Media and the UN that combats donor fatigue in the later stages of the Liberian Ebola outbreak (Temperton, 2015). The movie attempts to bring the viewer close the issue: watching graves being dug for victims, and sitting with children in a classroom (UN VR, 2015). Executive Producer Patrick Milling Smith stated “Someone is looking right at you, often very close, staring right into your eyes and the feeling is one of being seen or discovered, somehow complicit in the story or sharing a moment” , and indeed the closeup shots of the protagonist, Grace, and personal narrative reduce the distance between the viewer and the issue (Temperton, 2015).

f. Improving interactivity: gamification in *Becoming Homeless*

Combining interactive games with storytelling creates a powerful medium to promote long-term empathy in VR participants.

Become Homeless is an interactive virtual reality game, developed by the Virtual Human Interaction Lab at Stanford University (Virtual Human Interaction Lab, 2020). The 7-minute experience allows the viewer to interact with their virtual environment to try to save their home and protect themselves as they face homelessness. Combining interactive experiences with the stories of people who have faced homelessness allows the viewer to immerse themselves in the environment. Evidence from this study suggests that interactive VR can effectively improve empathy to the cause for even months after the experience (Shashkevich, 2018).

Are there alternatives to VR?

Companies have been trialing other novel ways to transparently display their supply chain information.

- **Nike** has a comprehensive interactive supply chain map that tracks information on where their products are made and by whom. Demographic features are available including the percentage of female workers and the percentage of migrants working in any given factory. Available here: <http://manufacturingmap.nikeinc.com/>
- **Nudie Jeans** has a Production Guide that provides information on where their products are made, with highly comprehensive information on their suppliers and sub-suppliers, including PDF summaries of the audit they have conducted. Available here: <https://www.nudiejeans.com/productionguide/>
- **Waitrose (UK)** has a comprehensive factory list, updated in October 2018, providing information on location, gender composition and trade union status. Available here: <https://www.johnlewispartnership.co.uk/content/dam/cws/pdfs/our-responsibilities/2018/waitrose-factory-list-november-2018.pdf>

VII. Conclusion

There is a strong opportunity to take advantage of the affordability, immersion and novelty of VR today in humanitarian communications and social marketing. VR can demonstrate both micro-level stories in a manner that is sensitive and emotional, while at the same time providing big-picture insights into the scale and widespread nature of humanitarian problems. However, VR cannot be considered as a perfect method of humanitarian communication. Its success is reliant on the quality of its story and the sensitivity with which it presents its material and subjects. We should always keep in mind that everything we create was created based on a series of conscious and subconscious choices we made:

“There is ideology enacted in what problems and issues are included, ideology in how those problems are identified and set up, and ideology in the options that one is given for dealing with the issues”

(Horsfield, 2003, p.164 in Irom, 2018, p.4288).

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