A|B|A|I
Association for Behavior Analysis International

ORIGINAL PAPER

Culturo-Behavioral Contributions to a Sustainable Market: The Interplay of Producers' and Consumers' Practices

Marco Tagliabue[1] ⬤ · Izabella Kazimiera Łęgosz-Tagliabue[2]

Abstract

Sustainability is a relevant and pressing theme in which concepts and tools of cultural systems analysis should be applied to a greater extent. The misalignment of the incentive system for producers and consumers raises the issue of sustainable production and consumption of goods and services. A change of paradigm may be needed for shifting defective practices into better informed choices that are consistent with environmental targets and avoid the overexploitation of our planet's resources. Previous efforts include the 2010 special issue of *The Behavior Analyst* and the Matrix Project, which advocated a greater involvement of behavior analysts and scientists in sustainability issues. In this conceptual analysis, we continue this effort by analyzing and discussing some of the contingencies underlying: *i*. manufacturers' drive for offering environmentally friendly goods; *ii*. consumers' bounded choices; and *iii*. their interaction in the market for achieving sustainable goals. We provide examples of virtuous and defective practices and relate to the Green Shift in Norway. The potential impact of this work consists of informing and influencing policymakers and advocacy organizations as agents of change. Their work is key to shape producers' and consumers' preferences for implementing sustainable practices and achieving common environmental goals.

Keywords choice · consumer behavior · cultural practice · Green Shift · sustainability

With rising energy and production demands, partially due to the increasing worldwide population, the effectiveness of policies and interventions to promote sustainable practices and achieving common environmental goals are under scrutiny. The differential speed between consumers' demands and the regenerative capacity of the

✉ Marco Tagliabue
  marco.tagliabue@oslomet.no

1   Department of Behavioural Sciences, Faculty of Health Sciences, OsloMet - Oslo Metropolitan University, PO box 4, St. Olavs plass, 0130 Oslo, Norway

2   CEMAsys Nordic AS, Oslo, Norway

🙌 Springer

environment that serves both as an input for provisioning for production and as an output for disposal represent a threat to future generations. For example, the OECD (2022) pointed to rising population and income as drivers of an increase of the use and disposal of plastic, and to the ineffectiveness of policies to curb plastic's leakage into the environment. Given the interplay of several agencies in establishing and maintaining sustainability issues and the complexity of relationships involved, a culturo-behavioral approach seems to be warranted.

This conceptual analysis addresses primarily policymakers and advocacy agencies, electively non-governmental organizations (NGOs), as agents of change. Coordinating multiple points of change and evaluating stepwise changes in cultural practices (see also Levin et al., 2012) could be an approach to better managing the interplay between the analysis of metacontingencies in behavior analysis and societal self-organization of limited resources. This raises many interesting changes that behavior analysts can help address, such as measuring behavioral variability, identifying sources of influence, and evaluating behavior change over time and across lineages.[1]

Sustainability represents a policy concept that has several important implications for our choices in our daily lives, and for the immediate and delayed effects of those choices. The World Commission on Environment and Development (WCED, 1987) defined *sustainability* as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[2] Sustainability is a complex concept because, among other factors, its effects are delayed, probabilistic, or both.

Arguably, the most common approach to tackle and shape sustainable consumer practices is the behavioral level of analysis and intervention. Behavior analysts have been applying principles from the science of behavior to sustainability issues for at least half a century (see Burgess et al., 1971; Cone & Hayes, 1984). However, there seem to be only a few studies that adopted a behavioral systems analysis to understating and shaping (more) sustainable practices (e.g., Seniuk et al., 2019) in spite of the pioneering work of complexity theorists from the late 1940s (e.g., Weaver, 1948) and their influence on behavior analysts interested in systems analysis some 40 years later (e.g., Rummler & Brache, 1988).

A cultural selection perspective applied to the behavioral components encompassing sustainable choices increases the likelihood of transmitting values and practices in time and across individuals who share a common set of characteristics. The behavior analytic community has used the concept of the metacontingency for several years (e.g., Glenn, 2004), although with limited applied usability (see Zilio, 2019).

This project aims at extending the findings of a behavioral approach to sustainable cultural practices (see also Tagliabue, 2022). Hirsh et al. (2015) suggested focusing on the level of behavioral mechanisms underlying sustainability and conducted research on delay discounting. While agreeing with their position, we go beyond and

---

[1] We thank the guest editor for his reflections on the interplay of behavior analysis, community self-governance and super wicked problems, which we included in this paragraph.

[2] https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (p.41, paragraph 1)

argue that we should be focusing on the interplay between producers and consumers in a market system; specifically, on sustainable choices and how they may inform cultural practices and policies.

The secondary goal of this conceptual analysis is to raise awareness on the roles and relations between producers and consumers that policymakers should be (more) aware of for making a positive impact on the environment. More specifically, we analyze whether behavior and system change should be initiated on the consumers' or the producers' end for establishing sustainable practices.

The analysis is organized in the following way: the remaining part of this section introduces one of the basic requirements for shifting sustainable practices: alternatives to purchasing behavior and consumers' bounded choices in a market that is heavily influenced by manufacturers' drives. Next, we interpret sustainability as a super wicked problem and call for an approach grounded in the analysis of behavior and cultural phenomena to break down the complex relations that characterize sustainable practices. We discuss the influence of producers and consumers as potential agents of cultural change that can lead to a paradigm shift, and shed light on how we can assess and influence pro-environmental behavior from a behavior analytic perspective. Lastly, we provide an example based on differential greenhouse gas (GHG) emissions scenarios.

In the field of waste management, the gold standard for virtuous consumers changed from the 3R principle (reduce, reuse, recycle) to the 4R principle (reduce, reuse, recycle, recover). While this seems to suggest focusing on the consumer's side, there is so much pressure from the manufacturers that we are sometimes "forced" to buy or consume (through different channels) that it is not clear anymore who has the most influence in this chain. Consumers are often the target of aggressive advertisement campaigns that are obviously aimed at increasing producers' profits through increased consumption. Moreover, consumers are also "forced" to purchase products that have already been selected for them by being offered in the local or global market, which may not provide enough choice to the most demanding consumers in terms of sustainability requirements.

Furthermore, many products are designed to fail sooner rather than later, such as electronics, which are continuously upgraded. For example, in their life cycle assessment of Apple's iPhone, Rodriguez et al. (2015) conclude that "Apple releases a new model of the iPhone every 1–2 years. The iPhone is intentionally designed to have a shortened life cycle, which leads to increased mining of REMs [rare earth minerals] and more fossil-fuel usage in production and transportation" (p. 3). Furthermore, not all consumers possess the abilities to repair these products, repair points may be few and inconveniently located (especially if consumers do not live close to metropolitan areas), and the cost of repair may be disproportionally high compared to a new purchase (see also Güsser-Fachbach et al., 2023).

Product managers and developers play an important role in creating and marketing new or improved products that may spread (e.g., the product development process by Ulrich et al. (2008) implemented in Asea Brown Boveri Ltd). Some of these strategies include green management, green supply chain, material eco-efficiency, and energy efficiency (Albino et al., 2009). The role of small businesses has also been acknowledged with respect to fostering sustainability: from local economy development, to

bridging the gap between public sector management and communities (Walker & Preuss, 2008).

Purchasing behavior is as interesting to the analysis as repairing and reusing. These represent more sustainable choices, but the term *more sustainable* does not come free of possible misunderstandings; everything could be produced in a more sustainable way. There seems to be no 100% sustainable product and it is unlikely that there ever will be, so we do not settle on a clear-cut definition of sustainability that encompasses both the features of new products and the virtuous practices contained in the 4R principle (see also Toman, 2006, on the difficulty in defining sustainability). In this and similarly complex scenarios, it is unclear who has the best chances of breaking this chain of events and relations that contribute to exacerbating the climate crisis.

Sustainable Behavior and Cultural Practices as a Super Wicked Problem

The concept of sustainability is intertwined with the study of wicked problems (Rittel & Webber, 1973): according to the originators of the concept, one important characteristic of wicked problems that warrants mention is that they are never solved, because there will always be disagreement about what constitutes a solution. Moreover, super wicked problems are characterized by time pressure, the lack of central authority, role ambiguity where those proposing solutions to the problem are the same actors that are causing the problem, and policy responses are prone to irrational discounting (Levin et al., 2012). Fundamentally, they possess intrinsic system complexity.

Climate change is one of the most obvious examples of this type of conundrum (Lazarus, 2009; see also Alavosius & Houmanfar, 2020). Faithful to its moral obligation, the climate science community (which is astonishingly multidisciplinary, transdisciplinary, and cross disciplinary) has informed the public about the irreversible effects of climate change on several occasions (e.g., Ripple et al., 2019, consisting of 11,000 scientist signatories). Similarly, welfare, health, and education within the domain of social sustainability seem to be characterized by complexity and time-pressing issues. For example, large beverage manufacturers have been using plastic bottles for years but only recently started advertising that they recycle the same amount as they release on the market.

It is challenging to obtain the exact numbers, but according to the National Association for PET container resources, only about 21% of bottles collected for recycling in 2017 (including but not limited to drink bottles) were turned into new things (NAPCOR, 2018). Tomra (2023), a Norwegian leading organization in reverse vending machines operating in over 100 countries, reports that, globally, less than 3% of annually sold drink containers (equivalent to more than 45 billion) end up in their closed-loop recycling system. Coca-Cola's declared sustainability target is collecting and recycling a bottle or can for each one they sell by 2030, in addition to using at least 50% recycled material in their packaging globally by the same year (The Coca-Cola Company, 2020). While praising this pro-environmental initiative

from the producer's side, consumers and the environment would be better served if manufacturers calculated how many tons of plastic they have released on the market since their operations started then committed to recycle the same amount over a set period as retroactive "compensation" (naturally, in addition to recycling all newly released bottles). In fact, according to the first Global Plastics Outlook published by the OECD (2022), "the world is producing twice as much plastic waste as two decades ago, with the bulk of it ending up in landfill, incinerated or leaking into the environment, and only 9% successfully recycled" (p. ND). Conversely, plastic container return rates in Norway in 2021 were 92.8% (Tomra, 2022), which place the country's deposit return scheme as a leading example worldwide based on a direct and *quid pro quo* incentive structure.[3]

The attitude-behavior gap is a threat to implementing corrective actions in situations where contingencies of choosing smaller-sooner rewards compete with larger-later rewards. This tension is represented by the phenomenon of delay discounting: "the decline in the present value of a reward with delay to its receipt" (Odum, 2011, p. 427). Delay discounting is a universal phenomenon and has been observed in several species (Li et al., 2021). Consumers may, thus, display a preference for smaller-sooner rewards that represent a threat to implementing sustainable practices and there are several examples available in the literature, ranging from the adoption of electric vehicles (Haider et al., 2019) to the purchase of recycled fashion products (Park & Lin, 2020).

However, there has been less research focusing specifically on the role of values and their relation to the contingencies of behavior in the situation of choice. For example, the review of Leiserowitz et al. (2006) identified a three-tiered distinction of values, attitudes, and behaviors needed to achieve global sustainability, but their discourse took place at an overarching level and did not include any functional analysis of behavior. In fact, the tradition of behavior analysis can contribute to the advancement of the field and topic by a strong experimental and methodological apparatus, an empirical approach to understanding and influencing behavior that rests on a selectionist perspective (see also Furrebøe & Sandaker, 2017), and a comprehensive approach based on the observation of behavior informing attitudes, values, and norms from single-subjects to cultural phenomena (e.g., from contingencies of behavior to meta-contingencies; see Glenn et al., 2016).

Assessing values and attitudes may include the measurement of attitudes toward sustainability by survey (e.g., Rejman et al., 2019), the experimental task of the implicit relational assessment procedure (IRAP; Barnes-Holmes et al., 2006) and fieldwork to explore the use of behavioral interventions on a selection of social and environmental sustainability themes. While the IRAP has been implemented in several clinical and non-clinical research projects, its application in the field of sustainability is limited. For example, Barnes-Holmes et al. (2010) reported that the "IRAP indicated pro-vegetable and anti-meat biases for the vegetarians that differed

---

[3] For comparison, the French government has postponed to fall 2023 the decision on whether to introduce a bottle deposit scheme for improving the country's plastic packaging recycling rate (Barroux, 2023), which is under 27% at the time of writing (Mandard, 2023).

significantly from the meat-eaters' pro-vegetable and pro-meat biases" (p. 298). Other studies include variations of automatic appraisals, such as a study on preference for meat consumption based on an IRAP-like methodology (i.e., IMPACT; Altenburg & Spruyt, 2022).

Once the assessment phase is complete, the interventions designed to increase more sustainable consumption feature a set of challenges based on the limits of traditional economic and policy interventions. These are characterized by economic incentives and bans or restrictions that may have a limited effect and are extremely costly to implement at a large scale; conversely, environmental changes embedded in policymaking support may yield large gains at a relatively small cost (e.g., social-norms and planning-prompt nudges, see Benartzi et al., 2017). In behavioral economics research, these changes have been termed *nudges* (Thaler & Sunstein, 2008) and, according to two systematic reviews with meta-analysis, have significant effects in domains such as dietary behavior (Arno & Thomas, 2016) and beyond (Mertens et al., 2022): overall effect sizes indicate a small to medium positive effect of nudges across several areas of sustainability. *Boosts* are nudges for a policy that have an educative function (see Grüne-Yanoff & Hertwig, 2016) and are more suitable for recurrent choice behavior. Because both nudges and boosts can steer present behavior by linking it with wide and abstract reinforcers (Rachlin, 2015), their use and long-term effects should be better understood and implemented for achieving sustainable practices.

In behavior analysis, nudges and boosts may be regarded as motivative augmentals or motivative operations. According to Törneke et al., (2008), "an augmental is a type of rule that instead of specifying consequences or contingencies, as the two types above (plys and tracks),[4] changes (augments) the reinforcing value of the consequences specified in the rule" (p. 146). More specifically, motivative augmentals comprise verbal behavior in the form of rules that alter the effectiveness of established reinforcers (Poling et al., 2020 – such as publicly displayed messages for encouraging recycling), whereas motivative operations affect the strength of reinforcing or punishing consequences (e.g., Laraway et al., 2003): for example, the placement of locally sourced produce inside a grocery retailer.

Maraccini et al. (2016) reviewed the concept of motivation and with augmentals as intervening variables in organizational behavior management research: rules, goals, and values. Although they do not explicitly mention nudges and boosts, there are several similarities with the application of transforming the consequential functions of stimuli in performance management as long as incentives are not substantially altered (which seems to apply in their example of getting free movie tickets contingent on sales performance). The majority of behavioral economics research on nudges and boosting is from applied settings. Several studies used the IRAP to

---

[4] Plys and tracks are two different type of rules that govern two different classes of behavior: pliance and tracking, respectively (Kissi et al., 2018). Pliance is rule-governed behavior under the control of apparent speaker-mediated consequences for a correspondence between the rule and relevant behavior" (Zettle & Hayes, 1982, p. 80). Tracking is rule-governed behavior under the control of the apparent correspondence between the rule and the way the world is arranged" (Hayes et al., 2004, p. 206).

investigate motivative augmentals with forms of cooperation more basic than sustainable behavior (e.g., Ghezzi et al., 2020; Rafacz et al., 2019).

Reaching beyond the level of individual behavior change (see Skinner, 1953) is an ambition articulated by Biglan (1995) and then Mattaini (2013), who urged behavior analysts to start tackling community and environmental issues (see also Leigland, 2011; Skinner, 1971). Seniuk et al. (2019) took their work as a starting point for putting forward a framework inspired by the Matrix Project and working with sectors for engaging more behavior analysts in sustainability practice and research. The non-profit Values to Action extends Biglan's work by creating organized groups of behavioral scientists and community members to conduct prosocial work within the structure of an "Action Circle" (see also Biglan, 2020). Sectors are at the core of the behavioral systems approach and stand for all individuals, organizations, and institutions that cause the problem. In this sense, producers and consumers, as we use the terms, are sectors of the super wicked problem of sustainability.

Another practical application of implementing the principles of multilevel cultural evolutionary science is represented by the Prosocial program for enhancing groups' productivity, equitability, and collaboration (Atkins et al., 2019; see also Wilson et al., 2023). These principles rest on Elinor Ostrom's work as she examined how people organize themselves to manage resources and sought to find solutions to the "tragedy of the commons" (see Ostrom, 1990). She was the first female Nobel Memorial Prize recipient in Economics in 2009 (followed by Esther Duflo in 2019), and she conducted several case studies of communities that successfully lived within sustainable boundaries for many generations.

As previously noted, one of the stated goals of this conceptual analysis is to discuss which sector should start the change of paradigm: the producers (i.e., those in executive leadership positions within large multinational companies) or the consumers of those products. First, we should address the question on whose behavior has a bigger impact on the environment: manufacturers that change strategy toward more environmentally friendly products or consumers that select (i.e., purchase) more environmentally friendly products, or fewer products according to the 4R principle). Behavior analytic research informing the latter case includes arbitrarily applicable relational responding (AARR; Stewart & McElwee, 2017).

Whose behavior is it easier to change: the behavior of, say, 30 million people or the behavior of one "producer" consisting of a small group of selective C-suite executives that covers the demand of these 30 million people for a specific product or set of products? If behavior analysts can redesign the set of individual and cultural contingencies (i.e., meta-contingencies) of either sector, this may result in alternative strategies affecting consumers' choices at large. Multilevel cultural evolutionary theory is the principled alternative paradigm (i.e., cooperation benefits all) to the "greed is good" ethos that Wilson et al. (2023) describe in relation to the Adam Smith's invisible hand and Milton Freidman's views of profit-driven corporate social responsibility that started gaining momentum since the 1970s (p. 4).

Similar to how Malott (2019) used the concept of cultural cusps for analyzing the Mexican Mural Movement, there seem to be both recursive and non-recursive interactions that form a complex phenomenon. A cultural cusp features "the coalescence of unique and nonrecurring interlocking and/or individual behavioral contingencies

that results in a product that leads to significant sociocultural change" (Glenn et al., 2016, p. 21). Examples of cultural cusps include the creation of the U.S. Declaration of Independence (Glenn et al., 2016) and the formation of NATO (Malott, 2016), and we see the potential benefits of applying the cultural cusp concept to the super wicked problem of environmental sustainability.

Another argument against optimism is the phenomenon of *greenwashing*. Greenwashing was first used by Jay Westerveld in 1986 and refers to "the practice of falsely promoting an organization's environmental efforts or spending more resources to promote the organization as green than are spent to actually engage in environmentally sound practices" (Becker-Olsen & Potucek, 2013, p. 1318; see also de Freitas Netto et al., 2020).

A change of paradigm may be called for overturning the status quo and replacing defective practices with protective (for the environmental and our society) ones. In terms of complex adaptive systems, this may be translated into setting the occasion for positive feedback loops that lead to a critical mass point. For example, Krispin (2017) utilized positive feedback loops at the cultural level of selection for illustrating the selection process sustaining the current smartphone industry, focusing particularly on the (escalating) production of aggregate products.

It may be more effective to focus on the producers and shape the extent to which they are capable and willing to introduce environmentally friendly products into the market. This approach is in line with previous research that used the concept of metacontingency to motivate governments to make organizations reduce their negative externalities, such as environmental pollution (Biglan, 2009), and enhance organizational leaders' decision making to foster prosocial behavior and social well-being (Houmanfar et al., 2015). This process may be achieved through lobbying, mandating, socially prompting, boycotting, and by imposing fines, incentives, and sanctions. In this sense, we may advocate the use of culturant hypercycles as the term for depicting these complex relations at the system level, as this term includes two processes: selection and generation of one or more aggregate products in the set of culturants under scrutiny (Krispin, 2019). This conceptual analysis allows identification of two macro hypercycles at the producers' and the consumers' level, which can be further unpacked into smaller sets or sectors depending on industry, location, and frequency of purchase (e.g., groceries vs. vehicles).

Some of the possible contributions of behavior analysis to research on pro-environmental behavior have been addressed by Wille and Lange (2022) by highlighting the role of context, methodology, and framework in behavior analysis for enriching the dominating mechanistic theories in research on pro-environmental behavior, inspiring new intervention techniques. Some of these are anchored in their exemplification of a behavior analytic model to sustainable choice reproduced, which is expanded to include an analysis of the behavior systems analysis proposed in Fig. 1. Although there are common factors influencing producers' supply (i.e., environment, economy) and consumers' demands, they tend to be discounted in different ways depending on which "side" of the market-system we approach first.

Environmental factors affecting consumers' demands include the current state of ecosystems, environmental damage, risks, and opportunities associated with the impact on the environment. Producer supply refers to the availability of products on
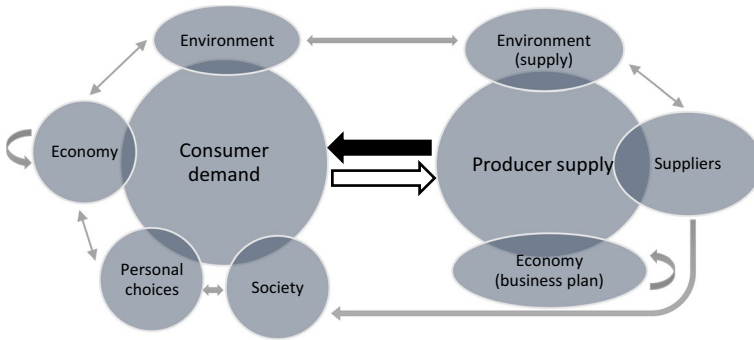
Fig. 1 Consumer-Producer Interactions in a Market with Feedback Loops. *Note.* Only the most important relations are displayed, starting from the primary feedback loop (first in black, then in white), secondary relations (thicker gray arrows), and tertiary relations (thinner gray lines)

the market, the selection of products, and any advertisement, which includes all matters in which the product is presented to potential selectors (i.e., customers). Society refers to current trends, which may include fashion, social media, news, advertisements, social movements/initiatives, and so on. Personal and societal choices rest on preference rankings and beliefs shared among the several individuals that communities consist of. Lastly, the economy related to consumers' demands is a measure of general prosperity of the society (e.g., inflation, affordability of products).

On the producers' supply side, the environment affects manufacturers directly, such as the impact of the environment on producers' operations (e.g., flooding of production sites), and indirectly. Suppliers stand for the availability of raw materials. With consumer demand we mean what is requested based on current needs, trends, fashions, and so on. Finally, the business plan represents the economical factor influencing supply of new or different products on the producers' side.

Consumers' and Producers' Perspectives: Where to Start

Consumers often lack information and are not in the position of making an informed and environmentally responsible choice. This may be mostly due to a lack of information, for example, as potential buyers of a new washing machine are not aware of the life span of the machine (Deutsch, 2010) or ignore the environmental impact associated with the production of the machine (e.g., see Yuan et al., 2016 for a life cycle assessment of washing machines in China). Consumers may not know about this scenario; hence, the fact they will have to exchange it after a certain time will not affect their purchasing decision. Producing a washing machine with a certain lifespan ensures consumers' recurring demand for the product category. Addressing consumer behavior would be ineffective as the producer owns the information regarding the product's lifespan, not the consumer.

Another example is given by a limited set of choice of products, especially environmentally friendly ones. When comparing the Norwegian groceries market to

other markets on continental Europe that feature the presence of large international groups (e.g., hypermarkets: Auchan, Carrefour, Aldi, etc.) there may be simply a lack of more environmentally friendly products that consumers in Norway have access to. Thus, they lack options, and so choose less sustainable products. Moreover, there might be a lack of food sovereignty, which refers to

> the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. (Via Campesina, 2007, as cited in Patel, 2009, p. 666)

We maintain that the role of NGOs is key to fostering access to and variability of products that meet the changing needs of local households as meeting sustainability goals gain increasing influence on grocery-purchasing behavior (e.g., substituting meat and poultry with plant-based protein products that are healthy, attractive, and affordable). Markets may react positively to business-as-usual: consumers may be willing to choose the products that they are most familiar with (i.e., compatible with their learning histories) instead of choosing unknown alternative products that differ and in addition may not meet the non-environmental requirements of the customers. However, this area needs more empirical analysis and whereas consumers seem to be more aware of these alternative products and their substitutability to meat and fish proteins (e.g., see Aschemann-Witzel & Odile Peschel, 2019, for consumer perceptions in Denmark), behavioral systems analysis and the role of feedback in behavior analysis could inform the effectiveness of policies and possible subsidizers for shaping and sustaining households' practices.

Furthermore, the environmental labeling system serves as a prime example where consumer confusion may arise.. There is a vast array of environmental labels in several market segments, and anyone can produce their own without meeting any reasonable criteria.[5] From the customers' perspective, they may look the same once they are assigned to a product, and it may be impossible to recognize which is an environmental labeling and which is a self-declared claim (i.e., which one is certified, and which one is not). This leads to an increased burden on the consumers' side of understanding and interpreting exactly if and in what measure their choice is in fact environmentally friendly. Here, behavioral problems are entwined with policy and regulatory shortcomings.

Lastly, metacontingencies should be designed and aimed at limiting consumption. Manufacturers do not seem willing to limit their production nor to save resources in a manner consistent with the major ideas of what sustainability implies: preserving what we have today so that future generations may use the resources in a different

---

[5] There are three types of labels: environmental labeling, self-declared environmental claims, and environmental declarations and for each there is ISO standard: (1) ISO 14024:1999-ISO 14024: 2018 (type I environmental labeling); (2) ISO 14021:2016 (type II self- declared environmental claims); and (3) ISO 14025:2006 (type III environmental declarations). Self-declared claims do not require third party certification.

way than we do today. Thus, it is important that the use of resources does not exceed the reintroduction or repopulation of resources. Although there are examples of companies that utilize policies to reduce production and promote the sustainability of their product, which demonstrates that this is actually a feasible solution, these seem to be outnumbered by purely revenue-driven producers. For example, Patagonia offers a life-time warranty on all of its products and encourages its consumers to send in their Patagonia products for free repairs as the garments become damaged over time (see Shourkaei et al., 2023).[6] The Swedish clothes producer specialized in children apparel Polarn O. Pyret resells used clothes purchased through their stores, which benefits both the first purchasers who get some of the money that they originally spent back and the new purchaser who gets a functional used garment with an economic and environmental advantage (see Brydges, 2022). In yet another case, IKEA implements the take-back program according to which customers may return their used furniture, rents out and sells refurbished furniture, and uses FSC-certified wood and recycled plastic (see Laurin & Fantazy, 2017). From the end of 2021, IKEA started offering spare parts, so that furniture may be repaired instead of being discarded, in line with the 4R principle.

Change on the consumer side may not result in change on the producer side. Producers may continue business-as-usual because it is more beneficial for them, somehow forcing the market to act as they want in terms of providing inputs for successive cycles. If producers do not provide environmentally friendly products on the market, customers experience limited options in what the producers have pre-selected for them and input on the market. As the market and the environment are always shifting, consumers' choices are dependent on what is presently available on the market. Consumers who need to replace their irreparable coffee mug may not demand sustainable products unless such products are already being offered by the producers, who otherwise define how the mug is supposed to look and manufacture it accordingly in a more or less sustainable way (i.e., materials, location, production scale and process, distribution, and so on). In this traditional model, consumer feedback is limited (e.g., to user experience) and may not cover the whole spectrum of product properties that impact the environment.

Only starting from the 1980s did customer participation start to grow in the production of goods and services. This phenomenon has been termed *co-creation* (Bendapudi & Leone, 2003) and its interdependency with corporate citizenship, business relations, and value among stakeholders comprise the broader scope of sustainability (Biggemann et al., 2014). This way, producers respond to the market-demand which is often based on customer feedback. Moreover, as digital capabilities for collecting consumer feedback increases, a growing number of large organizations are collecting large-scale amounts of consumer feedback data to inform future product development. For example, LEGO launched a crowdsourcing platform with contributions from over 1 million people for launching new products. In return, the contributors to selected winning ideas can participate in the corporate decision-making, receive public recognition, and may even get a profit share!

---

[6] We thank one of the anonymous reviewers for bringing this example to our attention.

The market/system dictates our choices in terms of to what extent we can choose. For example, let us consider the production of clothes. Considering the scenario of an environmentally friendly product and a non-environmentally friendly product, it is possible that both items may ultimately end up being incinerated or disposed of in landfills, despite their potential for reuse. Clothing items that are left unsold are often incinerated or shredded (Lee, 2023), which seems to be the business-as-usual model among some fast fashion as well as luxury brands (some of the most notorious cases were documented by New York Times journalist Jim Dwyer since 2010; see Elia, 2019). Even though we may think that producers empower us with the choice of a more environmentally friendly product, we are still limited by the producers' choice, which is dictated by other variables (e.g., the financial implications of sending unsold clothes to incineration or organizing reuse practice in the company). However, if the demand is not enough to sell all clothes, the production companies may keep doing this, unless they self-ban these practices (e.g., following the case of Burberry in 2018; see Cybis & Bernard, 2021) or regulators make them illegal (e.g., the French National Assembly enforced a law on September 30th, 2020 on "the Fight against waste and circular economy").[7] These examples suggests that producers have more power because they have a broad outreach, have financial power, and can decide about these variables that consumers do not have insights into nor the possibility to (directly) change.

Differential Emissions Scenarios

In this section, we propose a strategy for shifting both producers' and consumers' choice toward more sustainable ones by showing data on GHG emissions due to changes in production of an item. The hypothesis underlying this assumption would sound something like: how would emissions be reduced if company X switches from plastic materials to biomass in the production of item A? Moreover, how would consumers' choice change as a function of this insight?

Next, it would be possible to show how GHG emissions can be reduced if we release the corresponding product on the market but made of biomass (or another material associated with lower GHG emission). This "competitor" must be concurrent with item A, which is plastic-based. Based on changes in consumers' choices, it is possible to establish empirically whether more potential buyers would switch to item B (dependent variable) as changes in GHG (independent variable) are manipulated, while focusing on the sustainability of an item measured in terms of life cycle assessment (LCA) GHG emissions. While previous studies focused on the changes in GHG emissions as the output of consumers choices (e.g., Hoolohan et al., 2013; see also Aleksandrowicz et al., 2016 for a review of dietary behavior), there seems to be no or little evidence of experimental procedures that consider GHG emissions inputs in consumers' choices.

---

[7] https://www.assemblee-nationale.fr/dyn/15/dossiers/lutte_gaspillage_economie_circulaire

Let us posit the following scenario 1 (status quo): item A is made of plastic, its production emissions are 10 $kgCO_2e$/piece, and its market share is 30 million pieces sold. Scenario 2 (target) features item B made of biomass that emits 7 $kgCO_2e$/piece and sets out to sell 30 million pieces. The underlying research question in this scenario would be how many potential consumers would change preference or purchase from item A to item B before calculating GHG emissions for scenario 1 and scenario 2 and show which one has bigger effect on the GHG emissions. However, it should be noted that this example does not include other aspects of the product or service, nor the price set by either the producer or shown to the customer, so they either have to be assumed as constant or price variability should be included in the description for each scenario.

The example above may suggest that customers should not be given a choice, and it may be environmentally justifiable to ban plastic and offer exclusively biomass. However, what if producers started populating the market with items C, D, E, and so on, all of which are more environmentally friendly than A? Then consumers' choice is retained, and the cost of purchase is not necessarily affected, which fulfills the definition of a nudge. Moreover, it is still possible to calculate the GHG balance based on consumers' willingness to choose another item.

Conclusions

In this conceptual analysis, we raised awareness on how consumers and producers affect each other, and the limiting amount of influence modern day consumers may have with respect to these decisions. For example, in June 2021 the then Minister of Petroleum and energy of Norway, Tina Bru, made the following statement during a press conference: "We will supply energy to the world as long as the demand exists. The government will therefore maintain an oil policy that facilitates profitable oil and gas production in the framework of the Norwegian climate policy and our climate goals" (Cross, 2021). While Norway is one of the most sustainable countries in the world and concurrently receives most of its income from the underwater oil fields, this position seems to put the environmental responsibility on the oil-dependent consumers, who experience that their choices are limited.

In fact, Norway scores 7th in the global ranking of total progress toward achieving all 17 UN's Sustainable Development Goals (SDGs): 82 out of 100, where 100 means that all SDGs have been achieved (Sustainable Development Report, 2023). Other factors that characterize the case of Norway and contribute to shaping up sustainable economies in the face of its dependency on fossil fuel exploration and production are the following: *i.* the share of renewables in power generation in 2021 (the newest data from International Energy Agency) was 96.2%, and 91% of electricity was generated from hydropower (International Energy Agency, 2022). *ii.* the share of electric cars of the total number of new cars sold in Norway in 2022 was 78%: this is due to several strong financial incentives given by the government to the owners of electric cars (NAF, 2023) and rearranging the environment by building a dense network of charging stations. *iii.* Ambitious environmental targets that aim to reduce GHG emissions by at least 55% by 2030 compared to 1990 levels and

90–95% reduction by 2050 to achieve state of net-zero emissions (Climate Action Tracker, 2022). *iv.* A more sustainable economy is being shaped through investments in sustainable businesses: the income from the export of oil goes to the Norwegian "Oil Fund" and is subsequently invested in sustainable business all over the world. The Oil Fund recently sold its shares in companies that are not following environmental, social, and governance (ESG) related standards and could expose it on climate-related financial risks (Knudsen & Malkenes Hovland, 2023). *v.* Local investments, mostly in advanced technologies, to accelerate the achievement of climate-related targets. Some examples include the carbon capture and storage project in Meld and the installation of wind farms both on and offshore by Equinor. These projects require significant investments, which are largely funded by taxing oil trade revenue (Equinor, 2023; Government.no, 2023).

The leaders of other major oil producing countries such as the United States of America, Saudi Arabia, Russia, and China may have set up community boundaries for regarding their practices as "sustainable" and developed different vantage points. These can be seen as entry points for approaching and changing metacontingencies, which comprise policies, tax systems, incentives, and other socio-cultural institutions that are possible entry ways to shift consumer and producer practices.[8]

On the other hand, consumers can take the lead by lobbying for a change of paradigm (see also Alemanno, 2017). If we do not start reducing our needs for consumer goods, producers will have an advantage over consumers to the extent that the latter are left with unsatiated demands, say, for cars over bicycles. This is not a universal claim but virtually all of us can accomplish this goal as we take collective responsibility, and everyone does what they can. In his analysis of negative externalities, Biglan (2009) emphasized the lack of incentives to prevent them and the role that non-profit and advocacy organizations (e.g., cancer societies or societies for the conservation of nature for promoting pro-environmental practices) may have in influencing governmental policymaking traditionally resting on economic incentives.

The present analysis emphasizes the role that both policymakers and advocacy organizations have toward limiting consumerism (e.g., educating pupils, sensibilizing school personnel), lobbying for reaching the sustainability goals that have been agreed on in the international fora (e.g., acting upon the UN's 17 Sustainable Development Goals), and nudging and boosting better-informed pro-environmental choices as producers' and consumers' practices interplay in the market (e.g., implementing "green" defaults, enhancing recycling competences). Basic needs must be satisfied, but there is a risk that manufacturers continuously create artificial needs through marketing, social norms, and planned obsolescence for manufactured goods. This way, the market seems to overtake the driver's role in the system, initiating a set of positively accelerating feedback loops that represent the consumers' demands embedded in some of our cultural practices.

Assessment tools derived from relational frame theory (e.g., IRAP, IMPACT) have been used to measure values and attitudes among consumers toward products based on their environmental impact. Next, these tools may be utilized for understanding not only how consumers respond to different characteristics of these

---

[8] We are grateful to the guest editor for suggesting the points included in this paragraph.

products (e.g., price, attractiveness, quality) but also whether the demand of new products are in line with needs and desires of their social milieus. This may apply, for example, to solar panel installation investments, changing cellphones or washing machines, commuting by car or by bus. By including the social component in our analysis, we can look at the interdependencies among actors in a community or society. Next, we can move on to analyze and shape interlocked behavioral contingencies that are likely to lead to changes in the aggregate product and the extent to which the receiving system recurrently selects the culturant; thus, the metacontingency approach to sustainable practices suggested in the present analysis.

Moreover, nudges and boosts (i.e., motivative augmentals) are promising intervention tools for providing alternative repertoires shaping "better practices" for both consumers and producers. These approaches, along with traditional policy tools, may be economic yet powerful enough to incrementally transform defective practices into protective ones for the environment. An example of the former is implementing a waste disposal process, then covering the growing demand for the years to come as the population increases, and finally addressing what journalist Bjartnes (2015) referred to as the *Green Shift*. This term became quickly engrained into Norwegian culture, society, and politics (Ytterstad & Bødker, 2022) and depicts "a continually ongoing, inescapable and unstoppable process, involving reduced climate emissions and improved resource productivity in all sectors of society, at the same time offering new opportunities for value creation" (Bjartnes, 2015, translated by Ytterstad and Veimo (2020)). On the other hand, implementing small behavioral interventions by breaking apart the compound complexity of the Green Shift would limit the system inputs or the behavioral antecedents on which the environmental emergency is (partially) contingent.

We auspicate that this work will inform the dialogue among policymakers, advocacy organizations and their stakeholders, and inspire further research on and interventions for a systemic and cultural analysis of consumers' and producers' practices that characterize the unsustainable growth economy, their possible harmful delayed outcomes, and how they may be shaped to achieve environmental sustainability; or, at least, get us one step closer.

Data availability Data sharing is not applicable: we do not analyze or generate any datasets, because our work proceeds within a theoretical approach.

Declarations

Conflict of interests The second author is employed in a sustainability consultancy. Her involvement in the present conceptual analysis is in an individual capacity.

to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

References

Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental strategies and green product development: An overview on sustainability-driven companies. *Business Strategy and the Environment, 18*(2), 83–96. https://doi.org/10.1002/bse.638

Alavosius, M. P., & Houmanfar, R. A. (2020). Global warming: Analysis of behavior and organizational practices as climate impacts increase. In T. M. Cihon & M. A. Mattaini (Eds.), *Behavior Science Perspectives on Culture and Community* (pp. 221–256). Springer. https://doi.org/10.1007/978-3-030-45421-0_10

Aleksandrowicz, L., Green, R., Joy, E. J., Smith, P., & Haines, A. (2016). The impacts of dietary change on greenhouse gas emissions, land use, water use, and health: A systematic review. *PLoS One, 11*(11), e0165797. https://doi.org/10.1371/journal.pone.0165797

Alemanno, A. (2017). *Lobbying for change: Find your voice to create a better society*. Icon Books.

Altenburg, D., & Spruyt, A. (2022). Predicting meat consumption from concurrent, automatic appraisals: Introducing nuance to product appraisals. *Appetite, 170*, 105847. https://doi.org/10.1016/j.appet.2021.105847

Arno, A., & Thomas, S. (2016). The efficacy of nudge theory strategies in influencing adult dietary behaviour: A systematic review and meta-analysis. *BMC Public Health, 16*(676), 1–11. https://doi.org/10.1186/s12889-016-3272-x

Aschemann-Witzel, J., & Peschel, A. O. (2019). Consumer perception of plant-based proteins: The value of source transparency for alternative protein ingredients. *Food Hydrocolloids, 96*, 20–28. https://doi.org/10.1016/j.foodhyd.2019.05.006

Atkins, P. W. B., Wilson, D. S., & Hayes, S. C. (2019). *Prosocial. Using evolutionary science to build protective, equitable, and collaborative groups*. Context Press.

Barnes-Holmes, D., Barnes-Holmes, Y., Power, P., Hayden, E., Milne, R., & Stewart, I. (2006). Do you really know what you believe? Developing the implicit relational assessment procedure (IRAP) as a direct measure of implicit beliefs. *The Irish Psychologist, 32*(7),169–177. https://contextualscience.org/system/files/Barnes-Holmes,2006.pdf

Barnes-Holmes, D., Murtagh, L., Barnes-Holmes, Y., & Stewart, I. (2010). Using the Implicit Association Test and the Implicit Relational Assessment Procedure to measure attitudes toward meat and vegetables in vegetarians and meat-eaters. *The Psychological Record, 60*, 287–305.

Barroux, R. (2023, July 17). Bottle deposits: A crucial factor in reducing plastic use. *Le Monde*. https://www.lemonde.fr/en/environment/article/2023/07/17/bottle-deposits-a-crucial-factor-in-reducing-plastic-use_6056022_114.html

Becker-Olsen, K., & Potucek, S. (2013). Greenwashing. In S. O. Idowu, N. Capaldi, L. Zu, & A. D. Gupta (Eds.), *Encyclopedia of corporate social responsibility*. Springer. https://doi.org/10.1007/978-3-642-28036-8_104

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., Tucker-Ray, W., Congdon, W. J., & Galing, S. (2017). Should governments invest more in nudging? *Psychological Science, 28*(8), 1041–1055. https://doi.org/10.1177/0956797617702501

Bendapudi, N., & Leone, R. P. (2003). Psychological implications of customer participation in co-production. *Journal of Marketing, 67*(1), 14–28. https://doi.org/10.1509/jmkg.67.1.14.18592

Biggemann, S., Williams, M., & Kro, G. (2014). Building in sustainability, social responsibility and value co-creation. *Journal of Business & Industrial Marketing, 29*(4), 304–312. https://doi.org/10.1108/jbim-08-2013-0161

Biglan, A. (1995). *Changing cultural practices: A contextualist framework for intervention research*. Context Press.

Biglan, A. (2009). The role of advocacy organizations in reducing negative externalities. *Journal of Organizational Behavior Management, 29*(3), 215–230. https://doi.org/10.1080/01608060903092086

Biglan, A. (2020). *Rebooting capitalism: How we can forge a society that works for everyone*. Values to Action.

Bjartnes, A. (2015). *Det grønne skiftet [The Green Shift]*. Frekk forlag.

Brydges, T., Henninger, C. E., Barbu, L., & Lupu, R. (2022). Designing for longevity and neutrality: investigating how the Swedish children's clothing industry implements circular economy principles. *Fashion Practice, 1–23*. https://doi.org/10.1080/17569370.2022.2118968

Burgess, R. L., Clark, R. N., & Hendee, J. C. (1971). An experimental analysis of anti-litter procedures. *Journal of Applied Behavior Analysis, 4*(2), 71–75. https://doi.org/10.1901/jaba.1971.4-71

Climate Action Tracker. (2022). *Norway*. https://climateactiontracker.org/countries/norway/targets/

Cone, J. D., & Hayes, S. C. (1984). *Environmental problems/behavioral solutions*. Cambridge University Press.

Cross, D. T. (2021, June 14). Norway, the world's 'most sustainable country,' will continue drilling for oil. *Sustainability Times*. https://www.sustainability-times.com/lowcarbon-energy/norway-the-worlds-most-sustainable-country-will-continue-drilling-for-oil/

Cybis, P., & Bernard, S. (2021). Fast fashion: Why firms incinerate deadstock, and public policies. *Clean Economy Working Paper Series*.https://institute.smartprosperity.ca/sites/default/files/Fashion_WP_report.pdf

de Freitas Netto, S. V., Sobral, M. F. F., Ribeiro, A. R. B., & da Luz Soares, G. R. (2020). Concepts and forms of greenwashing: A systematic review. *Environmental Sciences Europe, 32*(1), 19. https://doi.org/10.1186/s12302-020-0300-3

Deutsch, M. (2010). Life cycle cost disclosure, consumer behavior, and business implications. *Journal of Industrial Ecology, 14*, 103–120. https://doi.org/10.1111/j.1530-9290.2009.00201.x

Elia, A. (2019). Fashion's destruction of unsold goods: Responsible solutions for an environmentally conscious future. *Fordham Intellectual Property, Media and Entertainment Law Fordham Intellectual Property, Media and Entertainment Law Journal, 30*, 539 https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1746&context=iplj

Equinor. (2023). *Offshore wind in Equinor*. https://www.equinor.com/energy/offshore-wind

Furrebøe, E. F., & Sandaker, I. (2017). Contributions of behavior analysis to behavioral economics. *The Behavior Analyst, 40*(2), 315–327. https://doi.org/10.1007/s40614-017-0110-0

Ghezzi, E. L., Houmanfar, R. A., & Crosswell, L. (2020). The motivative augmental effects of verbal stimuli on cooperative and conformity responding under a financially competing contingency in an analog work task. *The Psychological Record, 70*(3), 411–431. https://doi.org/10.1007/s40732-020-00400-7

Glenn, S. S. (2004). Individual behavior, culture, and social change. *The Behavior Analyst, 27*(2), 133–151. https://doi.org/10.1007/BF03393175

Glenn, S. S., Malott, M. E., Andery, M. A. P. A., Benvenuti, M. F. L., Houmanfar, R. A., Sandaker, I., Todorov, J. C., Tourinho, E. Z., & Vasconcelos, L. A. (2016). Toward consistent terminology in a behaviorist approach to cultural analysis. *Behavior and Social Issues, 25*, 11–27. https://doi.org/10.5210/bsi.v.25i0.6634

Government.no. (2023). *Carbon capture and storage – CCS*. https://www.regjeringen.no/en/topics/energy/carbon-capture-and-storage/id86982/

Grüne-Yanoff, T., & Hertwig, R. (2016). Nudge versus boost: How coherent are policy and theory? *Minds and Machines*, *26*(1), 149–183. https://doi.org/10.1007/s11023-015-9367-9

Güsser-Fachbach, I., Lechner, G., Ramos, T. B., & Reimann, M. (2023). Repair service convenience in a circular economy: The perspective of customers and repair companies. *Journal of Cleaner Production, 415*, 137763. https://doi.org/10.1016/j.jclepro.2023.137763

Haider, S. W., Zhuang, G., & Ali, S. (2019). Identifying and bridging the attitude-behavior gap in sustainable transportation adoption. *Journal of Ambient Intelligence and Humanized Computing, 10*(9), 3723–3738. https://doi.org/10.1007/s12652-019-01405-

Hayes, S. C., Zettle, & Rosenfarb, I. (2004). Rule-following. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies & instructional control* (pp. 191–218). Context Press.

Hirsh, J. L., Costello, M. S., & Fuqua, R. W. (2015). Analysis of delay discounting as a psychological measure of sustainable behavior. *Behavior and Social Issues, 24*(1), 187–202. https://doi.org/10.5210/bsi.v24i0.5906

Hoolohan, C., Berners-Lee, M., McKinstry-West, J., & Hewitt, C. N. (2013). Mitigating the greenhouse gas emissions embodied in food through realistic consumer choices. *Energy Policy, 63*, 1065–1074. https://doi.org/10.1016/j.enpol.2013.09.046

Houmanfar, R. A., Alavosius, M. P., Morford, Z. H., Herbst, S. A., & Reimer, D. (2015). Functions of organizational leaders in cultural change: Financial and social well-being. *Journal of Organizational Behavior Management, 35*(1–2), 4–27. https://doi.org/10.1080/01608061.2015.1035827

International Energy Agency (IEA) (2022). *Energy statistics data browser.* https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=NORWAY&fuel=Electricity%20and%20heat&indicator=ElecGenByFuel

Kissi, A., Hughes, S., De Schryver, M., De Houwer, J., & Crombez, G. (2018). Examining the moderating impact of plys and tracks on the insensitivity effect: A preliminary investigation. *The Psychological Record, 68*(4), 431–440. https://doi.org/10.1007/s40732-018-0286-z

Knudsen, C., & Malkenes Hovland, K. (2023). *Oljefondet solgte seg ut av 74 selskaper grunnet ESG-risiko i 2022*. [The Oil Fund sold out of 74 companies due to ESG risk in 2022]. https://e24.no/norsk-oekonomi/i/ab3WW4/oljefondet-solgte-seg-ut-av-74-selskaper-grunnet-esg-risiko-i-2022

Krispin, J. V. (2017). Positive feedback loops of metacontingencies: A new conceptualization of cultural-level selection. *Behavior and Social Issues, 26*, 95–110. https://doi.org/10.5210/bsi.v.26i0.7397

Krispin, J. V. (2019). Culturo-behavioral hypercycles and the metacontingency: Incorporating self-organizing dynamics into an expanded model of cultural change. *Perspectives on Behavior Science, 42*(4), 869–887. https://doi.org/10.1007/s40614-019-00212-3

Laraway, S., Snycerski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis, 36*(3), 407–414. https://doi.org/10.1901/jaba.2003.36-407

Laurin, F., & Fantazy, K. (2017). Sustainable supply chain management: A case study at IKEA. *Transnational Corporations Review, 9*(4), 309–318. https://doi.org/10.1080/19186444.2017.1401208

Lazarus, R. J. (2009). Super wicked problems and climate change: Restraining the present to liberate the future. *Georgetown Law Faculty Publications and Other Works*, *159*. https://scholarship.law.georgetown.edu/facpub/159

Lee, G. (2023, May 30). Explainer: Why fast fashion brands destroy unsold clothes. *Eco-Business.* https://www.eco-business.com/news/explainer-why-fast-fashion-brands-destroy-unsold-clothes/

Leigland, S. (2011). Beyond freedom and dignity at 40: Comments on behavioral science, the future, and chance (2007). *The Behavior Analyst, 34*(2), 283–295. https://doi.org/10.1007/BF03392258

Leiserowitz, A. A., Kates, R. W., & Parris, T. M. (2006). Sustainability values, attitudes, and behaviors: A review of multinational and global trends. *Annual Review of Environment and Resources, 31*(1), 413–444. https://doi.org/10.1146/annurev.energy.31.102505.133552

Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change. *Policy Sciences, 45*(2), 123–152. https://doi.org/10.1007/s11077-012-9151-0

Li, H. E., Rossi, M. A., Watson, G. D. R., Moore, H. G., Cai, M. T., Kim, N., Vokt, K. A., Lu, D., Bartholomew, R. A., Hughes, R. N., & Yin, H. H. (2021). Hypothalamic-extended amygdala circuit regulates temporal discounting. *The Journal of Neuroscience, 41*(9), 1928–1940. https://doi.org/10.1523/JNEUROSCI.1836-20.2020

Malott, M. E. (2016). What studying leadership can teach us about the science of behavior. *The Behavior Analyst, 39*(1), 47–74. https://doi.org/10.1007/s40614-015-0049-y

Malott, M. E. (2019). How a few individuals brought about a cultural cusp: From a Mexican mural program to a movement. *Perspectives on Behavior Science, 42*(4), 773–814. https://doi.org/10.1007/s40614-019-00211-4

Mandard, S. (2023, June 8). France lags far behind on recycling targets, warns European Commission. *Le Monde*. https://www.lemonde.fr/en/france/article/2023/06/08/france-lags-far-behind-on-recycling-targets-warns-european-commission_6030550_7.html

Maraccini, A. M., Houmanfar, R. A., & Szarko, A. J. (2016). Motivation and complex verbal phenomena: Implications for organizational research and practice. *Journal of Organizational Behavior Management, 36*(4), 282–300. https://doi.org/10.1080/01608061.2016.1211062

Mattaini, M. A. (2013). *Strategic nonviolent power: The science of satyagraha*. Athabasca University Press.

Mertens, S., Herberz, M., Hahnel, U. J. J., & Brosch, T. (2022). The effectiveness of nudging: A meta-analysis of choice architecture interventions across behavioral domains. *Proceedings of the National Academy of Sciences*, *119*(1), e2107346118. https://doi.org/10.1073/pnas.2107346118

Norges Automobil-Forbund [Norwegian Automobile Association] (NAF). (2023, August 4). *Dette er fordelene for elbiler i 2023* [These are the benefits for EVs in 2023]. https://nye.naf.no/elbil/bruke-elbil/dette-er-fordelene-for-elbiler

NAPCOR (National Association for PET Container Resources). (2018, November 15). *Report on post-consumer PET container Recycling activity*. https://napcor.com/wp-content/uploads/2018/11/NAP-COR_2017RateReport_FINAL.pdf

Odum, A. L. (2011). Delay discounting: I'm a k, you're a k. *Journal of the Experimental Analysis of Behavior, 96*(3), 427–439. https://doi.org/10.1901/jeab.2011.96-423

OECD. (2022). *Global Plastics Outlook*. https://doi.org/10.1787/de747aef-en

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Park, H. J., & Lin, L. M. (2020). Exploring attitude–behavior gap in sustainable consumption: Comparison of recycled and upcycled fashion products. *Journal of Business Research, 117*, 623–628. https://doi.org/10.1016/j.jbusres.2018.08.025

Patel, R. (2009). Food sovereignty. *The Journal of Peasant Studies, 36*(3), 663–706. https://doi.org/10.1080/03066150903143079

Poling, A., Lotfizadeh, A. D., & Edwards, T. L. (2020). Motivating operations and discriminative stimuli: Distinguishable but interactive variables. *Behavior Analysis in Practice, 13*(2), 502–508. https://doi.org/10.1007/s40617-019-00400-2

Rachlin, H. C. (2015). Choice architecture: A review of Why Nudge: The Politics of Libertarian Paternalism. *Journal of the Experimental Analysis of Behavior, 104*(2), 198–203. https://doi.org/10.1002/jeab.163

Rafacz, S. D., Houmanfar, R. A., Smith, G. S., & Levin, M. E. (2019). Assessing the effects of motivative augmentals, pay-for-performance, and implicit verbal responding on cooperation. *The Psychological Record, 69*(1), 49–66. https://doi.org/10.1007/s40732-018-0324-x

Rejman, K., Kaczorowska, J., Halicka, E., & Laskowski, W. (2019). Do Europeans consider sustainability when making food choices? A survey of Polish city-dwellers. *Public Health Nutrition, 22*(7), 1330–1339. https://doi.org/10.1017/S1368980019000326

Ripple, W. J., Wolf, C., Newsome, T. M., Barnard, P., & Moomaw, W. R. (2019). World scientists' warning of a climate emergency. *BioScience, 70*(1), 8–12. https://doi.org/10.1093/biosci/biz088

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*(2), 155–169 http://www.jstor.org/stable/4531523

Rodriguez, E., Carrasquillo, O., Lee, C., Lee, J., & Zhou, A. (2015). iGo Green: A life cycle assessment of Apple's iPhone. *iConference 2015 Proceedings*. https://core.ac.uk/download/pdf/158299081.pdf

Rummler, G., & Brache, A. (1988). The systems view of human performance. *Training, 25*, 45–53 https://hpttreasures.files.wordpress.com/2020/07/40.-the-systems-view-of-human-performance1.pdf

Seniuk, H. A., Cihon, T. M., Benson, M., & Luke, M. M. (2019). Making a footprint in environmental sustainability: A behavioral systems approach to engaging the behavioral community. *Perspectives on Behavior Science, 42*(4), 911–926. https://doi.org/10.1007/s40614-019-00233-y

Shourkaei, M. M., Taylor, K. M., & Dyck, B. (2023). Examining sustainable supply chain management via a social-symbolic work lens: Lessons from Patagonia. *Business Strategy and the Environment, 1–20*. https://doi.org/10.1002/bse.3552

Skinner, B. F. (1953). *Science and human behavior*. Free Press.

Skinner, B. F. (1971). *Beyond freedom and dignity*. Knopf/Random House.

Stewart, I., & McElwee, J. (2017). Relational responding and conditional discrimination procedures: An apparent inconsistency and clarification. *The Behavior Analyst, 32*(2), 309–317. https://doi.org/10.1007/BF03392194

Sustainable Development Report. (2023). *Rankings the overall performance of all 193 UN member states.* https://dashboards.sdgindex.org/rankings

Tagliabue, M. (2022). A behavioral analysis of rationality, nudging, and boosting: Implications for policymaking. *Perspectives on Behavior Science.* https://doi.org/10.1007/s40614-021-00324-9

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Yale University Press.

The Coca-Cola Company. (2020, July 6). *2020 World without waste report.* https://www.coca-cola.com/content/dam/onexp/ie/en/pdf-files/2020-world-without-waste-report.pdf

Tomra. (2022). *Norway's deposit return scheme is world's recycling role model.* https://www.tomra.com/en/reverse-vending/media-center/feature-articles/norway-deposit-return-scheme#:~:text=With%20a%20return%20rate%20of,bottles)%20through%20the%20deposit%20system.

Tomra. (2023). *Clean loop recycling.* https://www.tomra.com/reverse-vending/your-recycling-role/clean-loop-recycling

Toman, M. A. (2006). The difficulty in defining sustainability. In W. Oates (Ed.), *The RFF Reader in Environmental and Resource Policy* (2 ed.). Routledge.

Torneke, N., Luciano, C., & Valdivia Salas, S. (2008). Rule-governed behavior and psychological problems. *International Journal of Psychology and Psychological Therapy, 8*(2), 141–156 https://www.ijpsy.com/volumen8/num2/191/rule-governed-behavior-and-psychological-EN.pdf

Ulrich, K. T., Eppinger, S. D., & Yang, M. C. (2008). *Product design and development* (Vol. 4, pp. 1–3). McGraw-Hill.

Walker, H., & Preuss, L. (2008). Fostering sustainability through sourcing from small businesses: Public sector perspectives. *Journal of Cleaner Production, 16*(15), 1600–1609. https://doi.org/10.1016/j.jclepro.2008.04.014

Weaver, W. (1948). Science and complexity. *American Scientist, 36*(4), 536–544 https://www.jstor.org/stable/27826254

Wille, F., & Lange, F. (2022). Potential contributions of behavior analysis to research on proenvironmental behavior. *Frontiers in Psychology, 13*, 685621. https://doi.org/10.3389/fpsyg.2022.685621

Wilson, D. S., Madhavan, G., Gelfand, M. J., Hayes, S. C., Atkins, P. W. B., & Colwell, R. R. (2023). Multilevel cultural evolution: From new theory to practical applications. *Proceedings of the National Academy of Sciences, 120*(16), e2218222120. https://doi.org/10.1073/pnas.2218222120

World Commission on Environment and Development (WCED). (1987). *Our common Future*. Oxford University Press.

Ytterstad, A., & Bødker, H. (2022). Climate change journalism in Norway—Working with frequency around the "Green Shift". *Journalism Studies, 23*(11), 1291–1307. https://doi.org/10.1080/1461670X.2022.2084143

Ytterstad, A., & Veimo, M. (2020). Den sprikende kraften i "det grønne skiftet" [The spreading power of the green shift]. *Mediehistorisk Tidsskrift, 2*, 124–141 https://hdl.handle.net/10642/9641

Yuan, Z., Zhang, Y., & Liu, X. (2016). Life cycle assessment of horizontal-axis washing machines in China. *The International Journal of Life Cycle Assessment, 21*(1), 15–28. https://doi.org/10.1007/s11367-015-0993-5

Zettle, R. D., & Hayes, S. C. (1982). Rule governed behavior: A potential theoretical framework for cognitive therapy. In P. C. Kendall (Ed.), *Advances in cognitive-behavioral research and therapy* (pp. 73–118). Academic.

Zilio, D. (2019). On the function of science: An overview of 30 years of publications on metacontingency. *Behavior and Social Issues, 28*(1), 46–76. https://doi.org/10.1007/s42822-019-00006-x