Evidence Review of Online Choice Architecture and Consumer and Competition Harm

Research underpinning the CMA discussion paper "Online Choice Architecture: How digital design can harm competition and consumer"

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1. Introduction

1.1 This is a companion paper, which provides underpinning evidence to support the CMA publication, "Online Choice Architecture: how digital design can harm competition and consumers" (referred to as "the discussion paper"). Online choice architecture (OCA) describes the environment in which users act and make decisions, including the presentation and placement of choices and the design of interfaces. OCA is often used positively to help consumers, for example, by displaying relevant products prominently and to streamline friction. Competition and consumer authorities necessarily need to identify and address detriment, so this paper focuses on the harms that can arise from OCA practices.

1.2 This paper is intended to be used as a reference document. It provides summaries of the evidence on 21 OCA practices (e.g., defaults), organised into three sections: Choice Structure, Choice Information, Choice Pressure. For each of the practices the paper

(a) describes what the practice is,

(b) considers the effects on consumers and businesses and diagnoses the underlying causes of harm from the practice,

(c) assesses the competition and consumer harm, and

(d) considers potential remedies.

1.3 The paper also outlines the evidence on prevalence of OCA practices as well as selected cross-cutting issues related to OCA, for example vulnerability of consumers.

1.4 There will be a range of audiences for this paper including those working in competition and consumer authorities, academics, practitioners including designers and technologists, as well as those working within and advising businesses. The paper is not intended to be exhaustive but provides a review of the evidence available at the time of publication. This paper is not intended to act as guidance for businesses and their advisors, or to determine how the CMA will act in future cases and investigations where OCA plays a role, especially with regards to remedies.

1.5 Online commerce brings great benefits to businesses and consumers. For consumers, the move to digital markets has reduced friction, increased transparency and comparability and opened access to a truly global marketplace. Additionally, digital markets have dramatically reduced entry barriers for some types of business, heightened competition and provides any

business with access to a global pool of customers. However, rapid growth in this area also presents risks to the wellbeing of consumers and markets. Even though there are many similarities with the offline setting, consumers may behave differently online: they may act more quickly, have shorter attention spans, skim rather than read (Delgado et al., 2018; Duggan and Payne, 2011), direct their attentional focus narrowly and ignore substantial amounts of content (Pernice, 2017), and rely more on recommendations from strangers (Benartzi and Lehrer, 2015). The nature of online markets can induce more impulsive behaviours, reach further into people's social interactions and media consumption, and lead to more intensive advertising exposure (Danish Competition and Consumer Authority, 2020; Fletcher et al., 2021). Moreover, selling online gives businesses the necessary control to personalise and optimise almost every aspect of their interactions with consumers systematically at scale (Kohavi and Thomke, 2017).

1.6 **Choice architecture** describes the contexts in which consumers make decisions and how choices are presented (Johnson, 2022; Thaler et al., 2010). For example, think of the supermarket shelves closest to the checkout where customers have to linger, waiting to buy their items. The person who designs the layout of the store has a choice about what to put there. Should they choose the best-selling, highest margin items, like chocolate and gum? Or should they display healthy snack bars and fruit, which might be better for consumers' welfare? Designers like these, or "choice architects", make those decisions every day; their choices influence consumers' decisions and businesses' bottom lines.

1.7 **Choice architects** face the same questions when designing online environments, often with the benefit of being able to measure the effect of their interventions quickly and easily. For example, where should the "Buy" button be positioned relative to the "Back" button? How many clicks should there be to buy something rather than to return it? Should product options be ordered by relevance, price, popularity, or something else? This gives choice architects a potential advantage when selling their products, compared to consumers who may not even realise they are being influenced and their behaviour measured. There is evidence that businesses put considerable effort into designing the choice architecture of their websites, and that they test different versions in real-life field trials (Ghosh, 2021).

1.8 In online settings, choice architecture is the environment in which users act, including the presentation and placement of choices and the design of interfaces. This is described in this paper as **online choice architecture (OCA)**. OCA can be and frequently used positively (eg Sobolev, 2021), eg intentionally used by businesses to create smooth customer journeys, help match people with suitable products, or reduce waiting time. However, it can

also be used in ways that are not in the interests of consumers and has the potential to weaken competition. This is not always the case – many practices can be used in both positive and negative ways. A seamless purchase process, eg enabling a product to be bought in one click, may be positive for consumers and may save them time and effort. However, it might also induce impulsive, unwanted, and possibly accidental purchases, which could harm consumers and potentially weaken competition. In this paper, some of the practices described may be used positively (and sometimes may even have positive some effects for consumers, but negative effects on competition or vice versa). However, the focus is mainly on the use of practices in situations that cause harm for consumers and/or competition.

1.9 This paper provides a detailed summary of the literature on a range of OCA practices and their effects. It positions the practices within a proposed **taxonomy**, and identifies the literature on the **prevalence** of particular forms of OCA.

1.10 For discussions about OCA practices and their effects in relation to consumers and competition, the potential **harms** are considered in detail; that is, practices applied in situations that reduce consumer welfare, weaken competition, or enable businesses to gain or exploit market power. Harmful OCA can also make decisions unnecessarily complex for consumers, and create friction that makes it difficult for people to make decisions in their best interest.

1.11 In the wider literature, there are several interlinked terms that cover some aspects of OCA practices, including “sludge”, “dark patterns”, and “dark nudge”.

i. **Sludge** is excessive or unjustified friction that makes it difficult for consumers to get what they want or to do as they wish (Sunstein, 2020). This could include, for example, requiring customers to telephone a premium rate number to cancel a subscription or hiding important information about a product in the terms and conditions. It is important to note that not all friction is sludge. Friction can be helpful and may be deployed by policymakers to slow down thinking in high-stakes decisions where mistakes are common, or even by conscientious businesses who care about consumers making properly informed choices. For example, gambling rules often require consumers to go through a waiting period before attendance after signing up at a casino, or impose additional financial limits of the maximum amount that can be deposited into a temporary account to discourage impulse gambling at vulnerable moments (Carran, 2018).

ii. **Dark patterns** as a concept originated in the user experience (UX) design practitioner community, and was later adopted by the computer science and Human–Computer Interaction community (Gray et al., 2018). Dark patterns designate “user interface design choices that benefit an online service by coercing, steering, or deceiving users into making unintended and potentially harmful decisions” (Mathur et al., 2019). This includes, for example, “confirmshaming”, where a user is shamed into compliance through the wording of the “reject" option – eg having to click “No, I don’t care about charity” to avoid donating. Dark patterns often consist of multiple OCA practices combined as part of a user’s online experience. For instance, ‘sneak into basket” practices can be viewed as a combination of pre-checked defaults, sensory manipulation and sludge.

iii. **Dark nudges** are practices where a choice architect makes it easy or removes friction for consumers to make inadvertent or ill-considered decisions. For example, Newall (2019) identified dark nudges in the gambling industry, for example: (a) optimising the gambler’s experience by using modern electronic machines with touchscreen buttons to reduce the physical effort of long gambling sessions; and (b) exploiting gamblers’ cognitive biases (eg the tendency to overestimate the likelihood of highly specific events) to nudge them towards risky bets. Another example of a dark nudges is subscription trap, where a consumer can easily sign up for a free product or service but is not clearly told that they have enrolled in an ongoing payment arrangement after the initial free period expires.

1.12 ***Figure 1*** shows the overlap between different terms and the relationship between these concepts, adopted for the purposes of this paper.

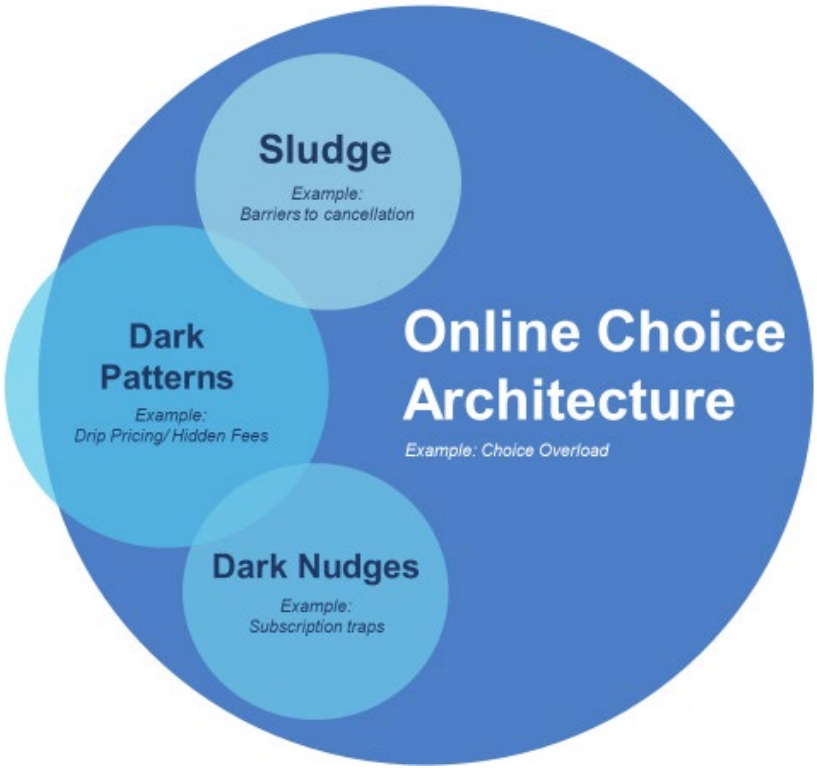

Figure 1. Online Choice Architecture covers a wide range of terms, including most dark patterns as well as all dark nudges and sludge

1.13 This paper uses a broad definition of OCA to enable discussion of a wider set of practices across a range of contexts. Carefully designed use of OCA is frequently beneficial to consumers and can be utilised in remedies. In addition, whilst the focus of the discussion in this paper is on harmful applications, it also covers practices where non-deliberate use may cause harm. However, the impact is often the same, regardless of intention. For this reason, this paper does not differentiate between intentional and unintentional applications of OCA. Additionally, some practices, such as those classified within dark patterns, are likely intended to be harmful or deceptive all the time (eg drip pricing), whereas other practices can be harmful in certain circumstances regardless of intention (eg ranking). A few dark patterns may fall outside the OCA taxonomy because they do not involve choice architecture (eg friend spam, where automatic messages are sent to members of a user's network without their permission).

1.14 This paper places OCA in its wider context when discussing the literature related to cross-cutting topics. One such cross-cutting topic of particular importance is the interaction of **algorithms** and OCA. For example, the use of algorithms underpins the ordering and display of search results, and

algorithms can facilitate personalisation of online choice architecture (Competition and Markets Authority, 2021a). In addition, choice architects may have multiple data-driven ways to measure the effectiveness of OCA, including through large-scale “A/B testing”. These tests detect the responses of real consumers accessing different versions of the website or app, and enable the business to determine the most effective version at a glance (Kohavi and Thomke, 2017).

1.15 This paper is a synthesis of the existing academic literature and available reports from other competition and consumer protection authorities and other experts. Some practices are described together with relevant CMA (or other regulators’) cases and market studies. All cases mentioned function merely as examples and do not represent an exhaustive list of all the past and ongoing cases from CMA and various other regulators and authorities across the world. There are also practices with evidence of impact on consumer behaviour, but where the potential for consumer harm is not yet well established in the literature. It is important to note that circumstances and context may vary, and that knowledge of the specific context is required when the documented practices are applied to a particular case or market study.

1.16 The examples mentioned set out in this paper are indications of concerns that have arisen in previous investigations or cases by public authorities and how they were examined and addressed in those cases. In instances where matters were resolved by businesses giving voluntary undertakings to the CMA about future practices, this was given without admission of liability.

1.17 The terms “consumer” and “businesses” are used broadly, eg when describing how a particular practice might have affected consumer behaviour or when discussing businesses’ incentives for using different OCA practices. In addition, while this paper focuses on OCA practices as they affect consumers, it is also plausible that businesses, especially those run by individuals, might themselves be subject to OCA practices other businesses use.

2. Structure of the paper

2.1 The first section of this paper sets out:

- a proposed taxonomy for OCA practices that divides 21 specific practices into three broad types: choice structure; choice information; and choice pressure
- an overview of the literature on the general effectiveness of online choice architecture, including when multiple practices are used
- a discussion of the prevalence of OCA practices with reference to academic work, including studies using data science as well as work by consumer and competition authorities.

2.2 In the second section of the paper, there is a further discussion of the literature and relevant reports under four themes (description of practice; effect on consumers; potential harms; and potential remedies) for each of the 21 specific OCA practices.

2.3 In the final section of the paper, there is a discussion of cross-cutting topics that are linked to OCA practices, their effectiveness, potential harms and the tools that are available to choice architects.

2.4 The cross-cutting topics are:

i. Algorithms and how they interact with OCA, eg in the ranking of search results
ii. Online privacy and the impact of OCA practices, including the use of defaults and data privacy choice screens
iii. Business models and examples of how OCA has been used in different online contexts
iv. Consumer vulnerability, why some consumer groups are more susceptible to harm, and why OCA practices may have a greater impact in certain situations or contexts
v. Consumer attention and how it relates to OCA
vi. The interaction of OCA with consumer awareness, learning, and trust

2.5 In addition, the accompanying ***discussion paper*** provides a brief summary of the taxonomy, the evidence described in this paper and some of the cross-cutting issues. It also provides further discussion of the types of harm that can arise from OCA, illustrated with case studies of investigations by the CMA and others.

Structure of discussion for each OCA practice

2.6 For each of the 21 OCA practices identified within the taxonomy, four themes are discussed:

a) Description of the online choice architecture practice

i. How is the OCA practice defined?
ii. What are some real-world examples of the practice?

b) The effect on consumers and businesses

i. How does the OCA practice affect consumers and businesses?
ii. Which underlying behavioural biases can be identified?

c) Potential harm to consumers and competition

i. How does the OCA practice harm consumers and competition?

d) Literature on potential remedies and case examples

i. Which remedies are suggested by the literature to reduce harm caused by the specific OCA practice?
ii. How have regulators taken OCA practices into account in investigations, analyses and cases?

2.7 Below, there is a discussion about the approach to each theme. For some practices, the literature focuses on the practice's effects; fewer studies focus on the potential consumer or competition harms or potential remedies. Where relevant, these limitations within the existing literature are noted for each practice.

2.8 The rating strength of academic evidence underlying each practice has been based on Ruggeri, Linden, Wang, Papa, Afif, Riesch and Green's (2020) table of evidence standards, also known as THEARI (Theoretical Empirical Applicable Replicable and Impact) rating system. These ratings of the strength of the evidence are an assessment of the extent and quality of available academic research relating to each identified practice, and should not be seen as conclusive. These ratings are collated in ***Table 1*** within the taxonomy section of this paper.

(i) Describing OCA practices

2.9 For each practice, this theme describes the practice with references to the key literature that identified it. The section also includes real-world examples to illustrate the practice.

2.10 While the focus here is mainly on how practices can cause harm, OCA practices that can be used to benefit consumers are also discussed. For some practices, such as prompts and reminders, parts of the literature have heavily focused on contexts where the intention of the intervention was to be beneficial rather than harmful to the consumers.

(ii) Effects on consumers and businesses, and potential underlying causes

2.11 For each OCA practice, this theme explores the literature that examines OCA's psychological effects on consumers, including on self-efficacy, regret and other emotions. The theme also considers why and to what extent the OCA practice can be effective, including how the practice relates to underlying behavioural biases.

2.12 There are some common types of behaviours that are relevant to multiple OCA practices, and that OCA can influence. For consumers, examples of these effects are:

a) ***Purchase behaviour***: "Actions taken by a consumer (including both to act, and not to act) concerning whether, how, and on what terms to purchase, make payment in whole or in part for, retain, or dispose of a product and/or a service, or whether, how, and on what terms to exercise a contractual right in relation to a product and/ or a service" (Velentzas et al., 2012).
b) ***Shopping-around behaviour***: Actions taken by a consumer when in the process of looking for information about a particular product or service, such as scrolling down a webpage, reading terms and conditions, comparing and exploring different options, such as looking for more products if the initial set of products does not seem satisfactory on the same platform, or comparing different platforms to find the best deal (eg price comparison websites).
c) ***Switching behaviour***: Actions taken by a consumer when deciding to move from the current service or brand and change to a new one, such as moving between two different mobile operating systems, or changing energy providers.

2.13 The behaviours mentioned above can range from the simple (eg a 1-click purchase) to more complex (eg comparing multiple products simultaneously and trying to decide which one is the best fit), or from a fast decision (eg

impulsive purchase) to a deliberate slow-paced action (eg reading customer reviews before purchasing) and other dimensions (eg low vs. high monetary value).

2.14 In behavioural science literature, there are several related and interlinked mechanisms that may explain the effects noted across the OCA practices:

- Behaviour is often described as the result of two interconnected cognitive systems – a fast, automatic, intuitive-driven "**System 1**" and a reflective, slower, more deliberative "**System 2**" (Kahneman, 2011). Errors of judgment may occur when people rely on their System 1 to make fast decisions in cases where it might have been better to slow down and think. For example, choice architecture practices, such as false or misleading scarcity claims (stating that there is limited supply of a product when there is not), use pressure to encourage consumers to rely on their fast System 1 for decision making, rather than slowing down and engaging the more analytical System 2 (Kahneman, 2011).

- However, some studies that considered the effect of "**nudges**" studied their impact in relation to System 1 and 2; small seemingly inconsequential changes to contexts that nonetheless affect behaviour work similarly under System 1 conditions as under System 2 conditions (Hunter et al., 2019; Steffel et al., 2016; Venema et al., 2019). This means that "nudges" may still be effective when consumers have more time to deliberate about their choices (eg when System 2 is activated) (Steffel et al., 2016).

- Academic research has identified a range of specific **behavioural biases** that can affect a consumer's online decision making (Gabaix and Laibson, 2006a; Luguri and Strahilevitz, 2021b; Sunstein, 2020). Examples include:

    i. Status quo effect (ie the tendency to avoid change) increases consumers' tendency, for a range of reasons, to stick with default settings that are presented to them (Kahneman et al., 1991).

    ii. Present bias (ie the tendency to prefer to settle for a smaller present reward than to wait for a larger future reward).

    iii. Regret aversion (ie the tendency to fear that the decision will turn out to be wrong in hindsight) may cause consumers to overreact to time-limited offers; choice architects can leverage this myopia to encourage instant gratification (O'Donoghue and Rabin, 2015; Zeelenberg and Pieters, 2004).

(iii) Assessing consumer and competition harm

2.15 Good choice architecture can bring significant benefits to markets and consumers. Firms in markets where consumers are active are under competitive pressure to make their customers' journeys as easy and pleasing as possible. They also have an incentive to avoid damaging their reputation or trust among consumers resulting from using of manipulative practices. Choice architects will therefore tend to focus their skill on designing an environment to optimise the customer experience. However, given that competition and consumer agencies are responsible for identifying and remedying harm, this paper will focus on how OCA used by businesses and their designers can cause harm.

2.16 OCA, if harmful, can make it difficult for consumers to make decisions in their own best interest, which may enable businesses to extract profits and build market power without doing so on their merits (Day and Stemler, 2019). In this paper, and illustrated in more detail with case studies in the ***discussion paper***, there are three potential ways in which different OCA practices can cause harm:

i. **OCA practices can distort consumers' behaviour.** Influenced by OCA, people may purchase unneeded or unsuitable products, spend more than they want to, receive poor-value items or service, choose an inferior seller or platform, or spend less time or effort searching for alternatives. OCA practices can also cause a range of non-financial harms, including inducing unwanted data disclosures, privacy invasion, marketing advances, and habitual product usage.

ii. **OCA practices can weaken or distort competitive pressures.** Where OCA practices distort consumer decision making, businesses may have less incentive to compete on product attributes that benefit the consumer, such as quality and price (Lindsey-Mullikin and Petty, 2011), and instead to compete on less beneficial attributes, such as prominence. Harmful OCA practices (which often require small tweaks to existing online environments) may often be easier and cheaper to implement than traditional innovation or research and development programmes. This can weaken competition on the merits of the products, and ultimately may result in poorer quality, more expensive products, less efficient markets and lower trust.

iii. **OCA practices can maintain, leverage or exploit market power.** OCA may be particularly problematic where a business has market power because the business can use OCA to maintain, leverage or exploit their market position. For example, businesses with market power may use OCA practices to reduce the likelihood that those customers move

outside of their ecosystem, or self-preference its own products to the detriment of other businesses on its platform.

(iv) Potential remedies

2.17 This paper outlines various remedies, suggested by the academic research, to harms caused by OCA, or cases and analysis by consumer and competition authorities. This outline is meant to illustrate and provides a non-exhaustive list of examples as to how and when OCA harms could be addressed. This paper is not guidance as to how the CMA will act in future cases, and the appropriate remedy in each case will turn on its facts.

2.18 There is a long list of carefully designed disclosures – price lists, information sheets, booklets, risk warnings – created by regulators and competition authorities that when applied in the real world were not read, heeded or acted upon by consumer, due to limited attention, context and constraints on time or cognitive capacity. For example, the Australian Securities and Investment Commission (ASIC) and the Netherlands Authority for Financial Markets (AFM) advocated that a focus on giving information or educating consumers to make better decisions is starting to be replaced by an understanding that changing choice architecture might be more effective. They also discuss that many information-based remedies tend to be less effective, in part due to behavioural biases, such as limited attention, inertia and overconfidence (ASIC and AFM, 2019).

2.19 However, recent work on “boosting” (ie interventions aimed at improving people’s competences to make decisions in light of their own goals) showed some benefit (Hertwig and Grüne-Yanoff, 2021; Lorenz-Spreen et al., 2021). For example, Lorenz-Spreen et al. (2021) found that encouraging participants to think about their own personality traits boosted their ability (by up to 26 percentage points) to correctly identify microtargeted advertainment (ie a term used to reflect the intertwining relationships between advertising and entertainment) that was aimed at them.

2.20 In addition to informing or educating consumers, authorities are increasingly calling for specific changes to the choice architecture in which people make decisions. This can include specifying the position, wording and design of important items, such as privacy settings, supplemented by real-life testing, to ensure options are sufficiently prominent (Competition and Markets Authority, 2020e). Sometimes this can be supported by in-depth behavioural design techniques, including user experience testing, eye tracking, and co-designing with users and choice architects (see for example, Adams et al., 2021). Care must be taken to ensure that businesses do not take actions to evade the

intended effects of the choice architecture developed by regulators (Willis, 2013).

2.21 Choice architecture practices often sit on a spectrum. While there is often no truly “neutral” presentation, choices can be made more or less prominent, desirable, or likely by manipulating their design (Gray, Chen et al., 2021). Where consumer preferences are not known and the stakes are high (eg in infrequent major financial decisions) forcing consumers to make an active choice, without defaults, prompts or ordering options in a particular way might be the fairest design option. However, all choices exact a toll from consumers, and there are many cases where sensible defaults and ordered lists help to maximise consumer welfare (Smith et al., 2009). Addressing online choice architecture practices often means working out which direction on the spectrum a choice architect needs to move towards, eg how much friction is appropriate to introduce when designing a consumer journey.

3. Taxonomy of OCA

3.1 The field of "choice architecture" emerged when researchers started to unpack the cognitive peculiarities of human decision making. The wide focus on deviations in human decision making from the rational choice model, which underpins much of OCA, ranges from Simon's bounded rationality proposal (Simon, 1955) and Tversky and Kahneman's (1974) heuristics and biases program, to contemporary behavioural economics (Camerer et al., 2004), Thaler and Sunstein's book on nudge (Thaler and Sunstein, 2008) or "applied behavioural science" (Kahneman, 2013).

3.2 Previous attempts by academics to investigate the field of choice architecture practices have followed two main pathways (Münscher et al., 2016):

i. The first focused on the **underlying behavioural biases** that could be the focus of any type of an intervention. For example, Datta and Mullainathan (2014) proposed that effective interventions should consider consumers' self-control, attention, cognitive capacity, and comprehension, while Dolan et al. (2012) developed a framework that directs choice architects on how to use various psychological mechanisms, such as priming or prominence.

ii. The second targeted **specific choice architecture practices** that may be considered when planning an intervention. For instance, Abrahamse et al. (2005) suggested focusing on facilitating commitment and providing feedback, while Johnson et al. (2012) recommended reducing the choice overload by removing options from the choice set, adjusting the time frames and sequences of choices, etc.

3.3 The taxonomy used in this paper was developed to help catalogue and differentiate various OCA practices, and to structure thinking about the relevant behavioural biases. Our taxonomy draws heavily on that of Münscher, Vetter and Scheuerle's (2016), which focused on three main decision components: decision information; decision structure; and decision assistance.

3.4 The proposed taxonomy incorporated elements of many other taxonomies and approaches, including:

- Brignull's (2010) ad hoc taxonomy of dark patterns
- Gray et al.'s (2018) typology of dark patterns strategies
- Conti et al.'s (2010) taxonomy of malicious user interface designs
- Luguri and Strahilevitz's (2021) taxonomy of dark patterns

- Mathur, Mayer and Kshirsagar's (2021) descriptive approach towards categorising dark patterns
- Narayanan et al.'s (2020) illustration of dark patterns examples across disciplines
- Nguyen and McNealy's (2021) "I, Obscura" – a dark pattern zine
- Robbins' (2021) Taxonomy of Content Manipulation
- Shahab and Lades' (2021) taxonomy of sludges
- Stango and Zinman's (2021b) taxonomy of consumer decision making.

3.5 The taxonomy presented in this paper it is not intended to be used as a binding CMA tool for future cases. It serves as a logical outgrowth from the literature and is valuable for capturing facets of OCA for the purpose of this paper. It integrates elements of previous taxonomies (especially Münscher's) into three main choice components: (i) **information**, (ii) **structure**, and (iii) **pressure** (see ***Figure 2***). For the purpose of this taxonomy, the decision/ choice component was renamed as "pressure" instead of "assistance" to highlight that some practices under certain conditions can have the potential to cause harm to consumers and businesses.

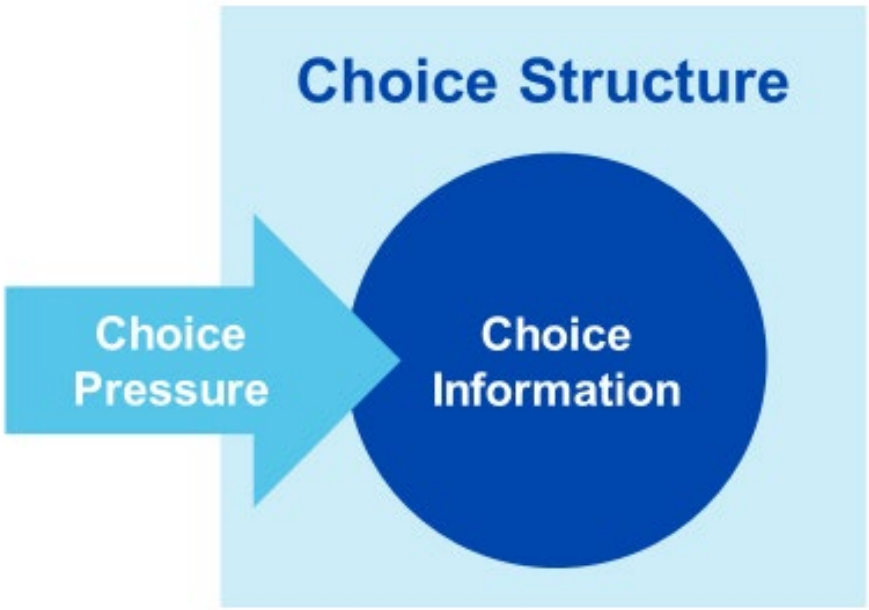

Figure 2. The Choice Situation: (i) structure; (ii) information; (iii) and pressure – Proposed Taxonomy of Online Choice Architecture

3.6 Within the three OCA categories, the taxonomy of OCA practices synthesises the available literature, as shown in ***Table 1***. The intention is that the taxonomy proposed in this paper will evolve over time to reflect developments in technology, business practices and research. It is also worth highlighting that harm may be aggravated where practices occur in combination (see section on ***Effectiveness of OCA practices***).

Table 1. Taxonomy of Online Choice Architecture categories and practices. Each description in the table below is intended to give a brief summary of the OCA practice. The CMA is not limited by these descriptions in assessing compliance with the law.

Choice Structure		
Category	**Description**	**Strength of the Evidence[1]**
Defaults	The choice architect applies a predefined setting that the consumer must take active steps to change.	★★★★
Ranking	The choice architect displays the order of options in a particular way.	★★★
Partitioned pricing	The choice architect presents individual price components without sharing the total or estimated total costs with the consumer.	★★★
Bundling	The choice architect groups two or more products and/or services in a single "package" at a special price.	★★★
Choice overload and decoys [2]	The choice architect provides too many options to compare.	★★★
	The choice architect adds an option to the choice set to make the other option(s) look more attractive to the consumer.	★★★
Sensory manipulation [2]	The choice architect employs visual, aural and tactile features to steer consumers towards certain options.	★★★
Sludge [2]	The choice architect creates excessive or unjustified friction that makes it difficult for consumers to get what they want or to do as they wish.	★★★
Dark nudges [2]	The choice architect makes it easy or removes friction for consumers to make inadvertent or ill-considered decisions.	★★★
Virtual currency in gaming	The choice architect creates elements of a virtual currency to be used as a substitute for the "real-world" currency.	★★
Forced outcomes [2]	The choice architect changes the outcome without giving consumers a choice.	★★

Choice Information		
Category	**Description**	**Strength of the Evidence[1]**
Drip pricing [2]	The choice architect initially shows only part of the price and reveals the full price of the product or service at later stages of the consumer journey.	★★★★
Reference pricing	The choice architect displays a previous (or future) price alongside the current price to make the current price look more attractive.	★★★★
Framing	The choice architect decides how decision-relevant information is described or presented to a consumer.	★★★
Complex language [2]	The choice architect makes information difficult to understand by using obscure words and/or sentence structure.	★★★
Information overload [2]	The choice architect gives a consumer too much information about a product or service such that information about the most relevant attributes is difficult to find and assess.	★★★

Choice Pressure		
Category	**Description**	**Strength of the Evidence[1]**
Scarcity and popularity claims	The choice architect informs consumers about limited stock, limited time to buy or high popularity of an item.	★★★
Prompts and reminders	The choice architect contacts the consumer to induce an action and/or follow up on a previous interaction.	★★
Messengers	The choice architect provides a platform on which a specific person or group can communicate with consumers.	★★
Commitment	The choice architect facilitates commitment by consumers to a particular behaviour in the future.	★★
Feedback	The choice architect provides consumers with feedback.	★★
Personalisation	The choice architect uses data to personalise offers.	★★

[1] The evidence measure is taken from Ruggeri, Linden, Wang, Papa, Afif, Riesch and Green's (2020) table of evidence standards, also known as THEARI (**T**heoretical **E**mpirical **A**pplicable **R**eplicable and **I**mpact) rating system. These standards are intended to communicate the strength of empirical evidence to policymakers: 1-star evidence rating (Theoretical) means that a concept has been discussed but lacks empirical validation; 2-star evidence rating (Empirical) means that a concept has been validated but lacks more robust data; 3-star evidence rating (Applicable) means that results are taken from controlled, reasonably powered trials; 4-star evidence rating (Replicable) means that the results have been successfully replicated in terms of setting, procedure and measurement; 5-star evidence rating (Impact) means that result insights have been implemented and applied at scale.

[2] This practice is usually (or almost always) considered harmful, according to the existing academic literature reviewed in this paper. It is important to note, however, that not all practices listed above are necessarily harmful by nature; some can have a positive or negative effect, depending on the conditions under and the context in which they are used. Additionally, those not suggested as usually or always harmful may be problematic in any particular case.

4. Effectiveness of OCA practices

4.1 In real online markets, many of the OCA practices would not appear in isolation and, when used in combination, it can be hard to distinguish the effects of individual practices on consumers' decisions. For example, free trials can obviously be beneficial to consumers, especially for experience goods, where product characteristics, such as quality or price, are difficult to observe in advance, but these characteristics can be ascertained upon consumption. But free trials – those that could lead to subscription traps – also involve a combination of multiple OCA practices. To create them, the choice architect would likely have had to set up a particular default, use elements of partitioned and drip pricing, reference pricing, friction and sometimes elements of other practices (eg framing, decoy pricing if consumers look at the subscription options) with personalisation (eg using outbound marketing notifications or emails to increase the number of consumers signing up).

4.2 There have been several systematic reviews on the effectiveness of selected choice architecture interventions in specific areas, such as food, pro-environmental behaviour, lifestyle risk factors and physical activity (eg Byerly et al., 2018; Carter et al., 2018; Wright and Bragge, 2018; for full description, see Annex, Table 8 with an overview of studies). However, most research investigates practices in isolation because investigating combined effects can be more complex and costly.

4.3 For example, Szaszi et al. (2018) gave a systematic review of the choice architecture intervention across various domains, such as consumer choice, health, sustainability, education, transport, finance, health, and others. To categorise the intervention, Szaszi et al. used the classification suggested by Münscher et al. (2016) (see **Taxonomy of OCA**). Specifically, Szaszi et al. (2018) found that 74% of the studies mainly assessed the effectiveness of interventions in one specific setting, while 24% of the studies focused on the exploration of moderator variables or underlying processes. This type of analysis shows that it may be useful to further explore the impact of combined OCA practices.

4.4 In addition, a recent quantitative review by Mertens et al. (2022) analysed the effectiveness of interventions across different choice architecture practices (referring to Münscher's taxonomy, 2016), behavioural domains, populations and locations. They showed that choice architecture interventions generally reach a small to medium effect size (ie an effect size is a way to quantify difference between two or more groups by using, for an example as in this study, a standardised mean difference also known as Cohen's *d*), and that

effectiveness substantially differs as a function of practice and domain. This means that if the Cohen's *d* value is higher, there is a larger difference between the average individual in each group. In general, a *d* value of 0.2 or smaller is considered to be a small effect size; a *d* value of around 0.5 is considered to be a medium effect size; and a *d* value of 0.8 or larger is considered to be a large effect size.

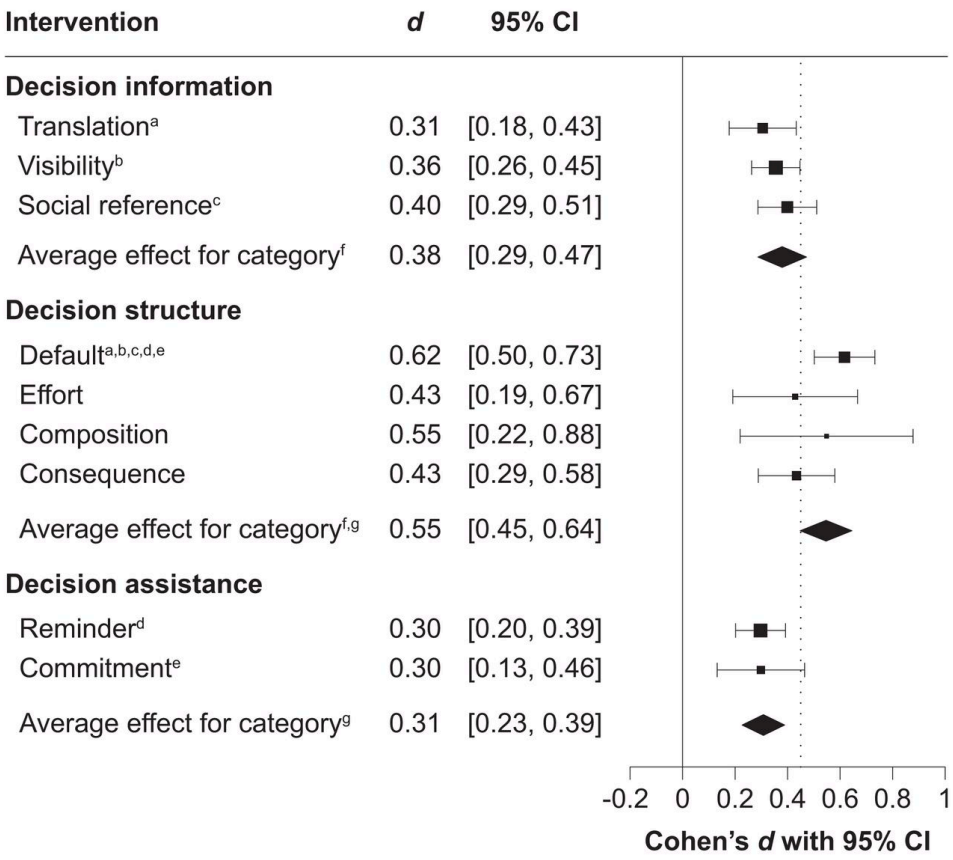

Figure 3. Forest plot of effect sizes across categories of choice architecture intervention techniques

(source: Mertens, Herberz, Hahnel and Brosch, 2022)

4.5 More specifically, comparing the effectiveness of decision information ("choice information" in the proposed taxonomy), decision structure ("choice structure" in the proposed taxonomy), and decision assistance ("choice pressure" in the proposed taxonomy) interventions across different domains consistently demonstrated that interventions within the "choice structure" category had the largest effect on behaviour (see ***Figure 3***). For example, using defaults in designing an intervention had medium to large effects (*d*=0.62) on consumer behaviour than providing access to relevant information (*d*=0.36) or encouraging consumers to self-commit (*d*=0.30). The authors explained that the relative advantage of structural OCA practices was due to consumers not needing to as much effort when processing information.

4.6 Furthermore, Vasas (2021) synthesised the available evidence on the effectiveness of nudge interventions that targeted search and switching behaviour in retail financial markets. The results showed that choice structure-based interventions have stronger effect on search and switching behaviour than on the choice information-based interventions (eg simplifying or highlighting information). Overall, nudge interventions increase consumer search and switching behaviour by 2-3 percentage points on average across reported studies.

4.7 On the other hand, DellaVigna and Linos (2022) compared the effect size of nudge interventions by two of the largest Nudge Units (ie governmental and non-governmental organisations applying behavioural insights to enhance consumer welfare) in the USA against the effect size of trials published in academic journals. The authors observed that the average impact of a nudge conducted by Nudge Units is smaller than the average impact of trials published in academic journals. The authors concluded that selective publication or publication bias in academic journals and differences in trial features, such as in-person communication vs. letter-based communication, can largely account for the difference in observed effect sizes.

4.8 As mentioned above, there is limited research on how the combined effects of each practice may be effective in influencing consumers, but Luguri and Strahilevitz (2021) provided some empirical evidence on how consumers might react when exposed to a combination of OCA practices in the “bait and switch” scenario (eg a type of dark pattern where consumers plan to do one thing, but a different, unwanted thing happens instead). They have conducted a study by asking adult US participants to express their initial attitudes towards privacy. Depending on the level of interest in privacy, participants were assigned into different experimental groups. For example, participants who expressed strong interest in privacy were defaulted into a costly identity theft protection service where they have been led to believe that they would need to pay for the service with their own money unless they opted out. Then, the study authors randomly varied whether the opportunity to opt-out was influenced by different types of OCA practices. In their experiment, some participants were initially asked to either click “Accept and continue (recommended)” or “Other options,” and the button that accepted the program was selected by default. If participants chose “Other options”, they were shown the next screen and asked to choose between “I do not want to protect my data or credit history” and “After reviewing my options, I would like to protect my privacy and receive data protection and credit history monitoring” (eg framing).

4.9 Next, if participants did not accept the program, they were asked to explain why they declined the valuable protection. Several non-compelling or

unappealing options were listed, including “My credit rating is already bad”, “Even though 16.7 million Americans were victimized by identity theft last year, I do not believe it could happen to me or my family”, “I’m already paying for identity theft and credit monitoring services”, and “I’ve got nothing to hide so if hackers gain access to my data I won’t be harmed”. This is another example of manipulating the option consequences and framing (also known as “confirmshaming”).

4.10 Participants could also choose “Other” and type in their reason, or choose “On second thoughts, please sign me up for 6 months of free credit history monitoring and data protection services”. Participants attempting to decline the identity theft protection were then told that since they indicated they did not want to protect their data, they would receive more information so that they could make an informed choice, which included “emotionally charged framing”. They were forced to remain on the page for at least 10 seconds before being able to advance, and they were shown a countdown timer during this period, adding further friction in their decision journey through the use of sludge (also known as “roach motel”).

4.11 If participants went through all three information screens and chose “I would like to read more information”, they were then directed to a question designed to deliberately confuse them. They were asked, “If you decline this free service, our corporate partner won’t be able to help you protect your data. You will not receive identity theft protection, and you could become one of the millions of Americans who were victimized by identity theft last year. Are you sure you want to decline this free identity theft protection?” The two options were “No, cancel” and “Yes”. This question was intentionally framed to confuse participants about which option they should select to decline the program (Luguri and Strahilevitz, 2021).

4.12 When participants were exposed to this aggressive dark pattern condition, their rate of acceptance (41.9%) quadrupled, with a 371% increase in rates of acceptance compared to the control group condition (11.3%). Luguri and Strahilevitz’s (2021) study showed that combined OCA (framing and defaults, sludge, and forcing unwanted outcomes) were more effective than mild and control group conditions in the study (Luguri and Strahilevitz, 2021). Based on this study and real-world examples, where OCA practices rarely appear in isolation, it is likely that the effectiveness of OCA practices might be stronger when combined. For example, personalisation may make dark patterns more effective and harder to detect (eg if businesses can tailor the most effective practices for different consumer groups).

5. Prevalence of OCA practices

5.1 Online environments have created new and convenient opportunities to implement and test the impact of choice architecture practices. This section presents the existing work aimed at investigating the prevalence of OCA. More specifically, it presents:

- Academic work on prevalence of OCA practices, including the intersection of OCA and markets
- Work by consumer and competition authorities and consumer organisations.

Academic work on prevalence, including the intersection of OCA and markets

5.2 Mathur et al. (2019) developed a semi-automated method for crawling more than 11,000 popular shopping websites to measure the prevalence of dark patterns. They found dark patterns on more than 11% of those sites (eg 1,818 examples of different OCA practices identified on 1,254 of the 11,286 e-commerce websites). One of the limitations of the study was that their method looked only for text-based elements that could be captured in a web crawl and did not include visual-based elements (eg positioning of text, size of the font, colour). This means that the analysis likely underestimates the presence of OCA practices.

5.3 In addition, Mathur et al. (2019) developed a descriptive taxonomy of dark pattern characteristics that captures the following five dimensions:

- *Asymmetric*: ie overemphasising the features of one choice, while not displaying equally prominently other choices, such as visually manipulating the colour of one option
- *Covert*: ie steering the consumer to make specific decisions without them being aware of the manipulation, such as introducing a decoy option to make certain other options appear more appealing
- *Deceptive:* ie inducing false beliefs about the interface, such as fake countdown timers
- *Hiding:* ie not disclosing all the relevant information, such as drip pricing
- *Restrictive:* ie not allowing consumers to freely navigate through the interface, such as forced action.

5.4 Most of the OCA practices detected in the paper were covert, deceptive and hiding important information from consumers (Mathur et al., 2019).

5.5 In a subsequent paper, Mathur et al. (2021) proposed an additional attribute to their taxonomy:

- *Disparate treatment:* ie allowing consumers with more resources to have a more favourable treatment, such as skipping interfaces while gaming.

5.6 Di Geronimo et al. (2020) analysed Google Play Store apps (eg Facebook, Amazon, Twitter) within the first 10 minutes of their usage. They demonstrated that potentially harmful OCA were widely prevalent across different apps. On average, each app used seven OCA practices. The distribution of OCA practices can be seen from ***Figure 4*** below, with ranking (ie false hierarchy – 61%), defaults (ie pre-selection – 60%), prompts and reminders (ie nagging – 55%), sludge (ie roach motel – 41%) and forcing outcomes (ie forcing action – 38%), leading the way. The follow-up experiment also found that most participants did not identify OCA practices when exposed to them, but were able to perform better in recognising them if they were informed what to look for (di Geronimo et al., 2020).

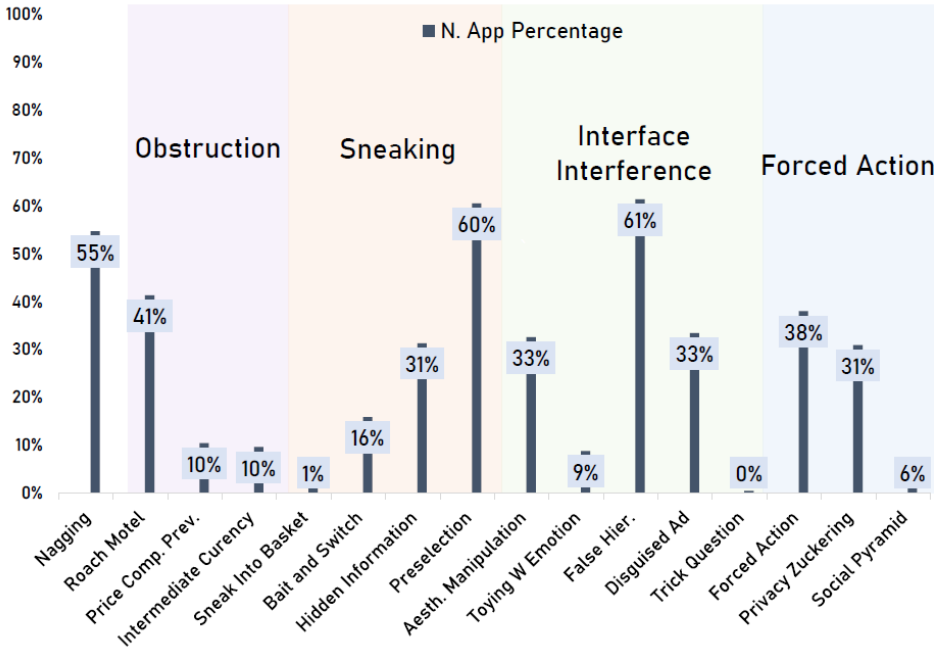

Figure 4. Percentage of apps containing each subcategory of harmful OCA

(source: di Geronimo et al., 2020)

5.7 Moser et al. (2019) completed a systematic review of the top 200 e-commerce websites in the USA. Their content analysis showed that 75% of websites had at least one OCA practice that could encourage impulse buying. While truthful scarcity claims can be informative in some instances, the authors found that a common element of those websites (featured in almost 95% cases) was relying on social pressure, such as providing recommendations on what others bought or low stock warnings (17%). These are examples of supply and demand types of scarcity claims.

5.8 Meyer et al. (2019) described the advertising content across 135 children's apps, and found that 95% of the apps contained at least one type of problematic advertising. These features ranged from the use of characters from popular cartoons and toy franchises (48%), prompts to upgrade to the full version of the app (46%), advertising videos that suddenly interrupt play or appear at the start/finish of different levels (35%), in-app purchases that enable gamers to buy extra credits, accessories and items that make the gameplay smoother (30%), and other advertising features.

Table 2. Top 10 dark patterns sorted by percentage of websites or apps containing the pattern **(source: Gunawan et al., 2021)**

Top 10 dark patterns	Desktop websites (%)	Mobile websites (%)	Mobile apps (%)
No consent checkbox for ToS/PP	70	70	67
No account deletion	52	57	67
No privacy settings	52	55	66
Notification setting opt-in by default	45	50	62
Visual option precedence	41	39	48
No bulk options for settings	32	37	47
General pop-up nags	31	34	44
Privacy setting opt-in by default	30	30	39
Extraneous notification badges	26	27	32
Account required	25	27	30

5.9 Gunawan et al.'s (2021) comparative study of mobile application, mobile browser, and web browser versions of 105 popular services investigated variations in dark patterns across modalities. They found that while services can employ some dark patterns equally across modalities, many dark patterns vary between platforms (see ***Table 2*** above), and that these differences saddle people with inconsistent experiences of autonomy, privacy, and control. For example, the most prevalent dark patterns across all three modalities (67-70%) was no consent checkbox for the Terms of

Service/Privacy Policy, while mobile apps (62%) were much more likely to have notification setting opt-in by default in contrast to desktop and mobile website (45-50%) (Gunawan et al., 2021).

5.10 The following four academic studies have explored the use of potentially harmful OCA in the domain of consent notices:

- Utz et al. (2019) selected a random sample of 1,000 consent notices relating to the 500 most popular European Union (EU) websites. They showed that 57.4% of consent notices used some element of visual manipulation practice. For example, the websites often used distinctive colour to draw attention to the button to accept privacy-unfriendly defaults, pre-selected checkboxes that enable consumer data collection, as well as masking advanced settings behind difficult-to-spot links.

- Nouwens et al. (2020) analysed privacy consent notices across the top 10,000 UK websites. They found that websites preferred to use notice designs that were more implicit (32.5%). In most of the notices, consumers had to put significantly more effort into rejecting their data tracking, which was a combination of a sludge and visual manipulation, where approximately 50% of websites were missing a “reject all” button completely.

- Matte et al. (2020) conducted a semi-automatic crawl of consent notices across 560 websites. They showed that defaults were predominantly used (46.5%) by pre-selecting privacy-unfriendly options for consumers.

- Soe et al. (2020) explored consent notices in the context of news outlets to check their compliance with General Data Protection Regulation (GDPR). They found that almost all websites used OCA in a harmful way when eliciting consent from consumers. Specifically, they showed that to deny consent directly or via browser settings, only 15 of the 300 websites provided a direct 1-click deny button, in contrast to all of them having 1-click accept button (ie dark nudge). In addition, approximately 50% of the websites required 10-12 clicks to click on deny consent button (ie sludge).

Work by consumer and competition authorities and consumer organisations

5.11 The recent Organisation for Economic Co-operation and Development (OECD) report on "Dark commercial patterns online" (2021) suggested that prevalence of harmful OCA is high – including across e-commerce websites, apps, privacy consent notices and others. However, researchers and investigators do not often have access to internal data of businesses that might provide information on the relative effectiveness of different practices, nor the ways in which they are deployed. Instead, academics and consumer and competition authorities have collected data using different techniques to identify OCA practices "in the wild", including:

- web-scraping techniques (ie automatically search websites and extract data on OCA practices)
- web-sweeping techniques in collaboration with other international regulators or authorities (ie manually checking on websites to identify potential examples of harmful OCA)
- mystery shopping (ie mirroring the "actual/real" consumer experience of buying a product or a service)
- requests for information (ie either "informally" or by using powers to request businesses to provide documents and information).

5.12 The International Consumer Protection and Enforcement Network (OECD, 2021) conducted a sweep of 1,300 e-commerce websites/apps across different of sectors and found that over one-fifth of them appeared to involve one or more examples of harmful OCA practices. The three most identified OCA practices were defaults (eg pre-ticked boxes), scarcity claims and drip pricing.

5.13 The Australian Competition and Consumer Commission (Australian Competition and Consumer Commission, 2021) analysed consumer reviews of the top 1,000 grossing and "free" apps on the Apple App Store and Google Play Store. The term "subscription" was strongly linked to the negative reviews on both stores because consumers usually would have a hard time understanding that they were agreeing to a subscription, or the price of the subscription, and/or struggling to cancel (ie sludge).

5.14 The Chilean consumer authority (El Servicio Nacional del Consumidor; SERNAC) found that 64% of the businesses they observed used some type of potentially harmful OCA to make people buy or do things they do not want,

such as registering and handing over their data (ICPEN, 2021). For this study, SERNAC analysed 107 websites of businesses, looking for practices that are hard to spot for consumers, such as sludge, drip pricing, false scarcity and others (ICPEN, 2021).

5.15 The Norwegian Consumer Council, Forbrukerrådet (2018, 2021), conducted three related analyses on data-privacy practices across well-known digital platforms (eg Facebook, Google, Windows, Amazon) using mystery shopping:

- In the first study, Forbrukerrådet (2018) analysed a sample of privacy-related settings in Facebook, Google and Windows. All three were found to use a range of OCA practices in a harmful way. For instance, Facebook and Google used privacy-unfriendly defaults that made it easy for consumers to agree to share their data, but made it substantially harder for consumers to deny them access.
- In the second study, Forbrukerrådet's (2018) analysis focused on Google and its location tracking practices. They discovered the use of various OCA practices, including:
    i. enabling location tracking by default
    ii. hiding relevant information (ie visual manipulation)
    iii. making it easier to agree to tracking via click-flow feature on their mobile devices (ie dark nudges)
    iv. making it harder to deny tracking (ie sludge).
- In the third study, Forbrukerrådet (2021) ran a similar analysis of Amazon and its Prime Services. They found asymmetry in the consumer journey because consumers were able to easily sign up for the Prime Service, but experienced multiple obstacles to cancel it. These included visual manipulation and greater effort to navigate through several screens (ie sludge).

6. Choice Structure

6.1 The way options or choices are structured and presented can affect consumers' behaviour and decisions. For example, imagine you are buying a subscription to your favourite video game. Even before you have started to explore the options at your preferred provider, the choice architect has structured options in such a way that it will guide your decisions – you can't choose an option that doesn't exist (an example of ***forced outcomes***). Perhaps you are shown a set of options, but one stands out; perhaps it is pre-selected, has a big red circle around it and is shown in the middle of the options. This is an example of a **default**, where the choice architect has already predefined an option and used **sensory manipulation** to make that choice more prominent through colour, size and positioning. In the most egregious cases, a provider may add the subscription to your shopping basket without you taking any action (this is a dark pattern called "**sneak into basket**").

6.2 Perhaps, before you decide to subscribe, you visit a comparison website that lets you see a wide range of options. The way the options are presented – whether in a list (ie one after another), simultaneously, or as a part of a scorecard/table – will affect what you would pick and how you would feel about your choice (Basu and Savani, 2017; Mogilner et al., 2013). In addition, if there are too many options, this might induce **choice overload** (Iyengar and Lepper, 2000). Knowing that consumers rarely look beyond the top results (Agarwal, Hosanagar, et al., 2011), the choice architect might consider how to fill those top spots. Should they **rank** the options by customer rating, relevance, price, how much the business has paid the comparison website, or by something else? Will this ranking be aligned with your preferences (ie ethical choice architecture)? How easy should it be for you to change the criteria for ranking, and will you actually do it? Do you even know which criteria you should use to sort the items by, or would you be guided by the criteria set by the business offering the product? In most cases, preferences are "formed on the spot"; consumers do not know beforehand what they are looking for (Slovic, 1995). Thus, the structure of choice per se could define and form your preferences.

6.3 You manage to compare different options and decide which subscription deal seems the best. At the final screen, you see that price has been separated and displayed into multiple charges, and it might take you some time to realise what exactly you need to pay for and what might be optional (this is an example of **partitioned pricing**).

6.4 Once you have bought your subscription, you realise that the rules have changed. In the world of the game, you might have to buy **virtual currency**, which may make it harder for you to value in-game options. In the middle of the level, you are prompted with an in-app purchase advert for the new powerful weapon that will enable you to progress through the game more easily. The button to make that purchase is just one-click away (ie **a dark nudge**).

6.5 Perhaps you decide to cancel your subscription. How easy is it to do this? You were able to sign up at the click of a button – but perhaps, to cancel, you must make a phone call during office hours, armed with reference numbers. This is an example of **sludge** – excessive friction that prevents you from acting in your own interests.

6.6 Choice architects often have a good understanding of these techniques and the impact they can have on consumers. In many cases, they may have varied choice structures over time and extensively tested consumer responses to the variations. In other cases, choice architects can reproduce techniques widespread techniques, without fully knowing the full effect they will have on consumer behaviour.

6.7 Existing behavioural literature shows that consumers often do not rationally compare attributes or alternatives and find the “best” option for themselves. As noted above, consumers do not always know what they are looking for. Their preferences can be “formed and constructed on the spot” (Slovic, 1995). So, the structure of choice can define which attributes people will compare options on. Thus, the way choice is presented affects the formation of the preferences of the consumers. Second, even if consumers have well-established preferences and know what they want to buy, maximising strategies (ie comparing all possible alternatives on all attributes) are often shown to be hard to apply or are unsuitably adapted (Schwartz et al., 2002). However, some alternative strategies have been suggested, such as satisficing (ie settling on a choice that is merely acceptable, rather than optimal) (Payne et al., 1988).

6.8 Accordingly, choice architects can control the arrangement of options and the decision-making format, which includes setting defaults, rearranging the composition of options, and changing option-related efforts, medium or consequences, thereby affecting consumers’ behaviour and decisions.

Table 3. Choice structure OCA practices

Choice Structure		
Category	**Description**	**Strength of the Evidence[1]**
Defaults	The choice architect applies a predefined setting that the consumer must take active steps to change.	★★★★
Ranking	The choice architect displays the order of options in a particular way.	★★★
Partitioned pricing	The choice architect presents individual price components without sharing the total or estimated total costs with the consumer.	★★★
Bundling	The choice architect groups two or more products and/or services in a single "package" at a special price.	★★★
Choice overload and decoys [2]	The choice architect provides too many options to compare.	★★★
	The choice architect adds an option to the choice set to make the other option(s) look more attractive to the consumer.	★★★
Sensory manipulation [2]	The choice architect employs visual, aural and tactile features to steer consumers towards certain options.	★★★
Sludge [2]	The choice architect creates excessive or unjustified friction that makes it difficult for consumers to get what they want or to do as they wish.	★★★
Dark nudges [2]	The choice architect makes it easy or removes friction for consumers to make inadvertent or ill-considered decisions.	★★★
Virtual currency in gaming	The choice architect creates elements of a virtual currency to be used as a substitute for the "real-world" currency.	★★
Forced outcomes [2]	The choice architect changes the outcome without giving consumers a choice.	★★
The notes from Table 1 above also apply to this table.		

Defaults

6.9 Defaults apply a predefined setting that users are less likely to change; setting defaults is one of the most effective online choice architecture practices (Jachimowicz et al., 2019; Smith et al., 2013). From a range of settings, here is strong evidence that shows that changing or setting defaults is more effective at influencing consumer choices and behaviours than changing the information (eg simplification) (Levin et al., 1998; Mertens et al., 2022). Looking at defaults from the perspective of consumer welfare, consumer autonomy and ethics, researchers have argued that ignoring defaults is not an option for regulators (Smith et al., 2009).

6.10 In the early days of online selling, defaults, in the form of pre-ticked boxes, became very prevalent (Jabłonowska and Michałowicz, 2020). For example, travel insurance was sometimes sold automatically when consumers were purchasing flight tickets, and cancellation insurance was automatically included in the sale of event tickets. In 2019, The Court of Justice of the European Union (CJEU) ruled that websites need active consent to store cookies on users' devices. In particular, the CJEU ruled that a pre-ticked check box that users must de-select is not a valid form of consent (*Federal Court of Justice, Germany vs. Planet49 GmbH In Case C-673/17*, 2019). However, the use of potentially harmful defaults may still be prevalent in a variety of settings (eg online search, social media services) and different features of online consumer journeys.

6.11 While a default in general might help users to make better choices by pre-selection of the most beneficial options, defaults are not always designed with the consumer's best interests in mind (Konsumentverket, 2021). For example, Google Ads Networks enabled advertisers to broaden their search advertising campaigns beyond Google-owned and -operated properties. Within the Google Ads networks display, "Include Google search partners" and "Include Google Display Network" were automatically pre-selected, as seen in ***Figure 5***. In the final report of CMA's Market Study on Online platforms and digital advertising (Competition and Markets Authority, 2020f), there was concern that Google was leveraging its strong market position from search into display by swaying advertisers to keep this option selected.

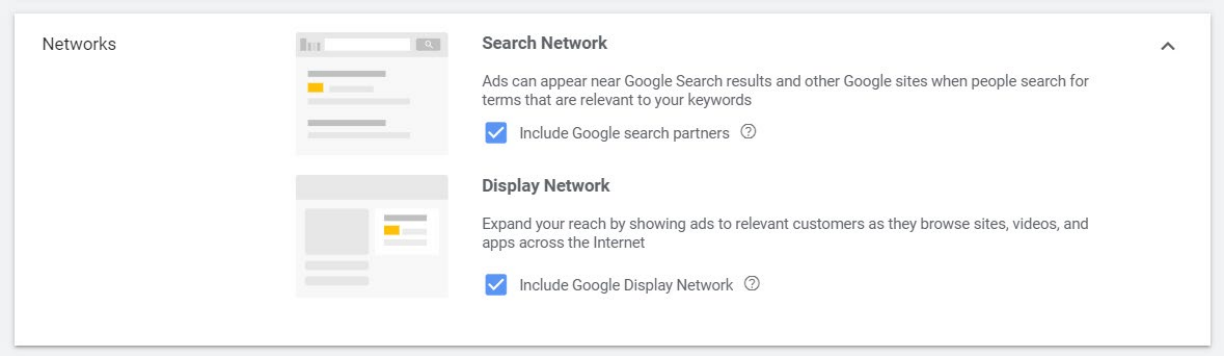

Figure 5. Google Ads networks default settings

(source: Competition and Markets Authority, 2020f Screenshot taken 08/04/2020, Google Ads.)

Effect on consumers and businesses

6.12 There is wide-ranging evidence from nudge units (ie governmental and non-governmental organisations applying behavioural insights to enhance consumer welfare) and other practitioners that defaults are more effective than other behavioural measures (eg transparency). DellaVigna and Linos (2022) removed default interventions from their meta-analysis of nudges because large effects skewed the overall results, and because nudge units rarely change the default owing to institutional constraints that are difficult to implement (especially in the USA). They defined default interventions as interventions that "change which outcome happens automatically if an individual remains passive" (Bronchetti et al., 2013), as in the classical case of retirement savings defaults.

6.13 Defaults exhibit stronger effects in the presence of many alternatives than in only two-alternative choices (Cronqvist and Thaler, 2004; Park et al., 2000; Shafir et al., 1993). For example, an analysis of many pension options chosen by Swedish consumers (Cronqvist and Thaler, 2004) showed that one-third of them ended up with their entire investment in the default fund, despite an elaborate educational campaign nudging them to make active choices. These findings illustrate how a large potential number of options can make consumers remain with the given default.

6.14 Beshears et al. (2010) showed that the defaults become less effective when they are set as more extreme options. In this study, only one-quarter of employees stayed automatically enrolled at the 12% contribution rates for retirement savings plan, which was viewed as significantly higher than in other studies and suboptimal for all the employees. In addition, the results showed that those employees who did not change their default position were in the

low-income category, meaning those individuals were disproportionally worse off.

6.15 Jachimowicz, Duncan, Webber and Johnson (2019) carried out a meta-analysis of 58 studies to understand whether default effects have an impact on consumers and, if so, how big it was. They found that a pre-selected default option is, on average, 27% more likely to be selected in a two-option choice. Even when attempting to correct for factors that could potentially bias this estimate (ie publication bias), they find that, if anything, the default effect increases. This indicates that studies that identified large default effects were being underreported in the published literature. Although the default effect is on average large, there is significant variation in the size of this effect. This might be partly explained by some of the study characteristics: in particular, defaults that affect decisions on consumer goods tend to be more effective than defaults that involve environmental decisions. They tested other study characteristics, such as whether the study was a field or a lab experiment, whether it was conducted in the USA or somewhere else, by time of publication, by type of choice (ie whether it is binary or continuous), but found that these other characteristics do not explain variation in the default effect size. Jachimowicz et al. (2019) speculated that this might be because consumer preferences that affect the environment are more strongly held than preferences on consumer goods or services.

6.16 Furthermore, Jachimowicz et al. (2019) identified few psychological mechanisms, including effort, implied endorsement, endowment, status quo and reference dependence.

- Choosing the default option minimises consumers' **effort** when making a decision (Johnson and Goldstein, 2003). The literature has identified two types of effort that are relevant: physical and mental effort. Physical effort can involve whatever action is necessary for the consumer to take to change the default. While part of the older literature considers actions, such as filling in paper forms or collecting necessary documentations, these are likely to be less relevant in the digital environment, where physical actions are likely to be less cumbersome. However, it is worth noting that consumer expectations are changing in line with the technological advances (Bhattacherjee and Premkumar, 2004). For example, consumers might find having to search online for information or fill in online forms equally as cumbersome as posting a letter in the past. In fact, sometimes cumbersome offline efforts are also required to change an online default (eg having to telephone to cancel a subscription) – see section on ***Sludge***. Mental effort is the neurocognitive effort required for an individual to make a decision. It involves mental calculations aimed at

identifying trade-offs and the best option, which takes time and increases consumers' cognitive efforts (Johnson and Goldstein, 2003).

- Another explanation – **implied endorsement** – suggests that defaults are effective because consumers may perceive that the intentions of the choice architect (eg the business whose website the consumer is using to make a purchase), in the form of the pre-selected options, are recommendations for their own benefit (Jachimowicz et al., 2019; McKenzie et al., 2006; Sunstein and Thaler, 2003). This may be because consumers believe that the choice architect wants them to select the default option (direct implied endorsement) or because consumers choose the default on the basis that this is what most people would do (external implied endorsement). In an online shopping context, Brown and Krishna (2004) argued that consumers may treat the defaults set by businesses as a recommendation and, in the case of less-reputable businesses, as a clear signal to their choices are being influenced.

- Defaults may also lead consumers to act as if they have already chosen the default option (**endowment effect**) and, consequently, they use the default as a reference point to construct their preferences (**reference dependence**). These biases can also be explained in terms of loss aversion (ie tendency to dislike losses more than they like equivalent gains). Thaler, Kahneman, and Knetsch (1991) argued that consumers may perceive that they already own the default option and getting rid of it might be viewed as a potential loss. First, the endowment effect may lead consumers to value what they perceive as being already theirs (the pre-selected default) more highly and therefore be averse to the idea of losing it (Park et al., 2000). Second, for status quo bias, any deviation from the current baseline might be perceived as a loss (Ritov and Baron, 1990). Third, consumers may use the default option as a reference point against which they construct their preferences, leading to a change in their evaluation of other options. This is because when exercising a choice, consumers construct and evaluate their preferences by retrieving information from their memory about the options available. In doing so, the content and order in which this information is retrieved and assessed (such as reasons for and against owning a particular object) may have an impact on what is preferred and ultimately chosen. The existence of a default option may increase and pre-empt the retrieval of information in favour of that option, leading to the default effect. Dinner et al. (2011) suggested that this may be induced by the so-called Query Theory (ie a memory-based view). They argued that when individuals decide, (a) they identify different arguments in the process by making unique queries, such

as generating reasons for or against owning a particular object; and (b) they perform these queries sequentially.

6.17 In their experiments, Dinner et al. (2011) found that reference dependence and preference construction can play a primary role in the default effect. However, they stress that this is unlikely to be the only mechanism able to explain the default effect across all the situations in which this has been found. Instead, it is probable that effort, implied endorsement and reference dependence likely play a role in different situations, with the strength of each mechanism varying depending on the circumstances.

6.18 Graßl and his collaborators (2021) conducted a behavioural experiment to investigate the effects of three OCA practices – "defaults", "visual manipulation", and "hard to cancel sludge" – on consumers' decisions in cookie consent requests and their perception of control over their personal data. They showed that most participants in the study agreed to all consent requests regardless of the dark patterns, meaning that there was no substantial effect of the dark patterns on consumers' consent decision relative to a no-dark patterns scenario. As a potential explanation for this outcome, the authors argued that encountering consent request daily has led consumers to develop a rule of thumb on how to deal with privacy settings. Interestingly enough, the presence of those three practices did not make participants perceive less control over their personal data – instead, obstructing the privacy-friendly option "Do not Agree" by changing into "Manage options" actually led to more, rather than less, perceived control.

6.19 In another follow-up experiment by Graßl et al. (2021), all of the three practices – default, visual manipulation, and sludge – were designed to influence participants in favour of the privacy-friendly option. This time the results showed that sludge and defaults steered participants about 10 times more towards choosing the privacy-unfriendly option than to the first study outlined above.

Harm to Consumers and Competition

6.20 In some cases, defaults are so well hidden that consumers may not be aware they even have a choice (Smith et al., 2009). For example, many consumers do not change the default browser setting on their screens and if large numbers of consumers stick with the default, it can have a large economic impact on web browser dominance.

6.21 The Mobile Ecosystems Market Study Interim report (Competition and Markets Authority, 2021c) described how default settings and pre-installations play an important role in consumers' choice of browser. This is because the

process for setting up a new default browser on both iOS and Android devices involves a series of potentially difficult steps, such as installing a new preferred default browser and navigating to find the relevant options. An important consequence of this market power in search is that it creates conditions make it difficult for rivals to compete on an equal footing. This was considered to be exacerbated by Google's behaviour that makes it more difficult for rivals to compete, which can reduce the ability and incentive for rivals to innovate (Competition and Markets Authority, 2020a).

6.22 Another type of default is automatic renewal, a practice whereby businesses unilaterally renew consumers' subscriptions when they expire, unless consumers actively cancel by a certain date (Konsumentverket, 2021). Obviously automatic renewal can be a very useful practice and prevent customers having to pay active attention to renewing a subscription and it can also make sure that customers are not without a product, if they fail to renew in time. But automatic renewal may also take advantage of consumers' failure to check up on expiry dates for services, either for a free trial or for a limited time use of a paid service. By using this practice, businesses might assume incorrectly that consumers want to continue the paid service or upgrade to the paid version of the free trial, without actively checking with the consumer. Over the years, unfair or deceptive "negative option practices" such as these have remained a persistent source of consumer harm, often saddling shoppers with recurring payments for products and services they did not intend to buy or did not want to continue buying (Federal Trade Commission, 2021). The CMA has been active in looking at the harm that can arise from automatic renewal practices– including responding to the loyalty penalty super complaint, its consumer law investigations in the anti-virus software and online dating sectors and through European and global co-ordinated projects (Competition and Markets Authority, 2018b, 2018c).

6.23 Defaults can cause harm in high-stakes decisions also and even when people are aware they are being influenced. For instance, Loewenstein et al. (2015) revealed to the participants that they were about to be defaulted to a random choice about their future medical wishes and allowed them to revise their choices – yet they still chose the default more frequently.

Literature on potential remedies

6.24 Active choice is one potential remedy used to counteract harmful defaults, particularly where it is difficult to decide on an alternative default that is more likely to be in consumers' interests. This type of remedy places special emphasis on consumer autonomy (Smith et al., 2009). Common examples include "choice screens," which force consumers to choose a default setting

from a list before continuing. For example, as discussed in the ***Discussion paper***, following the European Commission's 2018 finding (under appeal) in its Android case, Google introduced a choice screen on all new Android phones and tablets in the European Economic Area, including the UK, allowing users to select a search engine default (*CASE AT.40099 Google Android*, 2018).

6.25 As noted in the CMA's Mobile Ecosystems market study interim report, there may be limits on the impact of choice screens on the search engine used by consumers (Competition and Markets Authority, 2021e). For example, in the year to 31 August 2021 in the UK, almost all users chose Google Search in instances where they saw the choice screen Google introduced. To note, Google have introduced an updated choice screen, as of 1 September 2021. Choice screens have also been recommended for other contexts but with caveats on the need for testing and trialling with consumers. For example, in the CMA's Online Platforms and Digital Advertising Market Study, the CMA recommended requiring platforms to give consumers the choice not to share their data for personalised advertising (the "choice requirement remedy") (Competition and Markets Authority, 2020c). The CMA also proposed that the Digital Markets Unit (DMU) should be empowered to require Google and Facebook to observe a "Fairness by Design" duty to design choice architecture in a way that encourages free and informed decision making by consumers. This was intended to enhance user awareness and control over data. The CMA also recommended testing and trialling choice screens with consumers before implementation (Competition and Markets Authority, 2020c).

6.26 A temporarily successful active choice experiment was the Swedish government's extensive information campaign to encourage citizens to choose between 456 mutual funds for their pension rather than rely on a default option: two-thirds of citizens did so in 2000 (Cronqvist et al., 2018). However, once the campaign finished, the default once again became predominant, with less than 1% making an active choice of fund by 2003. This example showed that effective information campaigns can encourage consumers to consider changing their defaults, but also underscores that campaigns must be continuous to retain the effect.

6.27 Active choice may be less well suited to decisions with many alternatives, where consumers have less well-formed preferences or where something must happen if the consumer fails to make an active choice (Beshears et al., 2021; Carroll et al., 2009). It may also require considerable effort from consumers, and this cost should be factored into the trade-off for whether to use a default versus active choice.

6.28 In fact, in many contexts, defaults are both unavoidable and potentially welfare enhancing. For example, Smith et al. (2009) set out three types of defaults that can be set by businesses:

i. **Benign defaults** refer to the situation where the default is set from the preferences of most of the consumers when faced with making an active choice. This means that the greatest number of consumers can benefit. For example, in the case of pension savings, a majority of workers acknowledge that it would be beneficial to have sufficient income in retirement but struggle to make that daily choice. Therefore, setting a new default so that workers allocate a portion of future salary increases towards their retirement savings made a significant change (Thaler and Benartzi, 2004). However, administering such policies might be quite difficult, the choices might not suit some consumers, and it could be a problem if the consequences are large or significant for those who are not in the majority (Smith et al., 2009).

ii. **Smart defaults** refer to the situation where the default is purposely designed to help specific groups of consumers make better decisions. For example, a smart default for pension savings could be based on a simple linear model incorporating consumers' age, family status, intended age of retirement, risk preferences, loss aversion, and others. The key challenge for smart defaults is to collect enough consumer-specific data sufficiently quickly to compute the default calculation (Smith et al., 2009).

iii. **Adaptive defaults** refer to the situation where the setting of the default is based on the consumers' previous choices. For example, an adaptive default would require businesses to present the options with defaults that represent the best guess of what might be chosen, conditional on what has been chosen to date. This type of default might be particularly relevant in the online shopping environment where businesses can keep track of past consumer shopping decisions. However, if bias drove the initial purchases, this bias would quickly be built into the system and its effects multiplied (Smith et al., 2009).

6.29 In some instances, it might be suitable to require procedural constraints to reduce the prospect of consumers rejecting a welfare-enhancing default (Smith et al., 2009). These constraints usually raise the cost of moving away from the default by requiring greater effort. For example, software businesses might label settings as "recommended" when installing software to deter users from changing to less suitable settings. In other instances, where the default

is not welfare enhancing for at least some consumers, warnings and disclosures may be warranted (Robinson et al., 2016).

6.30 When it comes to the use of defaults (eg where auto-renewal of a subscription is set as the default option) that could lead to consumer harm, concerns may arise about the business's compliance with consumer protection law. In these circumstances, remedies might be achieved through enforcement action. For example, the CMA launched an investigation into two leading anti-virus software businesses, McAfee and Norton, which related to their practices and terms associated with the automatic renewal of one-year product subscriptions for a further year (Competition and Markets Authority, 2018c). A feature of these businesses (respective) subscriptions is that automatic renewal is typically set as the default option. The CMA was concerned that this could play a role in some customers carrying on paying for annual subscriptions they no longer wanted or needed. While not admitting liability, both businesses gave undertakings to make their automatically renewing subscriptions easier to understand and exit. The changes included giving customers whose subscription has auto-renewed a new right to obtain a pro-rata refund of the amount they were charged (after the existing refund window has expired). The changes make it easier for customers to get their money back if their subscription renews when they didn't want it to.

6.31 The Federal Trade Commission (FTC) considered automatic renewal to be a "negative option offer": a category that also includes, for example, continuity plans, free-to-pay or fee-to-pay conversions, and prenotification plans, and included it in its Enforcement Policy Statement in 2021 (Federal Trade Commission, 2021). The UK's Department for Business, Energy and Industrial Strategy (BEIS) also consulted on remedies to mitigate automatic renewal, including forcing customers to make an active choice about whether to accept automatic renewal at the start of the contract (BEIS, 2021). The consultation also recommended reminding consumers throughout that period, so they are aware of ongoing subscriptions and making it easier to cancel any subscriptions.

Ranking

6.32 The order of options has a large impact on the choices consumers make. Items appearing at the top of a list are more likely to be chosen than those later in the list in a range of contexts, including tweets (Agarwal, Xie, et al., 2011), Yahoo's price comparison sites (Baye et al., 2009), and Google listings (Yang and Ghose, 2010). There are a few reasons for this, including that consumers use more cognitive effort (and perhaps more physical effort) to scroll down a list of items shown on their screens, rather than choosing the top options. Therefore, well-designed ranking options can help consumers make decisions efficiently.

6.33 However, list compilers often also use **paid ranking** (also known as "sponsored ranking"). This means that businesses pay extra in exchange for a higher position in the search results. There are two types of paid ranking models (Netherlands Authority for Consumers and Markets, 2021):

(a) Auction-based ranking (ie the platform holds several top or near-top rank spots that are sold via auctions)

(b) Commission-based ranking (ie the platform gives better ranking position to the businesses that pay higher commission).

6.34 When businesses are not transparent about the criteria used to generate the ranking, it may raise concerns that rankings reflect only what is in the business's interest. Consumers may not understand that they are not seeing "organic" search results, and still expect to make an informed decision about their purchase based on those criteria, potentially distorting their decisions. This might refer to the instances where consumers misperceive rankings as objective recommendations (Netherlands Authority for Consumers and Markets, 2021).

6.35 In the CMA's publication on Algorithms (2021a), misleading or unfair ranking was defined as "the use of algorithmic systems to modify rankings to influence what a consumer sees to gain commercial advantage, but that ultimately degrades or misrepresents the offering to the consumer". The publication also argued that paid ranking practices can make it harder for new businesses or products to be viewed by consumers because they cannot afford to pay their way up the list. This may mean that lists are no longer strictly ordered by quality or relevance, potentially leading to worse consumer decisions, lower trust in results and a distortion of competition, in which better quality results may not prevail (Competition and Markets Authority, 2021a).

6.36 Furthermore, businesses with market power that both control the order of lists on their site and sell items or have a financial interest in items that appear on that list may also engage in **self-preferencing,** eg when they position their own products or products, they derive revenue from being higher up the list. The exploitation of market power in the list market may reduce choices for consumers, who often browse no further than the first page of results (Competition and Markets Authority, 2017d). However, the recommended choices do not need to even belong to the platform. They could also be linked to other businesses with which the platform has established relationship (eg commission or revenue sharing). For example, Aguiar and Waldfogel (2021) analysed Spotify's most-followed playlist to understand the extent to which Spotify has the ability to influence consumers' listening choices. The findings showed that playlists owned and curated by Spotify have signficiant influence on streaming. If a song is placed within "Today's Top Hits" playlist, it can increase its streaming potential by 20 million (Aguiar and Waldfogel, 2021).

Effects on consumers and businesses

6.37 A body of evidence on ranking and ordering showed primacy effects on choice, or advantages to being first or early in a sequence (Becker, 1954; Miller and Krosnick, 1998). These effects are also known as order effects or position bias, which is closely linked to consumer inertia and default effects. Most consumers start browsing at the top of lists, so higher ranked items are likely to receive more visibility. These primacy effects are especially salient online where higher ranked links are more likely to be clicked (Agarwal, Hosanagar, et al., 2011; Ghose and Yang, 2009; Yang and Ghose, 2010). For example, Ansari and Mela (2003) found that if the link in an email was displayed at the top, it led to a higher probability of being clicked by consumers. In addition, studies from the domain of eye-tracking (Duggan and Payne, 2011; Granka et al., 2004) showed that consumers' attention tends to focus from top to bottom, skimming the available information by following the "F-pattern" of reading.

6.38 In fact, across several contexts, items appearing higher up in a list are more likely to be chosen (see ***Figure 6***).

- In a review of the literature on how consumers search online, the CMA (2017d) found that consumers focus mostly on the top search results, which is not only driven by the top results usually being more relevant but may be a result of an inherent consumer bias.

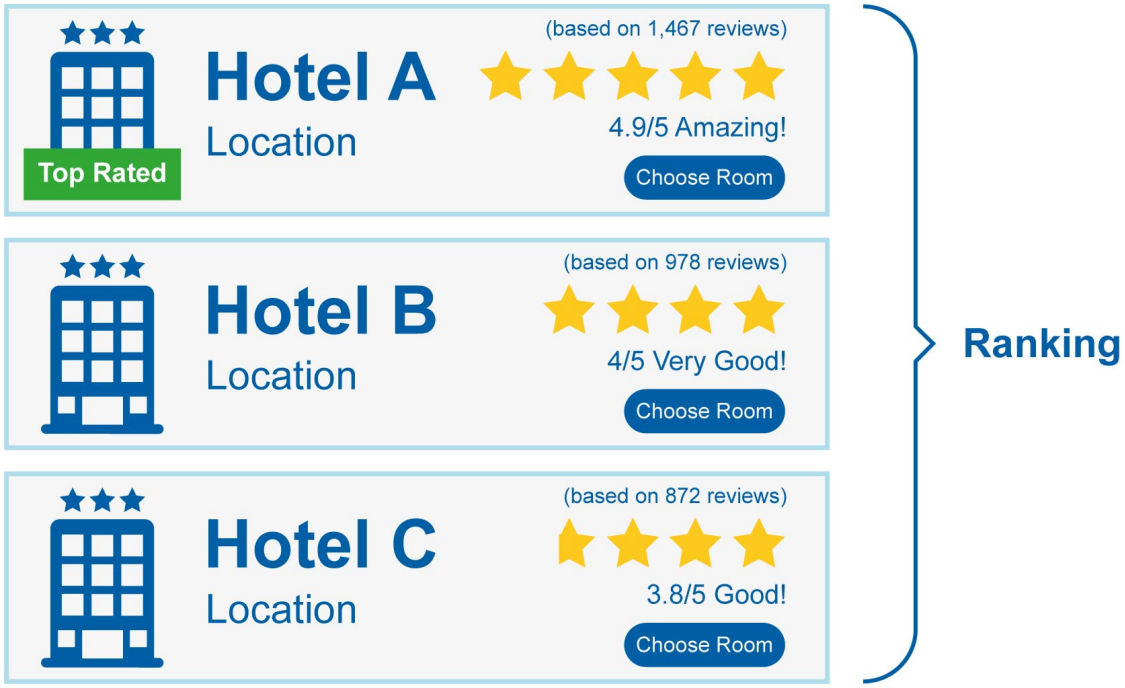

Figure 6. Example of ranking practice on a hotel booking website

(source: mock-up designed for the purpose of this paper)

- Carare (2012) analysed sales ranking data of the top 100 applications that have been bought via Apple's App Store. The findings showed that willingness to pay for the top-ranked product was approximately $4.50 greater than for the similar product when it is unranked. More specifically, the value attached to the highest rank spot was nearly double that of the value attached to the second highest rank spot.

- Mullett, Smart and Stewart (2018) found that participants in an experiment were more likely to choose the product most suitable for them if its advert appeared first on a simulated social media feed.

- In another experiment, Craswell et al. (2008) found that the first result in a list was more likely to be clicked than the second result, which was more likely to be clicked than the third. Differences were not statistically significant beyond the first three results, suggesting that consumers focus their attention on the top three.

- However, Ursu (2018) in analysis of field experiment data at Expedia found that rankings influence what consumers search, but depending on the type of search, they might not influence purchase decisions. Ursu (2018) also showed that rankings lower search costs, instead of influencing consumer expectations or utility.

6.39 Not only are items at the top of a list more likely to be chosen, but consumers also do not often change the order of a list – even when they can. For example, a Kantar Public report (Hanson et al., 2017) found that, of those consumers who had used a comparison website in the previous three months, only 28% had re-ordered their results. Overall, the findings showed that the factor(s) according to which online architects choose to order the options presented to consumers can have a significant influence on consumers' decisions.

6.40 Medium also seems to matter when it comes to ranking. Ghose et al. (2013) showed – using data from a South Korean microblogging website similar to Twitter – that ranking effects were stronger on mobile phones, suggesting higher search costs. For example, consumers find it harder to search for information on a small screen and they are more distracted when using mobile phones because they tend to browse for information in almost any context (eg while working, eating). Links that appear at the top of the screen and stores/supermarkets that are geographically nearby are especially likely to be clicked on mobile phones.

6.41 One of the key drivers that influence choices made from a list is the effort required to scroll down (Ghose et al., 2013). This means that when consumers purposely look down the list of items, it requires a certain level of effort that can be viewed as a search cost. Even in a situation where the list of items is a result of browsing or undirected surfing, such effort is still linked to the likelihood of scanning all items on a list, and therefore can be viewed as a search cost (Yao and Mela, 2011). Other drivers for order and primacy effects are similar to those for defaults (and indeed, order and ranking effects may be considered a weaker form of default), including salience (Wang, 2017) and beliefs about quality or relevance, such that items appearing higher perform better (Brown and Krishna, 2004).

Harm to Consumers and Competition

6.42 Ranking can potentially cause harm to consumers and competition if the ordering is misleading. For example, consumers might expect that a platform ranks sellers in line with the consumer's own interests (eg by quality or price), but in fact sellers might be ranked by the commission they pay to the platform. This means that competition ends up occurring on the basis of which sellers can pay the most to the platform for the ranking, rather than which sellers actually offer consumers the best product. Such behaviour might mislead consumers.

6.43 Consumers may also be misled if ranking and positioning is used to self-preference products or services from the business displaying the ranking.

Drawing on evidence that consumers click far more often on results that are more visible, the European Commission concluded that Google had given its own Shopping comparison service a significant advantage over rivals because of its more prominent placement on the search page. The Commission therefore fined Google €2.4 billion for abusing dominance in breach of EU antitrust rules (European Commission, 2017b). In a paper discussing the Commission's case, Fletcher (2019) noted that the "more favourable positioning" of results on the Google search page draws on saliency bias to increase traffic and click-throughs. She also argued that this practice might be particularly harmful for consumers who are "single homing" in that they do not shop around on other platforms.

6.44 Furthermore, when it comes to self-preferencing, Bourreau and Gaudin (2022) argued that video streaming platforms might bias search results away from third-party content to increase bargaining leverage with content producers. Such situations can happen if there are dynamic threats or price constraints (eg a "commitment" to provide organic traffic for free), which means their own content is systematically more profitable even if lower quality. However, such threats or constraints do not always apply; monetisation strategies and business models also matter. Bourreau and Gaudin (2022) focused on pricing structures where consumers pay a flat subscription, but content providers negotiate different royalties. However, they argued that if a streaming platform was incentivised through a pay per view model instead, the harm to competition might be even greater because they might try to push their own context in an even more prominent spot and block their competitors.

6.45 In the domain of privacy, the Swedish Consumer Agency (Konsumentverket, 2021) described a practice called "false hierarchy" where the order of options can lead to consumers making poorer choices. Privacy choices that are more harmful to the consumer might be presented first in a list of options.

Literature on potential remedies

6.46 Greater transparency about paid ranking (eg a disclosure that the businesses have paid to be top of the list) is often suggested as a remedy that may improve consumers' comprehension. However, the Netherlands Authority for Consumers and Markets (ACM) showed in an experiment on the transparency of different labels that consumers struggled to understand the label "sponsored" (Netherlands Authority for Consumers and Markets, 2021). On the other hand, the label "paid ranking" helped consumers understand the information better. In addition, they found that the visibility of information about paid rankings can be improved by using a striking colour or position.

6.47 For example, in 2019, CMA published principles for businesses on what **online hotel booking** businesses need to do to ensure they comply with consumer law (Aranha, 2019)**.** On failure to disclose the effect of payments on search results, the guidance states that hotel booking websites should clearly and effectively explain to consumers the methodology for determining the ranking, and to disclose their commercial relationship that might favour particular businesses. The guidance explains that hotel booking websites should provide an explanation on the same webpage, screen or equivalent as the search result to make sure consumers can make a fully informed decision.

6.48 There are also concerns that transparency may not be enough, and that paid ranking makes recommendations less efficient and less accurate, which could frustrate consumers, reduce trust, and lead to poorer consumer decisions (Netherlands Authority for Consumers and Markets, 2021).

Partitioned pricing

6.49 Since consumers respond strongly to price, choice architects who sell multiple related products face a decision about how to present the price to consumers. They could practise **partitioned pricing** – breaking the price down into its component parts without sharing the total cost (see ***Figure 7***).

6.50 Under partitioned pricing, the total or estimated total costs for a product are separated into a base price for a main product and surcharges for other components. All price components are presented simultaneously. Partitioned pricing is different from drip pricing, in which prices are dripped sequentially through a purchase process.

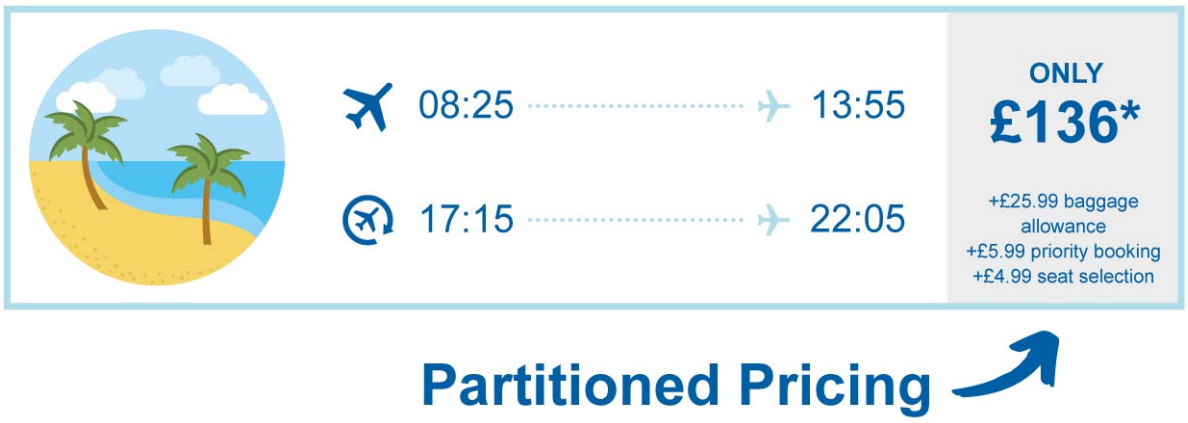

Figure 7. Example of partitioned pricing practice on an airline booking website

(source: mock-up designed for the purpose of this paper)

6.51 The issue with partitioned pricing is that a selection of lower priced items can make a package look very generous when a consumer hasn't added up the total cost. Sometimes both practices may be used in the same website. For example, the Office of Fair Trading was concerned that consumers were being misled about the level and/or the existence of payment card surcharges (Office of Fair Trading, 2012). The airlines under investigation were charging consumers an additional fee for payments by debit card, which was not included in the headline price (ie drip pricing), and/or were not presenting their credit card charges clearly and transparently, but rather in multiple separated categories (ie partitioned pricing). The outcome of the investigation was that all airlines within scope changed their pricing practices – they included debit card charges in all headline prices, and presented optional credit card fees clearly and transparently.

Effect on consumers and businesses

6.52 Studies on partitioned pricing show that the separation of surcharges on a product can lead consumers to underestimate the total price (Robbert and Roth, 2014). In fact, Robbert and Roth (2014) found that the effect of partitioned pricing on consumers' perception of price was larger than the effect of drip pricing. Participants exposed to partitioned pricing underestimated the total price by approximately 11%, and those exposed to drip pricing underestimated the price by approximately 3.2%.

6.53 Other studies show that partitioned pricing increases purchase intentions (Morwitz et al., 1998; Xia and Monroe, 2004), reduces ability to recall the total price (Lee and Han, 2002; Robbert and Roth, 2014), decreases search intentions (Xia and Monroe, 2004), impairs perceptions of fairness, and damages store trustworthiness (Robbert and Roth, 2014; Xia and Monroe, 2004).

6.54 However, different consumers might respond differently to partitioned pricing. Studies have shown instances where separation of prices might lower purchase intentions and diminish value perception when surcharges are high, and perceived as unreasonable by a subgroup of consumers who had a high need for cognition (Burman and Biswas, 2007) or consumers who perceived high benefits of the components (Hamilton and Srivastava, 2008). Similarly, Robbert (2015) found a different pattern of responses to pricing depending on consumers' level of price consciousness. Consumers who were very conscious of price were able to adjust for partitioned pricing by recalling price better and choosing the better deal, while consumers who were less conscious of price often incorrectly adjusted for or simply ignored surcharge information.

6.55 Some studies suggest that partitioned pricing can improve consumer decisions in some circumstances by making components more salient. Bertini and Wathieu (2008) argued that partitioned pricing can increase the amount of attention paid to secondary attributes by tagging prices to them, thereby making consumers more sensitive to features they might otherwise overlook. In line with that argument, Kim (2006) found that the visual salience of a price component significantly reduces the tendency to underestimate the total cost of a partitioned price.

6.56 Behavioural biases that have been investigated as relevant in consumer responses to partitioned pricing and bundling include the following:

a) **Reference dependence**

i. Consumers might anchor on the base price information and adjust their behaviour insufficiently to additional charges (Burman and Biswas, 2007). In this case, the reference point is typically a single, important component of a multicomponent price, such as the base price, while other add-ins might represent other less relevant points that consumers usually ignore.

b) **Mental accounting**

i. According to mental accounting literature, partitioned pricing should lead to decreased value perceptions of an offering (Robbert and Roth, 2014). Studies have found that a higher amount of money is spent when it appears in small units ($1 bills) than larger units ($20 bills) (labelled the “denomination effect” (Raghubir and Srivastava, 2009a).

ii. Although mental accounting principles are generally robust, the integration-of-losses principle (ie the tendency to combine all the losses) sometimes fails because the implicit assumption is that losses that might be integrated also must be equally salient, which might not always be the case for all mandatory surcharges (Greenleaf et al., 2016). Therefore, mental accounting might not be the most plausible behavioural mechanism behind partitioned and drip pricing practices. An alternative explanation for this phenomenon is that consumers might use simple heuristics to calculate the total price or even completely ignore additional components.

c) **Diversification bias**

i. Because resources such as money or time are limited, they have to be allocated across different goals following some rationale. This necessity is a gateway for cognitive biases, among them the diversification bias, ie the tendency to divide resources by the number of available categories and to allocate them evenly (Fox et al., 2005).

ii. Allocation biases, such as the diversification bias, variety seeking, mental accounting, and the denomination effect, have a large influence on how people allocate available resources in decision situations. A choice architect can thus tactically arrange the respective categories or allocation alternatives, such as segregating options into more diverse categories (Kahn and Wansink, 2004), or partitioning safety and style attributes of a car differently (Martin and Norton, 2009).

iii. In addition to behavioural biases, (Morwitz et al., 1998) found that the most frequently used strategy to process partitioned prices is the heuristic strategy (54.8%), followed by a considerable proportion that completely ignored the surcharge (23.2%), and the rest used mathematical calculations (21.9%). They also suggest that the more complex the calculation (eg if surcharge is presented as a percentage), the fewer the number of people who carry out accurate mathematical calculations. Overall, because some consumers are expected to use heuristics to process partitioned prices and others ignore the charges, even if some use a calculation strategy, Morwitz et al. (1998) posited that, on average, the recalled total cost will be lower among consumers who see partitioned prices than among consumers who see the combined prices with equivalent total cost.

d) **Salience bias**

i. Salience bias refers to the tendency to direct people's attention on information or items that are more noteworthy while ignoring those that are not in the centre of focus. Blake, Moshary, Sweeney and Tadelis (2021) used salience bias to explain the effect of partitioned pricing, saying that consumers do not pay attention to the price of complementary goods when making transactional decisions and ignoring the final price.

Harm to Consumers and Competition

6.57 The Office of Fair Trading (2010) price framing market study showed strong evidence that price framing (ie a business presents a price in a particular way or context that affects consumers' judgment of the value of the offer, such as bundling, partitioned pricing, reference pricing) exerts a powerful effect. This can lead to financial loss and other consumer harm when price frames are used in an inaccurate or misleading way. Price framing may cause shopping errors, such as buying too many or too few units compared with what the consumer would have bought if the offer was clear. There can also be errors in terms of the choice of trader or the price paid.

6.58 The OFT presented a behavioural experiment in which consumer detriment was measured using welfare losses (Office of Fair Trading, 2010). Welfare losses are a measure of actual monetary earnings in each of the price frames tested and the baseline treatment compared to the potential monetary earnings if subjects behaved optimally. Partitioned pricing led to the highest detriment of all the price frames, and caused consumers to make purchasing

and searching errors. The most prevalent error was that consumers bought products from the first shop they visited at prices that were higher than they would have paid had they continued their search.

Literature on potential remedies

6.59 Burman and Biswas (2007) showed that partitioned pricing can be used to increase consumer demand, which explains why it is so prevalent in today's marketplaces. This becomes problematic if businesses are trying to hide surcharges, such as by using smaller font sizes or presenting surcharges in a place where consumers are unlikely to notice them (see ***Sensory manipulation***). Therefore, potential remedies in this domain might require businesses to present a total price in a salient spot at the outset of the transaction for consumers to notice and process the information.

6.60 Additionally, campaigns such as Plain Numbers could further raise awareness, and support businesses to put more effort into communicating numerical information more clearly and fairly to improve consumers' numeracy (Plain Numbers, 2021).

Bundling

6.61 Product bundling is a well-known practice of marketing where two or more products and/or services are presented as a single "package" at a special price (Burman and Biswas, 2007). Examples of product bundling include "buy 2, get 1 free" in marketplaces, meal deals in restaurants, season tickets for entertainment performances, health clubs combining two or more activities at special rates, and others (see ***Figure 8***). Consumers may believe they are getting a lot as part of a bundle, even when the total price of separate components is less than the bundle price, or when some components would not otherwise be purchased. In addition to consumers being offered bundles, businesses buying from other businesses might find themselves in a similar position.

Figure 8. Example of bundling practice for a beauty website

(source: mock-up designed for the purpose of this paper)

6.62 Rao et al. (2018) argued that bundling encompasses three main dimensions of the choice scenarios, and developed a more comprehensive categorisation of types of bundles (see ***Table 4*** below):

i. The number of product categories in the bundle (eg one or multiple)

ii. The choice architect who designs bundles (eg business, customer or intermediary)

iii. The strategy for the bundle (eg static or dynamic).

Table 4. Categorisation of types of bundles, according to Rao et al. (2018)

Situation	Description (examples)	Bundling dimensions		
		Number of categories	Who creates the bundle?	Decision timing (static/dynamic)
A	Product assortment (assorted flavors of single-serving containers of fruit yoghurt)	One	Firm or customer	Static
B	Heterogeneous product bundle (PC bundle of computer, monitor, and printer sold by a retailer)	Multiple	Intermediary	Static
C	Heterogeneous product bundle (single and season tickets of distinct concerts organized by a symphony)	Multiple	Firm	Static
D	Heterogeneous product bundle (customer choosing (a) a PC and a printer in sequence or (b) a shopping basket of many categories)	Multiple	Customer	Static or dynamic
E	Self-bundle/cross-bundle (Expedia offering a bundle of an American Airlines flight ticket, a Hyatt hotel stay, and a Hertz car rental)	Multiple	Intermediary or customer	Static
F	Hardware and software bundles (Nintendo offering a bundle game Boy Advance w/ Super Mario Advance 2)	Two	Firm or customer	Static or dynamic

Embedded in each of these situations, are the three major strategies of pure bundling, mixed bundling, and pure components

Effect on consumers and businesses

6.63 Early economic literature had put the price discrimination (ie a strategy of "offering two or more similar goods at prices that are in different ratios to marginal costs", Varian, 1989) at the forefront of bundling practices (Schmalensee, 1984; Stigler, 1963). In contrast to the economic perspective on bundling that viewed components and bundle as a set choice, marketing researchers have focused on designing an appealing bundle. They argued that businesses could use bundling to boost efficiency and achieve strategic advantages (Venkatesh and Mahajan, 2009).

6.64 Furthermore, psychology research discussed two important issues for understanding bundles (Rao et al., 2018):

i. Bundle preference formation (eg bundles create a situation where consumers might shape their preference on the spot about a product or service, in particular, adding versus averaging model of choice; see Levin et al., 2002)

ii. Bundle comparison (eg while consumers might see the value of the bundle depending on the number of products featured in the bundle, they also tend to compare with other bundles, in particular, attribute levels across bundles or equivalent products across bundles or overall values).

6.65 Early behavioural literature used prospect theory (Kahneman and Tversky, 1979), mental accounting (Thaler, 1999), and anchoring and adjustment

heuristics (Tversky and Kahneman, 1974) to point out how consumers make judgments about bundles of items. For instance, because prices are perceived as losses, a bundle with a single price is more attractive than a separate component with multiple prices (Johnson et al., 1999).

6.66 More recent behavioural literature suggested that behavioural biases that influence consumer want for bundles may influence the way consumers make decisions about the product bundles, such as framing (Janiszewski and Cunha, 2004), partitioned pricing (Hamilton and Srivastava, 2008), reference pricing (Chakravarti et al., 2002) and information integration (Levin et al., 2002). For example, the price discount framing effect assumes that consumers differently place values on the specific items in the bundle, in particular, the effect of the price discount will be larger when the discount is linked to the more important products in the bundle (see, for example, weighted additive model; Yadav, 1995).

6.67 Another explanation for the price discount framing effect is that consumers place value differently on discounted items in relation to reference price using a value function that is steeper for losses than the value function for the gains (see, for example, reference-dependent model; Kaicker et al., 1995). Therefore, by following the explanation on why bundle prices and price increases should be integrated, it seems appropriate to select a price discount for the product that would be negatively evaluated by its existing offer price (Thaler, 1999).

6.68 While there are similarities, product bundling is distinct from partitioned pricing. Consumers are paying for different components within a deal advertised through partitioned pricing (see more in ***Partitioned pricing***), whereas with a bundle, they might be able to buy components separately (Burman and Biswas, 2007).

6.69 Under certain conditions, literature across various disciplines on bundling have shown that consumers prefer less to more products when comparing two bundles independently, but prefer more to less when assessing the same bundles concurrently (see Hsee, 1998; Simonson et al., 1994). One explanation for this behaviour is known as “less is better” effect where an item with positive utility on its own would reduce the total value when included in a bundle (Hsee, 1998). For example, Hsee et al. (1998) demonstrated that consumers would rather choose a complete 24-piece dinner set over a set with 31 undamaged pieces and several broken ones (which contains the same 24 pieces as in the smaller dinner set). Similarly, Sim\onson et al. (1994) showed that including a feature to a product that is not necessary can decrease the likelihood of that item being chosen even when the feature is solely an option to buy something for a somewhat high price. On the other

hand, Popkowski Leszczyc et al. (2008) proved that adding a useful, wanted, undamaged item to a bundle can also reduce willingness to pay if consumers are fairly confident that the added item is low in value, and that the other item is uncertain in value.

6.70 With the development of technology and data analytics, other approaches to bundling focused on multi-category choice models, structural modelling and machine learning. For example, Beheshtian-Ardakani et al. (2018) used algorithms to determine the product bundles for each market segment based on customer loyalty. In addition, Tunali et al. (2021) designed a multi-objective optimisation tool based on the algorithms that helps to specify bundle features, such as price, season, item similarity and association with bundle size constraints.

Harm to Consumers and Competition

6.71 Previous literature on bundling have demonstrated that consumers frequently find it hard to evaluate the value of items in the bundle and that they construct ad hoc preferences (see, for example, Simonson and Tversky, 1992b). It has also shown that consumers use other information available to guess missing or incomplete data about the bundle (see Ebenbach and Moore, 2000).

Literature on potential remedies

6.72 In 1998, the European Commission started its investigation regarding concerns that Microsoft Corporation leveraged its monopoly in the market for PC operating systems (OS) by tying its Windows Media Players (eg software that enables users to “play back” music and video content) with Windows operating system (eg operating systems installed on central network computers that supply actions as file and printer sharing, security, and user identity management). After five years of investigation into Microsoft Corporation, the European Commission concluded that Microsoft Corporation broke European Union competition law by gaining a dominant position in the market for operating systems and weakening the competition on the media player market. To address the tying issue, Microsoft was required to offer PC manufacturers a version of its Windows client PC operating system without the media player. As a result of the Commission's remedy, the arrangement of such bundles should mirror consumers’ actual preferences and provide choice (European Commission, 2004).

6.73 Following that, in 2009, the European Commission revealed another investigation into the bundling of Internet Explorer with Windows operating systems from Microsoft. The potential concern was that Microsoft's tying of Internet Explorer to the Windows operating system could harm competition

between web browsers, threaten product innovation, and diminish consumer choice (European Commission, 2009). As a result, Microsoft decided not to bundle those two products together in Europe (Johnson, 2009).

6.74 Another example, the Committee of Advertising Practice (2021a), in the context of in-game purchases, ruled that when consumers get virtual currency, especially if it is “bundled”, the information about the cost must be clearly explained (see section on ***Virtual currencies in gaming***). This is specifically relevant when the virtual currency is advertised that suggests the price-per-unit differs according to the size and price of the bundle (eg 100 credits for £5, and 200 for £7). In situations when consumers are expected to compare among different bundles, the claims that are advertised as “cheapest” should refer to the total price of a bundle, not the price-per-unit, while the claims that are advertised as “best value” should refer only to the cost-per-unit price and not the overall cost of a bundle. Furthermore, claims about savings referring to the bundled items should mainly reflect the overall savings experience by players where advertisers should not overestimate such claims by considering them on the basis of the most expensive price-per-unit equivalent (The Committee of Advertising Practice, 2021).

Choice overload and decoy

6.75 Changing the number and composition of options in a choice can sway consumer decisions. When the choice is difficult – for instance, due to an overwhelming number of options or a lack of expertise in evaluating them – preferences can be especially malleable (Bettman et al., 1998; Slovic, 1995).

6.76 Given the fluidity of consumer preferences across choice contexts, businesses can steer decision making by carefully designing how they arrange options. For example, businesses can position options online to push consumers toward higher margin products. They may add a high-priced item to the choice set, whereby the purpose is not so much to sell that particular item, but to make the other items seem more reasonably priced (Ariely, 2010) – this is called the **decoy effect** or **adding an extreme option** (eg making the intended target product seem a compromise option; see ***Figure 9***). Online experiments by Weinmann, Mishra, Kaise and vom Brocke (2020) found that users made higher pledges on a fictitious crowdfunding platform when higher priced options were added.

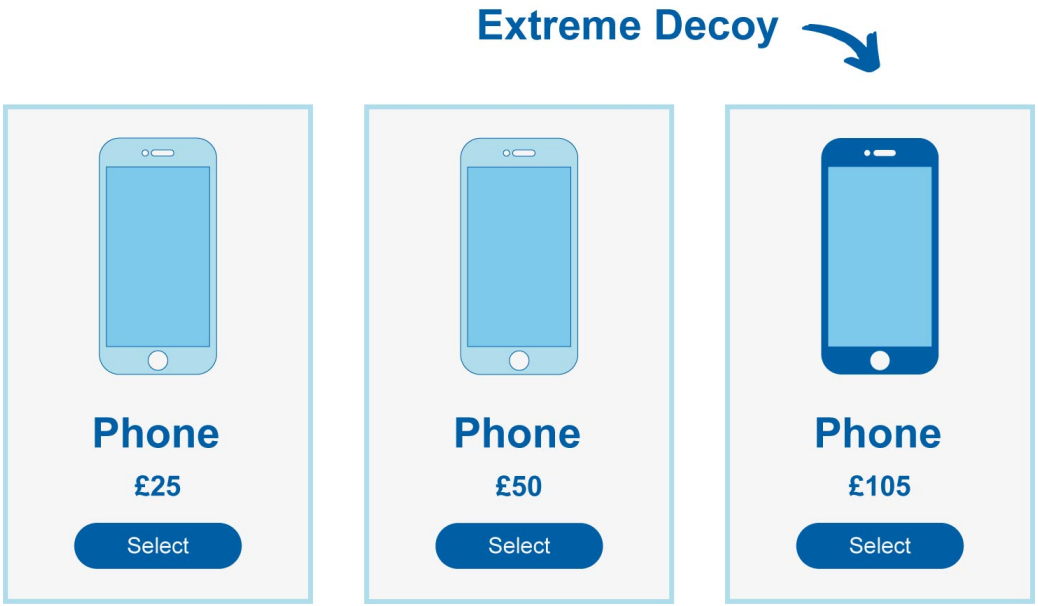

Figure 9. Example of extreme option decoy practice

(source: mock-up designed for the purpose of this paper)

6.77 Businesses may also take advantage of consumers' difficulty in processing many complex options by adding more options that involve difficult trade-offs (Ezrachi, 2017). Overwhelmed and confused consumers may be more willing to **satisfice** – ie find a choice that is merely acceptable rather than the best one – by going with a default or compromise option, which may be deliberately designed to benefit the business.

Effects on consumers and businesses

6.78 Behavioural decision research has long established that consumer preferences are often not well defined, but often constructed in the process of making a choice (Bettman et al., 1998). When uncertain about their preferences, consumers are more likely to be influenced by the context provided by the options under consideration (Payne et al., 1992). As they tend to evaluate options relative to the alternatives presented, *the way* options stack up against another can be more important than their inherent quality.

6.79 In situations of preference uncertainty, consumers tend to choose options that are easier to justify and are associated with a lower likelihood of regret (Simonson, 1989). They tend to favour the intermediate, or compromise, option that does not have blatant weaknesses, or the dominating option that is superior to another in the choice set (Dhar and Simonson, 2003).

6.80 The “compromise effect” denotes a phenomenon whereby the attractiveness of an option is enhanced solely by being the intermediate option, compared to when it is an extreme option (Kivetz et al., 2004). Hence, businesses that wish to promote higher priced options may do so by introducing another alternative that is even more expensive. This is commonly reported as in the “second cheapest wine” phenomenon, whereby diners often choose the second cheapest wine on the list, as a compromise between the cheapest (perhaps poorer quality) and the more expensive options. While the underlying mechanism of the compromise effect has yet to be conclusively identified, one explanation is the consumer’s desire to avoid extremes. Given their tendency to weigh disadvantages more heavily than corresponding advantages, consumers tend to favour the intermediate option, which has only small disadvantages compared to the extreme options (Simonson and Tversky, 1992a).

6.81 However, items displayed at the edges sometimes can also gain an advantage (see Bar-Hillel, 2015). For example, if one wants to increase the popularity of some dishes, one could place them at the beginning or end of the menu listings (Dayan and Bar-Hillel, 2011; Panitz, 2000). Similarly, on voting ballots, the first (and not last) position is the position with the most benefits (see Koppell and Steen, 2004).

6.82 Given these tendencies, businesses may strategically set which option to be the compromise in the choice set, or deliberately introduce an “**inferior decoy**” (ie an obviously inferior option to an alternative) to make the dominating alternative more attractive (see ***Figure 10***). The inferior decoy effect, also called the attraction or asymmetric dominance effect, refers to the phenomenon whereby the addition of a decoy may increase favourable

perceptions of the "chosen" item in the choice set (Huber et al., 1982). Hence, businesses may introduce a decoy item, not to get consumers to buy that item, but rather to increase the attractiveness of an existing item that dominates it. If the dominance relationship is easily detected, the dominating item will seem like a bargain in comparison with the decoy, making it easier for consumers to justify their choice (Simonson and Tversky, 1992a). A recent field study provided empirical evidence that employing the decoy effect increased an online diamond retailer's profit by 14% (Wu and Cosguner, 2020).

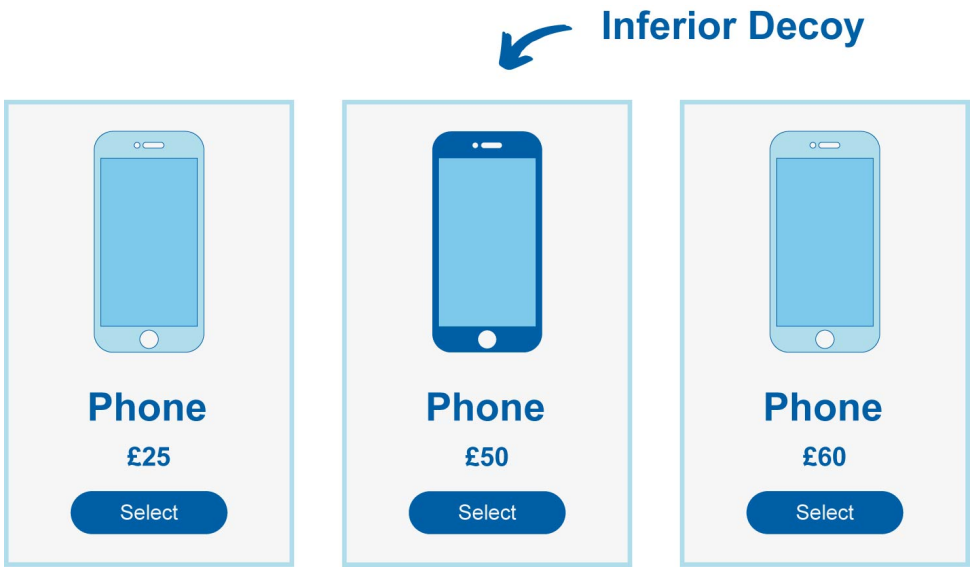

Figure 10. Example of inferior decoy practice

(source: mock-up designed for the purpose of this paper)

6.83 In the absence of stable and well-defined preferences, consumers must exert cognitive effort to evaluate alternatives and choose the best option. The term **choice overload** is used to describe a situation where the complexity of the decision problem exceeds the consumer's cognitive or psychological resources (Chernev et al., 2016; Reutskaja and Hogarth, 2009). For instance, having to choose from many alternatives can overwhelm consumers who may not have the motivation or ability to carefully assess all options (see ***Figure 11***). While consumers may find the idea of more options attractive, they face the risk of choice overload, which can undermine motivation to choose (ie might lead to consumers leaving empty-handed; Iyengar and Lepper, 2000), induce negative emotions and stress from the process of choosing, and lower satisfaction with their final choice (Reutskaja et al., 2020).

Figure 11. Example of choice overload practice in online book selection

(source: mock-up designed for the purpose of this paper)

6.84 Choice overload can be induced not only by excessive alternatives, but also the number of features associated with each alternative (Greifeneder et al., 2010; Lurie, 2004). The more dimensions on which the options are differentiated, the more complex a choice becomes because consumers need to sift through more information to compare options and make trade-offs. A series of experiments found that, when evaluating options, consumers have difficulty considering more than two or three different features at a time (Lunn et al., 2016). Above that, the ability to identify good and bad deals becomes much harder. Other factors, such as information presentation format, time constraints, and higher preference uncertainty, have been shown to facilitate choice overload (Chernev et al., 2016).

Harm to Consumers and Competition

6.85 A key characteristic of digital markets is the ability for businesses to personalise their offerings based on the data collected on each consumer. Businesses may use algorithms to tailor which set of options are shown in what order, as well as personalise the ranking of search results (Competition and Markets Authority, 2021a). For instance, expensive products may be shown first to consumers identified to have a high willingness to pay. The CMA has indicated that such practices can be problematic if consumers are unaware of how such discrimination is occurring or if they give rise to unfair harm to vulnerable consumers (Competition and Markets Authority, 2021a).

6.86 When presented with too many options, consumers face greater risk of choice overload, which can lead to poorer decisions due to cognitive limitations or psychological strain. They may strive to end the difficult experience of choosing by satisficing – settling on a choice that is merely acceptable, rather than optimal. Instead of trying to find the single best option, they tend to adopt simplifying strategies that are less time-consuming and require less cognitive effort, such as opting for the default or recommended choice (Payne et al., 1993). Consumers may also defer choosing altogether to avoid the negative emotions arising from difficult choices (Chernev et al., 2016; Dhar and Simonson, 2003; Iyengar and Lepper, 2000). Choice overload can also be emotionally costly to consumers who are able to select their "best" option. Though maximisers (those who aim to get the best possible outcome) make better quality choices than satisficers (who strive to choose the option that is "good enough"), maximisers may end up feeling worse after their choices than satisficers because they might still feel uncertain if they select the right option (Iyengar et al., 2006).

6.87 The ease with which consumers can process options can also influence their evaluations (Novemsky et al., 2007). Simple options tend to be evaluated more positively than complex alternatives, which require more cognitive effort to process. A recent lab experiment showed that consumers prefer simple electricity and water tariffs to complex ones, even though the latter may be more cost effective (Mayol and Staropoli, 2021). Moreover, simpler options tend to be preferred more often when consumers are faced with a larger number of alternatives to choose from (Iyengar and Kamenica, 2010).

6.88 Choice overload can also lead to not choosing at all or postponing choice, which might be a poor decision in itself (Iyengar and Lepper, 2000). This is an interesting finding because it goes against the theory that more choices for consumers is better for competition. Results from a survey experiment show that when the number of electricity providers in public service markets increased from three to 18, consumers' motivation to switch away from a

poor-performing provider fell by 10 percentage points (Jilke et al., 2016). Another study found that as the number of funds in 401(K) retirement plans increased, the probability of employee participation rate in those plans decreased (Sethi-Iyengar et al., 2004).

6.89 Choice deprivation (lack of choices) is more common and has more negative consequences on consumers than choice overload (too many choices) for most consumers across the globe (Reutskaja et al., 2022).

Literature on potential remedies

6.90 The market itself can develop technology-enabled decision aids to facilitate decision making while preventing cognitive strain from choice overload. For example, recommendation agents can conduct initial screening of available options to create a personalised consideration set (Häubl and Trifts, 2000). Using consumers' past behavioural data or consumers' explicit input of preferences, these tools can build short, ordered lists of alternatives that closely match consumers' preferences. Such tools have been found to improve both the quality and the efficiency of purchase decisions, by enabling consumers to focus their evaluation on the smaller set of high-quality options while lowering search costs (Häubl and Trifts, 2000).

6.91 On the platform level, one important factor to consider about competition is the extent to which consumers use only one platform (ie "single-homing") or use more than one platform (ie "multi-homing"). If multi-homing is a common feature in the market, platforms will be forced to compete on price and quality. Platforms will be competitively constrained on both sides by the fact that users can easily move to a rival platform. For example, sellers and buyers may have the option of using multiple platforms. If consumers are aware that many suppliers can be found on multiple platforms, the need to multi-home will be reduced. The costs associated with joining a platform, including material costs and the time and effort required, will also be a relevant factor. If the costs are high, then single-homing is more likely. Therefore, limiting the number of choices for consumers on one platform might reduce the effort costs associated with searching for the right product and encourage consumers to shop around across different platforms (Johnson and Davies, 2020).

Sensory manipulation

6.92 Sensory manipulation refers to the broad description of practices where the choice architect employs visual, aural, and tactile (touch and feel) features to distract consumers from or steer consumers towards certain options, eg if consumers interact with and receive information via virtual voice assistants.

6.93 In this paper, the primary focus will be on the visual manipulation, where choice architects can change the digital interface to steer consumers away from or towards certain choices using any of the following:

a) colour

b) size

c) positioning

d) style

e) any visual aspect (such as using pictures).

6.94 Visual manipulation sits somewhere between choice information and choice structure because it can change the way information content is displayed to encourage or discourage a particular choice (eg changing the size of the font), or it can modify the layout to make certain choices more or less prominent (eg using a different colour to highlight a preferred choice). This may change the weight that the decision-maker gives to attributes associated with goods or services. These visual design features can change willingness to pay for products and the products or options chosen.

6.95 Some examples of aesthetic manipulation include:

- **Accentuating products that the choice architect want consumers to buy**, eg by placing related or supplementary products in positions consumers will notice the most and/or highlighting them in bold colours. Mirsch et al. (2017) found that Amazon.com accentuates product-related items through these means and in doing so, pulls attention to related items (eg a mobile phone case on the phone's product page). This may trigger an extra purchase that the user did not set out to make.

- **Privacy choice options.** The Norwegian Consumer Council observed that Facebook's GDPR-popup interface is designed with a bright blue button "enticing" users to "Accept and continue", and dull grey for adjusted settings (Forbrukerrådet, 2018; Wagner, 2018) (see ***Figure 12***).

- **Hiding negative information**. Visual manipulation can hide certain information by placing it in an obscure part of the page, using colours that mask it, and by making it smaller (Wagner, 2018).

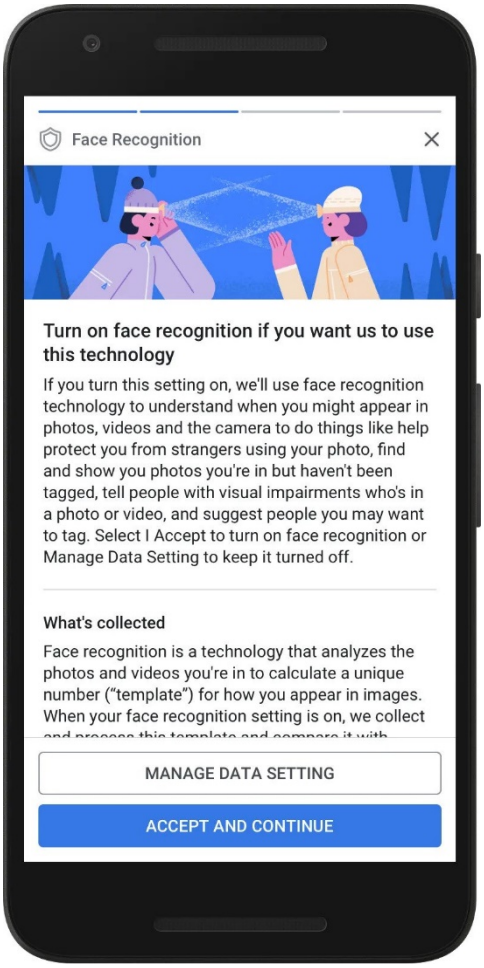

Figure 12. Example of Facebook's privacy choice option, according to Wagner

(source: Wagner, 2018)

6.96 Mathur et al. (2019) discussed "visual interference" as a type of dark pattern that uses style and visual presentation to influence users into making certain choices over others. As a by-product of analysing other dark patterns in the choice information (text) of websites, they also noted some of the aesthetic manipulations they found during their analysis. Using the taxonomy set out in the paper, the authors classified these "visual interference" instances as harmful and sometimes deceptive. They noted that users may not realise the effect the visual presentation has had on their decisions.

6.97 For example, Mathur et al. (2019) discussed several websites where visual manipulation had been found:

a) a subscription offering that was stylistically more prominent and emphasised than the non-subscription offering.

b) they also found websites using visual effects on choice relevant information and product descriptions that used visual manipulation to draw consumers' attention towards "discounts" available for those products. They found that both websites offered consumers free gifts to inflate the perceived savings on purchases in the checkout page. Then manipulations of style and visual presentation were used to draw consumers' attention.

c) the authors described the use of colour to hide information, eg the option to decline marketing communication is greyed out. They argue that this creates an illusion for consumers that the option is unavailable or disabled despite the fact it can still be clicked.

6.98 Narayanan et al. (2020) suggested that Google had changed its ad labels on website links displayed from searches to make it hard for users to distinguish ads from their organic search results but, after some backlash, reverted to their old interface. The paper referenced an online news article that shows the aesthetic changes of Google's Ad label from 2007 to 2019 (Wakabayashi and Hsu, 2020). In 2013 and 2014, the label was in bright yellow under the link (see ***Figure 13*** below to view the ad label over the years). In 2016 and 2017, the label "Ad" became green and arguably less distinguishable from organic search results (Marvin, 2020). In 2019, advertisement labels were made black, blending in with most of the text surrounding the link, potentially concealing the fact that it was a paid-for link (Wakabayashi and Hsu, 2020).

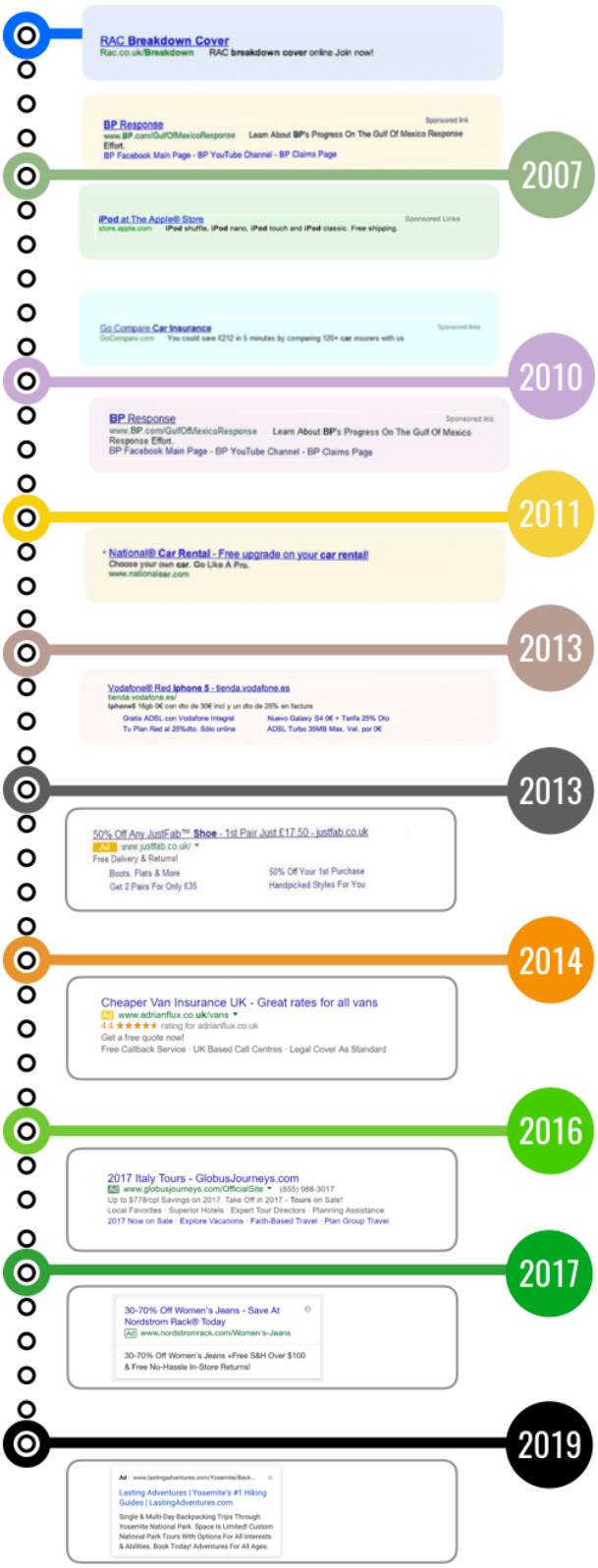

Figure 13. Example of Google's advertisement shading and labelling, according to Wakabayashi and Hsu

(source: Wakabayashi and Hsu, 2020)

Effect on consumers and businesses

6.99 Visuals are extremely important for consumers, both offline and online. To make a decision, consumers often rely on the information that is the most salient (Tversky and Kahneman, 1974). However, if a consumer focuses their attention only on prominent features of an image, they might fall under salience bias (also known as perceptual salience, which is a tendency to focus on items that are more visible) (Jin et al., 2021). For example, if a choice architect purposely uses a colour, font or frame to design an "Accept all cookies" button that is distinctive from the other button "Explore other settings", that might drive consumers' attention towards that highlighted option. Over time, however, some consumers have learned to ignore content at the very top portion of digital screens, or content that stands out visually from the rest of the screen, because these are so frequently advertisements (Pernice, 2018).

6.100 Google and YouTube published a joint research paper (Tuch et al. 2012) that investigated the role that visual complexity and prototypicality have on shaping users' first impressions of a website. Prototypicality describes something that looks like the typical form of something, and here relates to a website being aesthetically the way a user would expect it to look. The paper concluded that websites with low visual complexity and high prototypicality were perceived as highly appealing.

6.101 Beymer et al. (2007) explored the effect of three different types of pictures (pictures related to the text; pictures unrelated to the text such as advertisements; or no pictures) on the task of reading for comprehension (eg speed of reading, distractions, and retention of the material). They found that in the main task, pictures slowed readers down, decreasing first-pass reading speed, lengthening fixation duration (ie a brief moment, around 250 milliseconds, where the eye is paused on a word or word group), and making saccades shorter (ie fast eye movement, usually forward in the text around 8-12 characters, to take in the next section of text). They attributed the finding to the extra cognitive effort the reader is making to relate the pictures to the text. In addition, they showed that adverts seem to be distracting the reader by causing more regressions and rereading of the material. However, they found no impact of images on the retention of the material.

6.102 Mullett et al. (2018) demonstrated how the use of pictures can undermine the effectiveness of risk warnings in social media tweets for loans. The results showed that the proposed change in website risk warning significantly improved individuals' accuracy on two out of three questions testing their understanding of associated risks. There were also significant effects upon ratings given immediately after a particular risk warning was seen. Product

ratings given immediately after seeing the updated tweet warning were higher than after seeing the existing tweet warning. However, there was no differential effect of tweet risk warning upon the ratings given after seeing the full webpage information. This may indicate that the picture made participants more favourable to the product even though it was intended to draw attention to the risk warning.

6.103 Mandel and Johnson (2002) demonstrated through online experiments how visual priming affects the construction of preferences for purchasing cars and sofas. Visual priming describes the exposure to some prior event that increases the accessibility of information already existing in a decision maker's memory (Mandel and Johnson, 2002). In other words, it brings certain memories, emotions, and ideas to mind before buyers make a choice. For the sofa experiment, the two groups were shown either clouds to prime comfort, or green with pennies to prime price. This experiment was conducted by 76 undergraduates on a hypothetical shopping site (Mandel and Johnson, 2002). The group shown the prime for comfort valued the attribute of comfort in a sofa more; the group shown pennies valued the price more. In another experiment, the authors kept the visual prime present as a sidebar on every page, and as the wallpaper on the welcome page to prime for either money, quality or a plain background. When they also analysed the searches and time researching taken by the decision makers, they found people searched more and looked for longer at attribute information they were primed for. This means that consumers could be influenced to overweigh certain attributes of products and pay less attention to other attributes.

6.104 There is a wide-ranging body of literature that supports the idea that colour can have significant impact on consumer choices. Utz et al. (2019) systematically studied the online user interface of consent notices (also known as cookies) by analysing a random sample of 1,000 notices drawn from a set of 5,087 previously collected consent notices. Those 5,087 websites were chosen by creating a list of the most popular 500 websites for each member state of the EU. They found that 57.4% of consent notices steer website users towards accepting privacy "unfriendly" options, including by using forms of visual manipulation. These typically include highlighting the button to accept "privacy-unfriendly" defaults using colour. The choice of fonts and colours usually matched the underlying websites' formatting, but sites that relied on monetisation via online behavioural advertising were more likely to "conceal" the opt-out button by matching it to the branded design of the rest of the website, arguably making it less likely to be chosen. Crucially, certain colours may not universally have the same effect, but colours used in contrast or to blend in can be used to draw attention to or divert attention from certain choices (Utz et al., 2019).

6.105 Bagchi and Cheema (2013) analysed eBay's online data and conducted other studies to find out whether background colour affects online purchasing behaviour. They investigated the effect of red backgrounds on willingness-to-pay compared to blue backgrounds in different purchasing settings (auction or negotiation) (see ***Table 5***). They found red may cause "colour-induced aggression", which has two opposing effects: first, a greater desire to acquire an object; and second, to get the best possible deal. Therefore, there are two opposing effects, and one is more likely to occur, dependent on the purchase setting. Red was found to elicit higher bid jumps on the online auctions platform when there is bidding on an auction. However, red backgrounds were also found to decrease price offers when acquiring takes the form of a negotiation between the seller and buyer (Bagchi and Cheema, 2013).

Table 5. The effects of red vs. blue colour on willingness to pay in different purchasing settings (auction or negotiation, according to Bagchi and Cheema, 2013)

	Red	Blue (or grey)
Auction (competing against consumers)	Higher willingness to pay	Lower willingness to pay
Negotiating (seller vs. buyer)	Lower willingness to pay	Higher willingness to pay

6.106 In an offline setting, Yu and Zhou (2018) tested how colour can alter the attractiveness of a promotional activity (such as a limited-time discount). Their series of experiments tested the interaction between background colours (red or blue) and a promotional frame that was either positive or negative. The results of their first experiment showed that the promotional frame of the information (negative vs. positive) had no effect, but changing the background colour had a significant effect. The interaction between the frame and colour was also significant. When the background of the poster was red, the customer placed a lower value on the positive promotional frame than the negative promotional frame. Conversely, when the background colour was blue, the positive frame caused the promotional event to have a higher perceived value than the negative.

6.107 Shen et al. (2018) conducted a study that altered the colour of food labels (offline) as either blue or red. They found that red labels led to a longer

response time in decisions than blue labels, suggesting extra cognitive effort is used when attributes of a product are in red. One possibility posed by the authors is that red made people pay more attention to details, which is line with Mehta and Zhu (2009) previous work. There may be other explanations, such as red causing an emotional response that causes delay.

6.108 Utz et al. (2019) ran a series of field experiments using real choices made online. Using a sample of 1,000 notices collected from live websites, they systematised consent notices, and identified common variables of their user interfaces. Their research goal was to explore the design space for consent notices to learn how to encourage website visitors to interact with a notice and make an active, meaningful choice. They collected passive clickstream data to determine how users interact with consent notices, and invited them to participate in a voluntary follow-up online survey to obtain qualitative feedback (Utz et al., 2019).

6.109 In the first experiment, Utz et al. (2019) measured the impact of different placements of the choice button(s). The frequency of interactions with the consent notices displayed in different positions was then assessed. The notices shown in the bottom-left position received the most interactions (setting cookie options, accepting defaults, or rejecting consent notices), with 33.1% of users making a choice, regardless of device type or choice made. However, the notice positions typically observed were small bars at the top or bottom of the screen. These positions resulted in low interaction with the consent notices within the online experiment (2.9% and 9.6%, respectively). The authors hypothesised that there were higher interaction rates when notices were displayed at the bottom because these notices were more likely to cover website content rather than branding banners. Additionally, on smart phones, users used their thumbs to navigate the website, which may make it easier to tap elements at the bottom of the screen relative to the top.

6.110 The European Commission (2014a) carried out a market study on environmental claims for non-food products. The study found a high presence of claims: 70% of the products examined had an explicit environmental claim (either a text or a logo). When implicit claims are included (form of environmental image or colours), it rose to 76% of products. This might happen because the green colour could implicitly signal to consumers that certain products are more sustainable or eco-friendly. In contrast, Visser et al. (2015) looked at how to effectively market sustainable shoes to mainstream consumers instead of simply appealing to consumers who are already environmentally conscious. They found that using a green/environmental colour scheme instead of a red one did not increase buying intention on its own.

Harm to Consumers and Competition

6.111 Visual manipulation may be used in conjunction with other OCA practices, including defaults, biased ranking and forced choice. In these cases, colour, size, font or position may be used to indicate what the default is, draw attention to top search results, or hide the possibility of an opt-out.

6.112 Deceptive visual design is about manipulating a consumer into doing something that may not be in their best interest but may be in the interest of the businesses behind those interfaces. A dark pattern practice called "misdirection" refers to a design that purposefully focuses the attention on one thing to distract the attention away from another (Brignull, 2021c). For instance, a business might create a big green button that says "Accept recommended settings" to distract attention from reading more about the settings and alternatives.

6.113 Mejtoft et al. (2021) conducted a small A/B test to compare two different cookie prompt approaches: (i) with two OCA practices (eg visual manipulation and "sneak into basket)"; and (ii) without dark patterns. Visual manipulation involved a bright, green "Accept" button, while the "Decline" button was an unattractive grey. The text had a hidden link under "Use of Cookies", where it explained the types of cookies being used. The results showed that participants did not read the Use of Cookies page. They also found that 60% of participants made no decision on either accepting or declining the cookies when they were exposed to a small banner cookie prompt, while in the condition with full screen cookie prompt, all participants make a decision (eg 80% of participants accepted the use of cookies). They found that the reason was that full screen cookie prompt was obviously in the way if consumers wanted to continue to go the website, and therefore they had to respond by either accepting or declining.

6.114 Additionally, there is harm to consumers and businesses when search engines use visual manipulation to deliberately conceal the fact that certain links or products are advertised or sponsored. Consumers want to use organic searches that list the most popular websites first rather than paid search links where the business has paid to have their link or products come up first (Competition and Markets Authority, 2020e). Visual manipulation that conceals this fact may deceive consumers into thinking the advertised link is the most popular. This could result in a purchase on the advertised/sponsored website, rather than a consumer buying from the most popular website.

6.115 The Advertising Standards Authority (ASA, 2019) noted that Amazon's ad used multiple ways to visually present information on the page as a part of the checkout process for consumers. In this example, consumers saw the gold

box that was designed to nudge them to make their order and benefit from a 30-day free trial of Amazon Prime. That gold box sat within a larger grey box that provided additional information about that option. To the left of the grey box, consumers were also presented with a blue hyperlink that stated "*Continue and don't gain Amazon Prime Benefits*". By clicking that link, consumers could continue with their order without signing up or gaining Prime benefits. However, the second option was smaller, significantly less prominent, and shown in a place that would not have been easily noticed by consumers. Based on the consumer data provided by Amazon (eg number of consumers who clicked on each of the options), ASA concluded that the average consumer was likely to be misled by the presentation of options. This example showed the cumulative effects of visual manipulation, framing, and arrangement of options on consumers' behaviour.

6.116 In another case, the Federal Trade Commission (2018) noted that Triangle Media Corporation did not follow the ROSCA (*Restore Online Shoppers' Confidence Act*) compliance principles, and deceived consumers when ordering their "risk-free trial" products (eg skin cream, dietary supplement and others). Consumers who decided to enrol in the trial were under the impression that they would pay only for the shipping and handling that was prominently displayed as $4.95 or less in the yellow box on a computer or in the simplified table on a smartphone (see ***Figure 14***). However, what was not prominently displayed for consumers was the information that by placing an order they would be automatically enrolled in their membership program. This meant that consumers would need to pay $84.71 for a trial full-size product on the 15th day if they did not call to cancel the membership, in addition to the initial $4.95. For consumers accessing this information on their mobile device, that information is hidden in the Terms and Conditions hyperlink. This example showed how visual manipulation together with auto-enrolment default, hidden information, and drip pricing disadvantaged consumers.

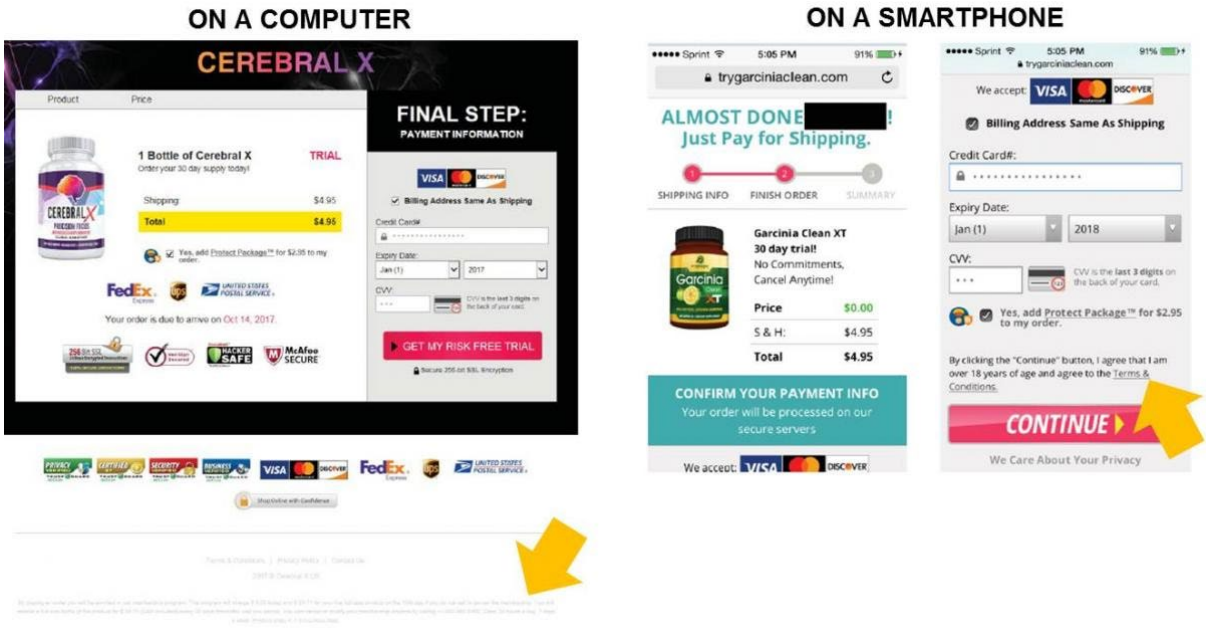

Figure 14. Example of Triangle Media Corporation website page on a computer and a smartphone, according to the FTC, 2018

(source: Federal Trade Commission, 2018)

Literature on potential remedies

6.117 In terms of information or data sharing consent choices, such as cookies, Utz et al. (2019) noted that consumer attention tended to be focused on the bottom left of the screen. However, this may be context specific. Choice architects, encouraged or mandated by policymakers, could place choice options that might otherwise be ignored in this position to potentially get better interaction from users. Utz et al. (2019) concluded that mandating the position of these choices might prevent choice architects from deliberately placing these choices in positions that will not be noticed or attended to. For instance, the Netherlands Authority for Consumers and Markets (ACM) judged that an example of privacy information shown at the bottom of the screen might be misleading when displayed in very small print right at the bottom of the page, far from the price (Netherlands Authority for Consumers and Markets, 2020).

6.118 There would be difficulty in mandating the colours that should be able to be used on websites that sell products. While there is some evidence that blue and more neutral colours may increase the willingness to pay for goods and services if there is a fixed price (as demonstrated by Bagchi and Cheema, 2013), it is unclear that such findings are replicable across contexts and cultures. In fact, it is likely that colour is important insofar as it stands out or

blends in with the rest of the website, making certain features, information or choices more or less prominent.

6.119 Narayanan et al. (2020) recommended that designers avoid using dark patterns inadvertently when optimising their websites. They suggested that designers should not simply consider one variable in their A/B testing, such as looking only at conversion rates, but should also consider the number of people leaving the page. The authors called for designers to self-regulate or be regulated and suggested designers practise ethical design. They suggested it may be valuable for businesses to partner with neutral third-party consumer advocacy agencies to develop processes that will certify apps to be free of known dark patterns. They also recommended that businesses ask the designers they hire about the ethics of their past work.

Sludge

6.120 Sludge describes aspects of the choice architecture that lead to excessive, unjustified and harmful friction, making it difficult for consumers to get what they want or to do as they wish (Shahab and Lades, 2021; Sunstein, 2020). Sludge affects decision making by making it harder for consumers to navigate through their everyday lives; sludge reduction or removal promotes welfare for the consumer (Shahab and Lades, 2021). Closely linked to sludge is “dark nudges”. Whereas sludge impedes decision making (mainly by increasing friction) in domains that can promote consumer welfare, dark nudges make welfare-reducing decisions easier to enact (eg by reducing frictions) (Soman et al., 2019; Thaler, 2018).

6.121 Sunstein (2020) noted that it is important to distinguish the term “sludge” from “friction”, because not all friction is harmful. Sometimes, it is beneficial to increase friction to promote deliberation (Dai and Fishbach, 2013), particularly in situations where the consequences of poor decisions can be significant. For example, introducing friction, such as by creating decision points (Soman et al., 2010) to help with self-control, would not be classified as sludge. Similarly, the concept of “administrative burdens” (Herd and Moynihan, 2019) is much broader. Administrative burdens, such as completing a long form to file a divorce or mortgage application, may not be excessive, but rather designed to counteract recklessness and impulsivity (Madsen et al., 2021). In addition to being harmful, friction also has to be “excessive” and “unjustified” to be defined as sludge. For example, Konsumentverket (2021) provided an illustration of a sludge (roach motel dark pattern) where consumers are required to call customer service if they want to cancel their subscription, according to the cancellation details presented in the side panel (highlighted with red border, below; see ***Figure 15***).

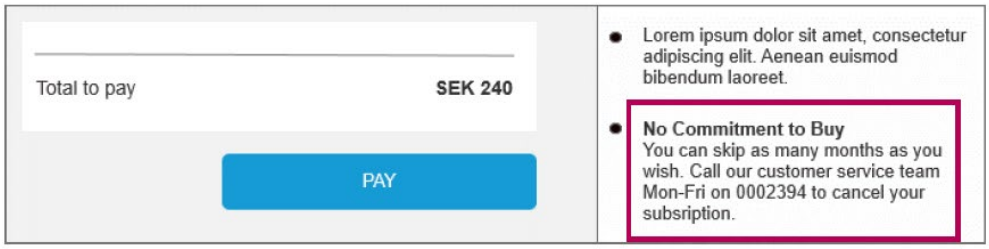

Figure 15. Example of a hard to cancel/roach motel dark pattern, according to the Konsumentverket report

(source: Konsumentverket, 2021)

6.122 Sludge makes it harder for consumers to act in their own interests, but does not usually prevent them entirely, if they are able to expend the requisite effort and/or have the requisite skills and tools. Outright bans or restrictions on taking action are therefore not defined as sludge (they may be classified instead as "forced action" – see ***Forced outcomes***).

6.123 To an extent, sludge can be seen as an obstacle to freedom of choice, especially if it reduces or impairs navigability (Sunstein, 2019). There are different types of effort that consumers might need to expend in order to navigate online environments. They might involve the acquisition of information, which might be difficult and costly to obtain. They might involve time that people may not have. They might be psychological or emotional, in the sense that they involve frustration, stigma or humiliation.

6.124 In his article on nudges and sludges, Mills (2020) concluded that their relationship is symmetrical – where a nudge decreases the frictions associated with a specific option, sludge is simultaneously imposed on all other options available to a decision maker. He looked at four types of friction:

a) *economic*: changing economic/material (dis)incentives to encourage/discourage specific decision outcomes (eg adding a premium charge for a specific outcome)
b) *hedonic*: changing individual pleasure/comfort to encourage/discourage specific decision outcomes (ie adding a graphic health label to cigarette packaging)
c) *social*: changing social/moral costs to encourage/discourage specific decision outcomes (ie informing households about the energy use of their neighbours)
d) *obscurant*: changing the psychological/cognitive burden to encourage/ discourage specific decision outcomes (ie using excessive and complicated language in a document).

6.125 Sludge can be found both offline and online. In an online environment, for example, sludge can be found as a long-form, slow-loading process or a requirement to enter forgotten passwords, while in an offline environment, sludge can mean posting forms to separate places, attending in-person meetings at an inconvenient time, or waiting on hold on the phone. A process that starts online can cause sludge by making the user do things offline (eg having to phone a helpline, or post a letter rather than an online form, subscription traps where you can register online but cancel only offline). Some businesses might consider sludge as their retention strategy, and it has become part of their "businesses as usual" model of work (Soman et al., 2019). A study of 526 news organisations in the USA found that only 41% make it easy for people to cancel subscriptions online, and more than a half

trained their customer service reps in tactics to dissuade customers who call to unsubscribe (Scire, 2021). Consumers might be required to fill in long online forms or spend hours on the phone talking to customer service representatives, and as a result of that imposed friction, many of them might decide not to cancel their subscription at all (Sunstein, 2020).

Effect on consumers and businesses

6.126 Behavioural biases might make administrative burdens prohibitive or impose a serious navigability challenge. Sludge is particularly irritating when consumers are present-biased or overoptimistic (Sunstein, 2020). Designers in private or public sectors might fail to anticipate the importance of behavioural biases because they may overestimate consumers' motivation to overcome sludge or underestimate the annoyance it causes. Soman et al. (2019) noted that choice architects often underestimate sludge in the processes they create. They argue that it can be hard for choice architects (who are experts in their area) to empathise with non-experts who experience sludge with detrimental outcomes. In other words, experts would not experience the same barriers in navigating through a complex online choice architecture, and thus might have difficulties identifying the effect of sludge on non-experts' behaviour. In some cases, experts would be also affected by sludge, but they might not realise this in advance because they do not experience the process themselves.

6.127 Inertia plays an important role (Madrian and Shea, 2001) because consumers tend to procrastinate on tasks (Akerlof, 1991), especially where they are deemed to be boring or difficult. Present bias also makes consumers susceptible to sludge. Often, the future seems distant, and consumers delay tasks until another day, especially when it requires more effort. In tandem, inertia and present bias make consumers focus on the short term and to neglect future actions (Ericson and Laibson, 2019).

6.128 In addition, consumers tend to be unrealistically optimistic when trying to achieve their future goals and overcome inertia. For example, a study of people's failure to redeem money by filling in forms showed that consumers thought that there was about an 80% chance that they would do so within the 30 days they were given. The actual redemption rate was 31% (Tasoff and Letzler, 2014).

Harm to Consumers and Competition

6.129 The effects of sludge can be estimated in terms of direct costs (eg money lost by customers) and indirect costs (eg time lost by customers). Psychological costs also matter; for example, consumers can experience frustration, anxiety or humiliation (Thunström, 2019).

6.130 In some cases, sludge is used opportunistically by businesses who seek to give consumers the impression that they will receive an excellent deal but who know that consumers will not take advantage of the opportunity (Persson, 2018). For example, a business might offer a free gift or discount voucher that is so difficult to claim that very few customers do so. Despite most consumers not benefitting, the offer might still make them more favourable towards the business or induce them to buy something they would not otherwise have.

6.131 While everyone is likely to be adversely affected by sludge, vulnerable consumers (eg digitally challenged, low income, disabled or elderly) may be disproportionately affected because they can have limited mental bandwidth to respond to all the imposed frictions (Sunstein, 2019). In other words, the problem of cognitive scarcity is especially serious in relation to sludge (Mullainathan and Shafir, 2013) (see ***Consumer vulnerability***). Consumers can focus on only a small subset of life's challenges because their cognitive resources are limited (Gabaix, 2018). For example, to navigate through multiple online pages to cancel a subscription and complete several forms can be mentally draining. People who are not digitally savvy might give up before actually completing the process. This means that simplification and burden reduction do not merely reduce frustration, they can help people make more informed decisions (Dynarski et al., 2018). For this reason, it is important to focus on the distributional effects of sludge – and on people it is most likely to harm (Herd and Moynihan, 2019).

6.132 Those consumers desperately in need of welfare support might also be those who might be struggling the most to overcome sludge to access welfare benefits because of their limited mental bandwidth and their focus on financial and other concerns (Mullainathan and Shafir, 2013). For example, low-income consumers may be especially affected by sludge practices because they are focused on a wide range of immediately pressing problems. If a business requires consumers to navigate a complex system or to complete a lot of forms, they might give up. But the issue of sludge practices is not limited to low-income consumers; it also affects the elderly population, consumers with a language barrier, or those who do a disproportionate amount of administrative work (predominantly women) (Sunstein, 2020). This means that sludge may worsen existing inequalities (Government Equalities Office and Equality and Human Rights Commission, 2013).

6.133 Sludge can also cut the number of rebates (eg bonus, redress or discount) that consumers claim (Bar-Gill, 2012), and generally decrease consumers' freedom, defined as the ability to do what they want to do (Sunstein, 2019). Moreover, when businesses implement "sludgy" choice architecture rather than compete over price or quality, the result can be lower social welfare because consumers are not getting the best deal as intended by competition

forces (Akerlof and Shiller, 2015). This might happen because businesses are having a hard time keeping up with other competitors or they want to closely retain their current pool of consumers. Sludge can also reduce economic efficiency by raising the price of goods (Shahab and Lades, 2021), eg when administrative requirements lead to a greater need for administrative capacity and person-time.

6.134 Sludge also prevents consumers from escaping "subscription traps", where friction prevents exit. The harm from subscription traps can be significant and widespread. A 2017 study by the European Consumer Centre in Sweden found that 3.5 million consumers in six European countries over three years were estimated to have accepted an offer online or in social media that led to a subscription trap (European Consumer Centre Sweden, 2017). Similarly, a 2016 study showed that over a one-year period in the UK, about 17 million consumers signed up to a subscription service using continuous payment mechanisms, but two million consumers had their requests to cancel eventually declined (Citizens Advice, 2016).

Literature on potential remedies

6.135 Much sludge consists of dreary or duplicative paperwork and waiting time, in person or online. To determine whether the friction counts as excessive or unjust, a behavioural analysis or a "sludge audit" could be completed. This means assessing what sludge exists and how to reduce it, preferably with reference to cost-benefit analysis and cost-effectiveness analysis. Cost-benefit analysis focuses on measuring the benefits of the action, while cost-effectiveness analysis focuses on relative costs and outcomes of different courses of action. They can be more or less formal and elaborate. They might be highly quantitative, embodying an effort to calculate costs and benefits; or they might be more qualitative, with an effort to understand what is being required and to ask, in a more intuitive way, whether the existing burden levels are excessive. In either case, they should be seen as an important component of a general effort to understand the effects of sludges, and should be done periodically to see if the current set up is justified (Sunstein, 2020).

6.136 Soman et al. (2019) suggested developing a tool that will help organisations to identify sludge. The tool consists of scorecards and a dashboard with three components – a score for process, communication, and inclusivity. The three components of the dashboard map onto three different aspects of the user experience design process that different parts of an organisation might handle.

6.137 Some of the benefits of sludge reduction are psychological and hedonic – a reduction of frustration, anxiety, and perhaps a sense of stigma or humiliation (Herd and Moynihan, 2019). It also might improve consumers' ability to choose optimal products/services and level of consumption. In addition, sludge reduction efforts can greatly improve access to goods and services, which has positive effects for consumers and competition. For example, it might be easier for consumers to understand and compare products, which ultimately improves competition.

6.138 Tasoff and Letzler (2014) tested three different effort-related interventions, including an intervention aimed at reducing sludge; an intervention intended to overcome overoptimism; and an intervention aimed at reducing the difference between the predicted and actual redemption rates of participation forms (eg participants would get $5 if redeemed). First, they informed participants that in previous groups with similar people, redemption rates were less than one-third. Second, they issued two clear reminders: one soon after purchase; and another when the deadline for redemption was near. Third, they made redemption far simpler by eliminating the requirement that people must print out and sign a certification page. The results showed that the first two interventions had no effect on what people actually did, and that the only effective intervention was sludge reduction, which reduced overoptimism by 26 percentage points. In all three groups, the participants thought that there was an 80% chance that they would mail in the forms, though the average for mailing forms was only 30% of the time.

6.139 The UK Penrose Report (2020) pointed to three gaps where the UK's legal framework arguably does not prevent harm to vulnerable consumers, and where current protections need to be stronger: (i) loyalty penalties and price discrimination; (ii) rip-offs hidden in the small print of long and complicated contracts; and (iii) sludge. Penrose (2020) suggested that the CMA should undertake a market investigation to assess how sludge should be recognised and measured. It should then identify consumer protection rules and analytical techniques that will be needed to protect consumers from sludge as digital technologies evolve and develop over time. The report also noted that real-time experiments run by businesses and other organisations can quantify the effectiveness of a particular choice architecture, and can provide powerful new tools for regulators to make sure that consumers are not being exploited.

6.140 Another potential remedy is to ensure that exit from a product or service is as easy as entry. In 2021, the FTC announced (Scire, 2021) that they would ramp up enforcement on businesses that fail to provide an "easy and simple" cancellation process, including an option that's "at least as easy" as the one to subscribe. To address this problem, the FTC (2021) highlighted four basic requirements that negative option marketing must follow to comply in its

guidance and cases. Businesses must clearly and conspicuously reveal the material terms of a negative option offer including, at a minimum, key terms such as the existence of the negative option offer, the offer's total cost, and most importantly for sludgy practices, how to cancel the offer. In addition, businesses must not erect unreasonable barriers to cancellation or impede the effective operation of promised cancellation procedures, and they must honour cancellation requests that comply with such procedures.

Dark nudges

6.141 The word “nudge” is more commonly used to describe a positive intervention aimed to increase a person’s or society’s welfare; there is a large literature on this, which has entered public consciousness to great acclaim (Thaler and Sunstein, 2008). Nudges might include making an action easier or more attractive by changing the way the invitation is designed or expressed. For example, placement of the button that brings a user to the next frame in the upper right corner of a mobile app could train consumers to click there without examining the content of the screen, potentially agreeing to things inadvertently (see ***Figure 16***). The “Buy Moves” button on the bottom right panel is the same green colour as the buttons for “Play,” “Let’s Go,” and “Start Level” in the top left, top right, and bottom left panels, respectively (Willis, 2020).

6.142 Digital nudges come in various online technologies and channels, such as email, SMS, push notifications, mobile apps, social media, gamification, e-commerce, e-government, and location services. One of the key advantages of digital nudges is that they are relatively inexpensive, easy to implement, and can spread quickly (Özdemir, 2020).

6.143 The “dark nudges” can be described as the practice of businesses making it easy for consumers to make bad choices, which decrease their welfare or are not in line with their preferences. However, the terms “dark nudge” or “nudging” may also be found in the literature to describe a much wider phenomenon where businesses aim to change consumers’ behaviour against their best interests (Campione, 2020).

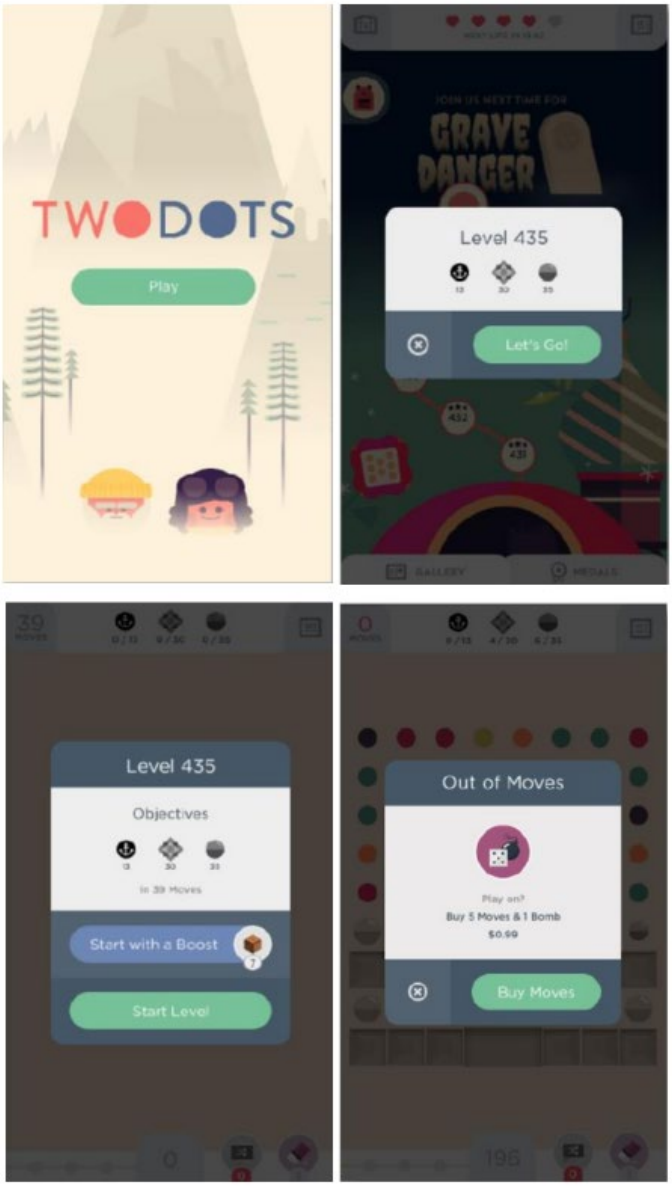

Figure 16. Example of a dark nudge practice in an online game, according to Willis

(source: Willis, 2020)

Effect on consumers and businesses

6.144 Businesses have found, especially in the online domain, that they can increase sales by reducing the time between seeing an item and purchasing it (KPMG, 2017), such as encouraging consumers to save their payment details, allowing them to buy an item in one click, or offering a “buy now pay later” option. In online shopping, one-click purchasing quickly became the norm and a popular feature for consumers and businesses (Birner, 2015). Consumers can make a transaction with only one click because they have entered their payment and other details at previous stages of their shopping

journey or during an earlier purchase. Once consumers have clicked on the button, the order will be shipped to the customer's address.

6.145 There is a large body of literature on shopping convenience as one of the principal motivations underlying consumer willingness to buy online (Beauchamp and Ponder, 2010; Colwell et al., 2008; Moeller et al., 2009; Reimers and Clulow, 2009; Tanskanen et al., 2002). The key aim for online retailers is to maximise the speed and ease of shopping because they argue that consumers want to spend less time on shopping and more time on other activities (Jiang et al., 2013).

6.146 In a traditional brick-and-mortar retailing environment, two factors are of primary importance in delivering convenient service to consumers: time saving, and effort minimisation (Etgar, 1978; Kotler and Zaltman, 1971; Seiders et al., 2007). The option-related effort refers to the minimisation of cognitive, physical, and emotional activities that consumers need to complete in order to buy goods and services (Berry et al., 2002).

6.147 In online shopping environments, Jiang et al. (2013) identified five dimensions of convenience – access, search, evaluation, transaction, and possession/post-purchase convenience – by employing small-scale mixed methods research, ie focus groups and online surveys. In particular, access convenience was identified as the biggest driver of online shopping convenience by reducing wait time and allowing consumers to expend less effort while buying.

6.148 When consumers are in so called "hot" visceral states (ie when they are strongly influenced by hunger, sexual desire, fear, exhaustion, or other strong emotions), they tend to underestimate the extent to which their preferences and behavioural inclinations are influenced by their state (Loewenstein, 2005). Removing friction can then lead to overspending and buyer's remorse when they are out of the "hot" state (Friedman, 2011; Maziriri and Madinga, 2015).

6.149 Another online domain where dark nudges have been particularly prevalent is privacy settings (eg cookies buttons). Soe, Nordberg, Guribye and Slavkovik, (2020) analysed 300 consent notices in a selection of Scandinavian and English language news outlets. They showed that some OCA practices were not aligned with GDPR principles. For example, almost all of the news outlets' websites gave a one-click accept button but, in contrast, only 5% of the websites provided one-click deny button. In addition, dark nudges can be used in tandem with other OCA practices, such as defaults, drip and/or partitioned pricing. For example, consumers might be concerned about the level of ease with which products can be added into a basket (Holkar and Lees, 2020b).

6.150 “Buy now pay later” (BNPL) options, in which consumers spread the cost of items over a certain period (eg usually several months) without incurring any interest, have become increasingly popular in recent years. This can have advantages for consumers. However, if something goes wrong, consumers also might have to pay late fees and even have their credit scores changed. More than 17 million UK consumers have now used a BNPL business to make an online purchase (Wearn, 2021). In some cases, businesses might incentivise customers with special discounts to use this payment option.

Harm to Consumers and Competition

6.151 The ease and convenience of use for some consumers can lead to excessive patterns of behaviour when they lose the control of their consumption and spend unhealthy amounts of time on their phones, apps and computers (Paay and Rogers, 2019).

6.152 BNPL schemes have been criticised for causing harm (BBC News, 2021), particularly because they are not currently regulated in the same way as credit products, which might share similarities. What makes these types of products attractive for consumers is their streamlined purchasing ability that can reduce the “pain of paying” and encourage consumers to overspend, making it easier to fall into debt. It also harnesses present bias (ie the tendency to settle for instant gratification than to wait for a larger future reward) where consumers ignore the future costs. In the UK, Citizens Advice (2021) warned consumers not to spend more than they can truly afford, and to make sure they understand what they're signing up for. The Treasury and the Financial Conduct Authority (FCA) considered additional regulation of the industry (Jones, 2021). The Money and Mental Health Survey (Holkar and Lees, 2020b) on BNPL options found that consumers are finding it harder to resist since the lockdown, have low levels of comprehension (eg did not understand the service’s terms and conditions), and have difficulties keeping up with repayments.

6.153 Consumers in financial difficulty or experiencing financial distress are particularly vulnerable to harm from minimised friction. In the Money and Mental Health Survey (Holkar and Lees, 2020b), 41% of participants reported that easy and fast buying makes it a lot more difficult to have control over their budget. Speeding up the purchasing process and limiting the time consumers can deliberate about their decisions can lead to impulsive buying, and make it especially hard for consumers with mental health issues to control spending.

6.154 Another domain where dark nudges are especially prevalent is the gambling industry, with the shift from mechanical to modern electronic gambling machines (Schüll, 2012). Previous mechanical gambling machines were slow

and simple – the gambler had to drop in some money, pull a lever and wait for the outcome. In contrast, electronic machines optimise each step of the gambler's experience by removing friction from the gambling experience through touchscreen buttons that minimise the physical effort of long gambling sessions (Newall, 2019). For example, the gambler can insert large sums of money or token equivalents for an uninterrupted gambling experience with significantly higher number of options (see ***Choice overload and decoy***). It is also harder to interpret outcome feedback than ever before (see ***Feedback***). With the jump to "remote" online and mobile gambling, gamblers today can overcome physical limitations and bring those activities into the home and on the go. For example, from October 2015 to September 2016, British gamblers lost £4.5 billion on remote gambling, and about £1.8 billion on gambling machines (Gambling Commission, 2017), generating a new dimension of gambling harm.

Literature on potential remedies

6.155 In contexts where it is known that consumers are making fast decisions, a potential remedy may be to add more friction in the purchasing process and create more decision points (Soman et al., 2019). For example, instead of a one-click shopping process, consumers might need to go through multiple screens to make the final purchase (eg "*Are you sure you want to continue with this purchase?*"), or adding waiting time to the final decision. The Danish Government (2017) has introduced a law mandating a 48-hour waiting period before consumers could finalise an application for pay-day loans (with double active choice involved initially and after the 48 hours). This may give consumers an extra opportunity to deliberate and to avoid impulsive financial decisions.

6.156 Another domain where regulators have recognised adding friction as beneficial is gambling. For example, gambling rules often require consumers, after signing up at a casino, to go through a waiting period before attendance or impose additional financial limits of the maximum amount that can be deposited into a temporary account to discourage impulse gambling when they are vulnerable (Carran, 2018).

Virtual currencies in gaming

6.157 Consumers are familiar with their own currency and have had lots of practice using it but must think harder and often become confused when using a different currency abroad. For instance, Alter and Oppenheimer (2008) reported how individuals tend to estimate the value of familiar forms of currency as being greater than unfamiliar forms of currency.

6.158 Virtual currency is typically used as a medium of exchange for virtual goods in gaming and virtual environments. The Committee of Advertising Practice (2021) have defined virtual currency as "fictionalised currency used within a game or system, often with a name such as 'credits', 'gold', or 'points', which may or may not be purchasable with real money". It can be acquired by earning achievements through play or purchased using real money. Consumers can then use this currency to purchase in-game objects, to enhance gameplay or fulfil social and aesthetic functions (Hamari and Lehdonvirta, 2010). Virtual goods may include extra lives, clothes for an avatar, and more powerful weapons or tools (Hamari and Lehdonvirta, 2010; Lehdonvirta, 2009). Virtual currency and virtual goods can often be used only within a specific virtual environment and cannot be exchanged for real-world money. However, the circumstances where virtual currencies in games are used include free-to-play (F2P) games where it is optional for consumers to buy currency and then use it to enhance their game play. This section will primarily focus on describing virtual currencies in gaming.

Effect on consumers and businesses

6.159 There is a shared literature between consumer research and applied psychology that investigates how the cues associated with specific ways of paying might affect consumers' decisions to spend. The impact of virtual currencies as a medium of exchange is linked to transactions where people are using scrip (ie substitutes for legal tender, often in a form of credit) rather than any other form of payment that the law allows. Research by Raghubir and Srivastava (2008) suggested that people may spend more when using scrip instead of cash, and that contextual features of scrip, which distance it from fiat currency (ie things that make it resemble real cash less), may compound this effect.

6.160 Hsee et al. (2003) showed that a medium (ie a token people get as the instantaneous reward of their effort, such as points, money, grades) can affect consumers' choices in different situations. For instance, when loyalty programme customers buy products, they might earn loyalty points that are used as a medium that can later be redeemed as a gift or another product. Medium maximisation occurs if a consumer tends to focus on the medium

instead of the final outcome. The behavioural issues associated with medium maximisation may also include psychological myopia and information asymmetry. Hsee et al. (2003) explained that the introduction of a medium can lead to psychological myopia where the consumer makes decisions in pursuit of short-term results without fully considering future consequences. By medium maximising, consumers are neglecting how overspending might affect their budget. Firms may be aware that consumers are subjected to medium maximisation, and are likely to spend more in a virtual environment in the presence of a medium.

6.161 Research on the use of gift cards (Helion and Gilovich, 2014; Reinholtz et al., 2015) has found that purchasing decisions are qualitatively different when individuals are using non-fungible funds, and that there may be a bias towards "hedonic" purchasing in these situations. In instances where virtual currency is bought initially via a gift card, then similar behaviours to those found for gift cards more generally might be observed.

6.162 In a recent report by the Swedish Consumer Agency (Konsumentverket, 2021), researchers referenced a particular type of currency called "Intermediate currency/Pseudo currency", which describes a situation where consumers spend money even if they initially did not plan to spend any. This is because the new currency does not contain explicit information about how much of the real currency it is equivalent to.

6.163 Hamari and Lehdonvirta (2010) highlighted how aspects of a game's design may affect how much virtual currency consumers purchase. To generate demand for virtual currency, the authors argued that game developers might want to make products desirable or valuable. There are several pieces of literature that have attempted to explain what drives purchases of virtual currency and virtual goods. Many looked at how individuals' motivations and decision processes led to such purchases (Guo and Barnes, 2007; Lehdonvirta, 2005, 2009; Lehdonvirta et al., 2009).

6.164 An experimental study by Huang, Lim and Lin (2021) tested numerosity effects (ie people's tendency to form a judgment about an amount or likelihood based on the number of units into which a stimulus is divided; see Pelham, Sumarta and Myaskovsky (1994)) in massive multiplayer online games where gamers swap real money for virtual currency based on an exchange rate to be able to buy virtual goods. Results showed that when the virtual currency exchange rate was not prominent, gamers either wouldn't talk about the rate, or perceived a virtual item as more expensive if the price is numerically high. However, when the virtual currency exchange rate was prominent, gamers would talk about the exchange rate and perceive a virtual item as less costly if the price was numerically high.

6.165 It is important to note that there are two main limitations to the body of work on virtual currencies. The first is that it is not clear how experiments with currency exchanges generalise to video games and other virtual environments. Some of the references outlined above refer to different domains such as gift cards and monopoly money; even poker chips have been studied in this context (Lapuz and Griffiths, 2010). The second is that the interaction between the research outlined above and the denomination effect (ie people's tendency to spend larger currency denominations less than their equivalent value in smaller denominations; see Raghubir and Srivastava (2008). This well-known effect (Raghubir and Srivastava, 2008) suggests that valuation is suppressed in domains where the face value of a spent currency is high, and is inflated in domains where face value is low. This would suggest that valuation of digital products would be suppressed in domains with high currency face value – such as in video games in which individuals spend thousands of "coins" or "gems" for a single purchase.

Harm to Consumers and Competition

6.166 The Swrve 2019 Gaming Monetization Report analysed data from over 10 million users worldwide and found that only 1.6% of consumers made an in-app purchase over a three-month period. This means that the overall number of consumers who are potentially affected by practices surrounding in-app purchases and the use of in-game currency is likely to be low. However, the literature also suggests that if there is harm, it may be concentrated on heavy users. For example, while only a minority of consumers make purchases, the report found that over 50% of revenue is generated from 10% of paying consumers, and less than 0.2% of all users. Those who are affected are likely to be younger and more vulnerable consumers (*Swrve 2019 Monetization Report*, 2019).

6.167 Virtual currency may stimulate larger and more frequent microtransactions, and contrived durability of in-game purchases may also exacerbate overspending, especially if consumers are unable to track their purchases in an easy, quick and accessible way (Hsee et al., 2003; King and Delfabbro, 2018). As mentioned above, medium maximisation, psychological myopia and information asymmetry may lead to some consumers making sub-optimal purchasing decisions.

6.168 Another consumer-reported problem with virtual currencies is linked to the idea that purchasing an item through multiple exchanges of virtual currency may lead to confusion and/or biased decision making. In their paper, Petrovskaya and Zendle (2021) referenced an example of players purchasing "lockboxes" in the game Neverwinter. To obtain these in-game items, players

can first buy a premium currency (Zen); they can then convert this to Astral Diamonds (another in-game currency) before finally spending those Astral Diamonds on lockboxes. In situations like these, players report "being disoriented by the presence of multiple in-game currencies and believe that this multiplicity disguises the true cost of in-game transactions" (Petrovskaya and Zendle, 2021).

6.169 Some studies have found that younger consumers are more vulnerable to overspending or impulsive purchases in gaming and virtual environments where microtransactions are involved (Dreier et al., 2017; Gainsbury et al., 2016; King et al., 2016). Firms may use information asymmetry to maximise the likelihood of spending from younger and more vulnerable consumers. These consumers are more likely to lack the ability to make reasonable judgments on the value of microtransactions. This may also be of particular concern if these consumers are making these purchases using a parent's or guardian's money without their consent.

Literature on potential remedies

6.170 To protect consumers, especially younger and more vulnerable game users, several remedies may be considered. King and Delfabbro (2018) outlined the following suggestions:

a) Regular statements on spending activity
b) Greater awareness of real monetary value of virtual goods
c) Limits on purchases and a two-step purchasing process
d) Age restrictions
e) Self-exclusion options.

6.171 They also suggested that it may be beneficial that consumers are given feedback on their spending activity. Information asymmetry may mean consumers are unaware of the long-term costs associated with microtransactions. However, providing regular statements of spending activity within these gaming and virtual environments may increase cost-related awareness for consumers. King and Delfabbro also suggested that it may be useful if game designers offered an easy, quick and accessible way for consumers to track their overall expenditure on in-game purchases (King and Delfabbro, 2018).

6.172 Additionally, King and Delfabbro argued that medium maximisation and psychological myopia may be reduced if consumers are aware of the real-world prices of virtual goods. Protective measures, such as conversion tables that ensure virtual goods are associated with real-world prices instead of

virtual currency, may increase spending awareness and change behaviour (King and Delfabbro, 2018; The Committee of Advertising Practice, 2021a).

6.173 The ability to set limits on purchases ensures consumers aren't spending more money on in-game purchases than they want to. King et al. (2019) suggested a two-step purchasing process may also reduce impulsive or accidental purchasing. It may involve having to read terms and conditions or entering a password in order to confirm purchases. Consumers could also be given the choice to opt into "cooldown" periods where they are unable to spend money on in-app purchases for certain time periods. These measures may reduce the level of impulsive purchases and may prompt consumers to make more careful purchasing decisions (King and Delfabbro, 2018).

6.174 Younger consumers may find it difficult to make reasonable judgments during microtransactions on gaming and virtual environments. The use of age restrictions may mean these consumers can make purchases only with the approval of a parent or a guardian. For example, joint action by the European Commission and Member States (2014b) on in-app purchases stated that Google and Apple should encourage businesses to improve their payment settings so that users could better control when they were opening a "payment window". Previously, parents had complained that they had authorised a single payment and were surprised that their child then went on to buy more virtual items. The reason was that they had opened a 15- to 30-minute "payment window" where no further authorisation was needed. In addition, the OFT's Principles for Children's Apps and Games (2014) also focused on making sure that children were not pressured to make in-app purchases to reduce the risk of their making unauthorised payments (for more details, see ***Example 6. Children's online games***). Moreover, in-game options for self-exclusion can give consumers the choice to ban or disable microtransactions options.

Forced outcomes

6.175 How consumers perceive the outcomes of their decisions at the outset can greatly influence what they do. However, if businesses design online environments to trick consumers into purchasing more options or performing an intended action, different from what consumers want, this might be harmful.

6.176 This section introduces three practices where consumers are forced into an outcome that they did not initially intend:

i. "Sneak into basket"
ii. "Forced action"
iii. "Bait and switch".

6.177 These practices sit at the far end of the choice spectrum and might not be considered OCA per se because consumer choices are restricted or might not exist at all. But, since this paper deals with consumers and businesses (eg choice architects), these practices are included because choice architects were the ones creating the restrictions on consumers in the first place.

6.178 For all three practices, there is a limited academic literature; some of them are already banned in many jurisdictions. Therefore, the descriptions for each of those practices do not follow the usual format (eg definitions, effect, harms and potential remedies), but instead are condensed descriptions.

Sneak into basket

6.179 Sneak into basket (also known as "negative option billing" or "expanding shopping cart") is a dark pattern whereby somewhere in the purchasing journey the site sneaks an extra item into the shopping basket, often through the use of an opt-out radio button or checkbox on a prior page (Brignull, 2021d). Sneaking can be viewed as an attempt to hide, disguise, or delay the divulging of information that the consumer may object to (Gray et al., 2018).

6.180 This practice relies on the default effect, with the website behind it hoping that consumers will keep the products they add to the cart (Mathur et al., 2019) (for more, see ***Defaults***). For example, a few years ago, consumers were defaulted to purchase travel insurance when booking a flight through Ryanair. To opt out and remove that option, they had to select a dropdown menu that read, "Please select country of residence and from there select the option "Don't insure me'," which was positioned between two countries in an alphabetical order (UXP2: Dark Patterns, 2017).

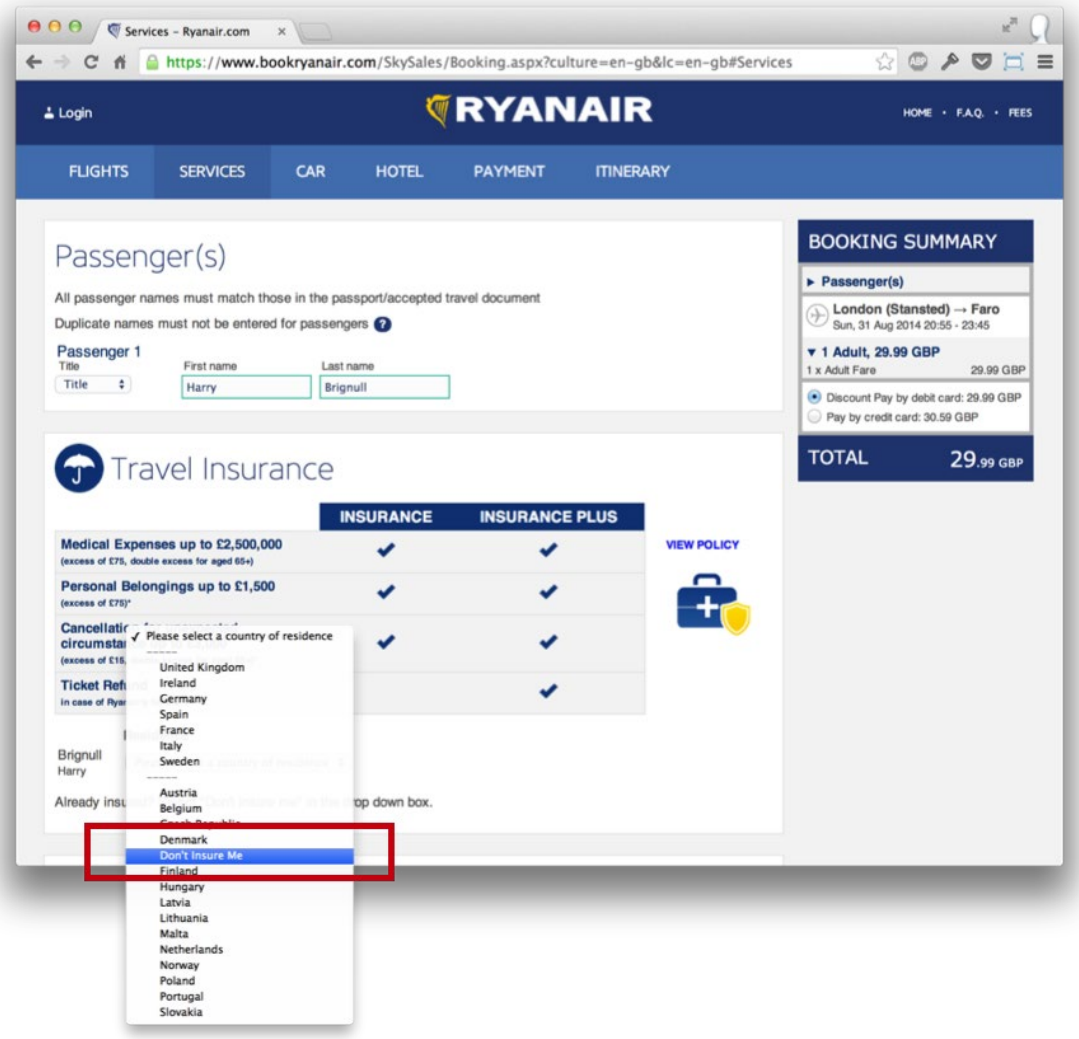

Figure 17. Example of "sneak in basket" practice at Irish airline Ryanair website, according to Frontier.is

(source: pngkit, 2021)

6.181 Mejtoft et al. (2021) analysed 50 different home cooking recipe websites and conduced a small-scale AB test, about their compliance with GDPR (data protection legislation in the EU) and how they used different dark patterns in their design – especially sneak into basket and misdirection. They demonstrated that even though legislation give consumers a choice to make about cookies, it is worth noting that by using manipulative practices it is possible to "bypass" the legislation and trick consumers into making a favourable choice for the businesses. For example, on one website, consumers were prompted to comply with a statement that only "Necessary Cookies" were used, but designers also added third-party cookies without the consumers' full consent. They could be removed manually by clicking an opt-

out radio button or checkbox on a prior page. Out of the 22 GDPR-approved websites analysed, 11 had a sneak into basket design.

6.182 According to commentators, sneak into basket is a harmful OCA that causes unfair treatment of consumers and needs official regulations (Cara, 2019). In fact, many existing laws may be relevant to this practice, including the Consumer Contracts (Information, Cancellation and Additional Charges) Regulations (2013) in the UK. In addition, “inertia selling” is considered “unfair” and prohibited under schedule 1 CPRs (ie demanding payment for or return of unsolicited goods) (*The Consumer Protection from Unfair Trading Regulations 2008 No. 1277*, 2008).

6.183 Mathur et al. (2019), within their taxonomy of dark patterns, classified sneak into basket as at least partially deceptive because it incorrectly represents the nature of the action of adding an item to the shopping cart. This means there may be good reason to restrict the use of this practice, where this is not already the case.

6.184 Another potential remedy is to purposely introduce more friction into the design to encourage more reflective behaviour. This might enable consumers to pause and evaluate whether the forced decision is one that they really want to make (eg share their data or purchase an added item) (Hansen and Jespersen, 2013; Kahneman, 2011; Mejtoft et al., 2019).

Forced action

6.185 Forced action requires consumers to perform a specific action to access (or continue to access) a specific functionality (Gray et al., 2018). This action may manifest as a required step to complete a process or may appear disguised as an option that the user will greatly benefit from. Various forced action practices have been identified across different websites, including forced updates, forced enrolment, social pyramids (ie requires users to recruit other users to use the service), and some aspects of gamification (eg situations in which certain aspects of a service can be "earned" only through repeated and unwanted use of aspects of the service). A well-known example of this practice is the Windows 10 operating system update where the user was unable to shut down or restart their operating system without updating (UXP2: Dark Patterns, 2018).

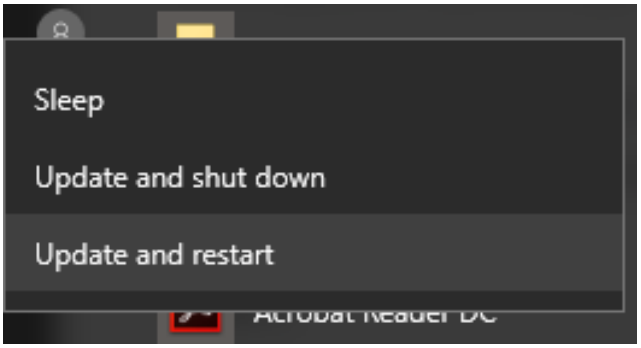

Figure 18. Example of "forced action" in the Windows 10 operating system, according to UXP2

(source: UXP2: Dark Patterns, 2018)

6.186 Mathur et al.'s (2019) taxonomy of dark pattern characteristics classified "forced enrolment" as restrictive and asymmetric. Restrictive means that there is little or no choice; asymmetric means that the user must do additional, tangential tasks.

6.187 Forced actions have the potential to cause poor user outcomes, and may force users to interact in ways that are misaligned with their goals. Important to recognise here is that some of those practices might receive positive feedback from consumers from a usability perspective (eg avoiding nagging), but do so at the expense of their choice (Gray et al., 2018). Therefore, it may be useful to go beyond classical user experience methodology and evaluate the wider decision-making context across the entire user journey when investigating this practice.

6.188 It is difficult to see positive effects of forced actions in contexts involving normal levels of risks, when allowing consumers to adjust a default or opt out is usually costless. There are particular tensions when forced action is used to manipulate settings relating to data privacy, as shown in Gray et al.'s (2021) analysis of cookie banners. For instance, two strategies known as "consent walls" or "tracking walls" prevent the user from interacting with the site until they have made a choice to allow cookies or make another consent decision. Because these forced actions tend to limit user choice, most of the reviewed literature suggests restricting the use of this practice.

Bait and switch

6.189 Bait and switch refers to a practice in which a consumer sets out to do one thing, but a different, unwanted thing happens instead (Gray et al., 2018). For instance, a business might advertise a desirable product to reel the consumer in, and then once they are invested, switch it for a more expensive or inferior alternative. This practice can lead to financial loss for consumers and is

prohibited in the UK (*The Consumer Protection from Unfair Trading Regulations 2008 No. 1277*, 2008) and in the EU (Konsumentverket, 2021).

6.190 Brignull provided an example of bait and switch from 2016 when Microsoft encouraged consumers to upgrade their computers to Windows 10 (Brignull, 2021a). Initially, consumers were presented with the earlier versions of Windows where they were shown pop-up windows similar to that pictured below (see ***Figure 19***). As the year progressed, Microsoft replaced the meaning of the "X" button at the top right to mean the opposite of what it would usually mean. In all the previous versions of Windows, this button was designed to 'close' the opened window. In this specific instance, it meant "Yes, I do want to upgrade my computer to Windows 10". This meant that consumers were more likely to click, but received the opposite outcome to what they wanted and expected.

Figure 19. Example of "bait and switch" in the Windows 10 upgrade process, according to Brignull

(source: Brignull, 2021a)

7. Choice Information

7.1 In many countries, existing legislation requires businesses to disclose certain information to ensure that consumers can make informed decisions, particularly about regulated products and services. This information can include risks or limitations, as well as its basic features, such as price. When it works, there are two benefits to these types of disclosures. On the one hand, information about price, quality, and other aspects allows consumers to make the best use of their budget by finding the product or service they want to purchase. Then, because of consumers' ability to locate the best deal, businesses have an incentive to compete to improve their offering (Beales et al., 1981).

7.2 To make an informed decision about a transaction, consumers must be provided with adequate information. However, even when the information is available, the way it is presented – which aspect is emphasised, the tone or language used, and the timing of disclosure – can influence decision making. This section covers online choice architecture practices that businesses may use to steer decision making through the presentation of choice information, without altering available choices.

7.3 For example, businesses may use biased language and labels to frame certain choices in an unfairly positive or negative light. Businesses may also frame price information in a misleading way to make the offer more attractive – for instance, by displaying alongside it an unjustified "reference price" or by using "drip pricing" to reveal the total price of an offer only at the later stages of the transaction. They may also try to hide certain information that could be perceived negatively by consumers, such as unfair cancellation policies, by deliberately using complex language or by burying it in a large volume of information.

7.4 To illustrate, say you are looking to book a flight to Japan. Upon opening the webpage, you may see a pop-up screen that says: *"*Don't miss out on the opportunity to earn free flights by signing up to a frequent flyer program". This practice is an example of **framing,** whereby businesses use loss-framed language to encourage consumers to toward a certain choice. Then, even before entering flight details such as time of departure and the destination, you might be exposed to the vague message: "Fly green with us". This oversimplified sustainability claim can potentially be misleading if it is difficult to substantiate. Perhaps, once you have seen the ranking of prices for the different airline providers, you also notice that some prices are displayed next to a previous higher price to emphasise the discount. This is an example of **reference pricing**. You decide to book a flight that costs £456.50. As you

continue along the purchase journey, entering your details, you arrive at the last screen to realise that the final price has now risen to £522.25 due to add-ons such as booking fees, insurance fees and additional luggage fees (this practice is a dark pattern known as **drip pricing** or **hidden costs**). When you try to explore further what is covered by the insurance, you are presented with another screen that is more than 10 pages long written in insurance jargon (potentially inducing **information overload**). Given the **complex language**, you struggle to understand under what conditions you might be protected if something happens to your journey. In this section, these OCA practices will be explored in depth.

Table 6. Choice information OCA practices

Choice Information		
Category	**Description**	**Strength of the Evidence[1]**
Drip pricing [2]	The choice architect initially shows only part of the price and reveals the full price of the product or service at later stages of the consumer journey.	★★★★
Reference pricing	The choice architect displays a previous (or future) price alongside the current price to make the current price look more attractive.	★★★★
Framing	The choice architect decides how decision-relevant information is described or presented to a consumer.	★★★
Complex language [2]	The choice architect makes information difficult to understand by using obscure words and/or sentence structure.	★★★
Information overload [2]	The choice architect gives a consumer too much information about a product or service such that information about the most relevant attributes is difficult to find and assess.	★★★
The notes from Table 1 above also apply to this table.		

Drip pricing

7.5 The timing and presentation of information disclosure can influence decision making. For price information, the timing can determine whether a consumer ends up making a purchase or not. Thus, businesses may vary when certain price information is shown to reduce the offer's perceived cost and to increase the likelihood of a purchase.

7.6 Drip pricing is a strategy where businesses advertise only part of a product's price upfront, and "drip in" additional price components as consumers proceed through the buying process. The additional charges may be compulsory, eg booking fees, or optional, eg add-ons and warranties (Ahmetoglu et al., 2014). What distinguishes drip pricing from "partitioned pricing" – ie the practice of separating prices into their component parts – is the element of temporal separation. Separating out surcharges presented together is price partitioning, while drip pricing is when those surcharges are revealed only later in the purchasing process (Greenleaf et al., 2016).

7.7 Drip pricing practices appear to be common online, used by businesses in sectors as diverse as airlines, hotels, events ticketing and financial services (Santana et al., 2020). When components of the price – particularly ones that are compulsory – are not revealed until late in the purchasing process, consumers will have difficulty knowing whether a particular offer is a good deal when compared to alternatives in the market. Because consumers tend to focus predominantly on the headline price, businesses may use drip pricing to display low headline prices and gain an unfair advantage over competitors that transparently display the total price upfront (Santana et al., 2020) (see ***Figure 20***).

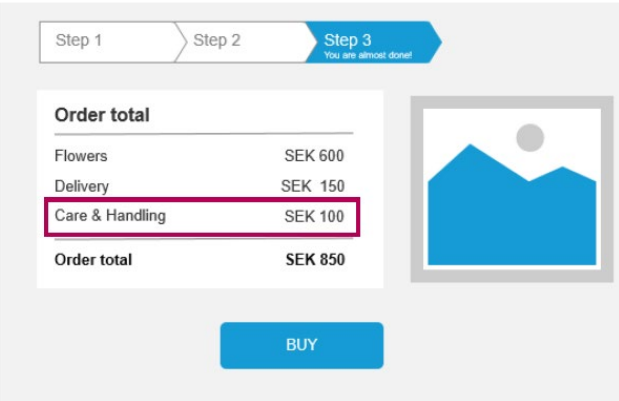

Figure 20. Example of a Hidden cost dark pattern, wherein consumers are presented with an additional cost at the last step of purchasing (highlighted in red), according to Konsumentverket
(source: Konsumentverket, 2021)

7.8 An examination of price advertising practices by the Office of Fair Trading concluded that drip pricing has a high potential to mislead consumers and hamper competition (Office of Fair Trading, 2010). In recent years, various regulatory agencies have intervened to protect consumers against harm from drip pricing practices (Santana et al., 2020). For example, the CMA took enforcement action in 2018 against major online hotel booking platforms where there were concerns that the platforms were hiding compulsory price components from the headline price advertised on the initial search result page (Fung et al., 2019). The online hotel booking cases were resolved by the firms involved giving undertakings that they would address the CMA's concerns. There were no findings that they had broken the law.

Effect on consumers and businesses

7.9 Research has consistently shown that when an offer is presented using drip pricing, consumers are more likely to make a purchase and less likely to shop around and compare prices (Ahmetoglu et al., 2014). With components of the price initially hidden, such as mandatory surcharges, drip pricing can lead consumers to believe that the price is lower than it actually is. Once consumers – lured by the low headline price – proceed through the purchase process, a sense of ownership and attachment makes it difficult to turn back, even as significant surcharges are "dripped". The behavioural mechanisms responsible are further described below.

7.10 Consumers encountering drip pricing have been shown to focus predominantly on the lower headline price and underestimate the total price of the offer (Greenleaf et al., 2016; Morwitz et al., 1998). Even when hidden charges are revealed after a few clicks, consumers often give insufficient weight to them compared to the more salient headline price (Huck and Wallace, 2015). These effects can be explained by the "anchoring and adjustment" theory, whereby consumers tend to "anchor" on the first piece of information encountered and adjust insufficiently to subsequent information (Tversky and Kahneman, 1974). In the case of drip pricing, consumers may anchor on the headline price, and then insufficiently adjust upward in response to additional costs, thus underestimating the total price.

7.11 After proceeding with multiple stages of the buying process beyond the initial headline price, consumers may feel a sense of imagined or anticipated ownership toward the product, leading them to value it more (known as the "endowment effect"; Kahneman et al., 1991). Since not purchasing the product may feel like a loss after establishing a sense of ownership – and after having invested time and effort – consumers are less likely to abandon

the purchase process despite “dripped” costs. Further, consumers have a desire to be consistent with their previous actions, also known as the “commitment and consistency” principle (Cialdini, 1993), meaning they tend to remain committed to the purchase, even as they become dissatisfied with price increases, and even if they could have got a better deal elsewhere.

7.12 A series of experiments found that, under drip pricing, consumers were more likely to initially select the lower base priced option, even though it was often more expensive than the alternative after surcharges were included (Santana et al., 2020). These initial selections turned out to be “sticky”, with consumers reluctant to change their selection even when given the opportunity to do so after seeing the total price. These effects were attributed to, among others, high perceived costs of restarting the search and low perceived benefit to switching because they anticipated similar high surcharges across businesses.

7.13 Evidence from a large-scale field experiment also demonstrated that drip pricing may lead consumers to overpay (Blake et al., 2021). For example, when a secondary-ticket sales platform used a drip pricing setup to hide buyer fees until checkout, its total revenue increased by about 20% compared to when total prices were transparently displayed upfront. In addition to making more purchases, consumers were more likely to make more expensive and higher quality purchases when faced with a drip pricing setup. The researchers also found that sellers on the platform responded to the change in consumer demand by listing higher quality tickets, to increase their profits, when the platform used the drip pricing setup (Blake et al., 2021).

7.14 On the business side, there are incentives to strategically set lower headline prices to lure consumers, only to “drip in” high additional charges later when they are less likely to walk away. Experimental evidence suggests that, given the opportunity to use drip pricing, businesses are prone to charging the highest possible drip price they can get away with (Huck and Wallace, 2015).

7.15 Finally, drip pricing has been shown to reduce perceptions of fairness, particularly when the surcharge cost is high or when there are multiple surcharges (Carlson and Weathers, 2008; Xia and Monroe, 2004). When consumers feel deceived by businesses, the effect of drip pricing may diminish or even reverse (Greenleaf et al., 2016). A large-scale online field experiment with a German cinema found that, when the surcharge was hidden, consumers initiated a purchase process more often, but also dropped out more often when the surcharge was revealed at checkout (Dertwinkel-Kalt et al., 2019). Overall, the dropout rate cancelled out the gains from higher initial demand, making drip pricing a less profitable strategy in this context.

Harm to Consumers and Competition

7.16 By presenting the price in a misleading way, such as excluding compulsory costs from the headline price, drip pricing practices can worsen consumer decision making. For example, consumers have been found to spend more under drip pricing – making more expensive purchases and making purchases they might have forgone entirely, had they known about the surcharge before committing to the buying process. A large-scale field experiment on a ticket sales platform found that when additional fees were hidden until the checkout stage, consumers were 14% more likely to buy a ticket than in an environment with upfront fees (Blake et al., 2021).

7.17 Drip pricing also increases the time and effort required to learn the total price of offers (Baye and Morgan, 2019). Higher search costs may discourage consumers from shopping around and comparing prices. Different businesses may also partition and hide extra fees in different ways, which further reduces comparability (Fung et al., 2019). Experimental evidence shows that, even in a simplified environment with low search costs, drip pricing leads to worse purchasing decisions (Huck and Wallace, 2015). In the real world, where search costs are higher and businesses may be wilier, the expected harm from drip pricing is likely to be greater.

7.18 Drip pricing is not only harmful for consumers, but it can also hamper competition by creating an uneven playing field between fair dealing businesses and those that push the boundaries too far (Office of Fair Trading, 2010). If the headline price is the most salient aspect for consumers, businesses using drip pricing to offer the lowest headline price will have an unfair advantage over those that transparently display the total price upfront (or set lower drip costs). As consumers have difficulty identifying the best deal when encountering drip pricing, businesses that genuinely offer a better deal will be insufficiently rewarded, dampening competition.

7.19 Moreover, the prevalence of drip pricing practices in the market may lead otherwise fair dealing businesses to follow suit and adopt similar practices to win consumers. In such cases, there could be plenty of competition on the salient upfront price, while businesses act more monopolistically on less salient dimensions, such as drip costs that ultimately affect the total price (Fletcher, 2019). As drip pricing becomes an industry norm, it can raise total prices above normal competitive levels, and increase business profits at the expense of consumers (Baye and Morgan, 2019).

Literature on potential remedies

7.20 Increasing the transparency and clarity of prices upfront, rather than hiding price components, enables consumers to make more informed decisions. An experiment examining seller and buyer behaviour found evidence that banning drip pricing promotes competitive behaviour in the market (Rasch et al., 2020). When sellers were required to charge an all-inclusive price, overall total prices charged were lower than the case without the requirement, and buyers benefitted from transparent pricing because they were able to identify the best offer more easily. The benefit to buyers was found to be particularly large when there was uncertainty about the extent of drip pricing in the market.

7.21 Regulatory interventions seeking to reduce the practice of drip pricing have been introduced in recent years. The Office of Fair Trading (Office of Fair Trading, 2010) provided some recommendations for fair pricing practices, which included the inclusion of compulsory charges in the headline price. In 2012, the UK government introduced regulations prohibiting sellers from imposing a surcharge on consumers for using certain payment methods (BEIS, 2015). A particular concern in relation to these surcharges had been that they were "dripped" – ie often hidden until the final stages of the transaction.

7.22 Finally, if consumers are sufficiently annoyed by drip pricing, there may be some scope for self-correction in the market (Huck and Wallace, 2015). For example, some businesses may strive to use their reputation for being transparent as a dimension of competition. That is, they may try to differentiate themselves by advertising that they use all-inclusive pricing while their competitors add many surcharges (Greenleaf et al., 2016). If a significant portion of consumers value fairness and transparency, and that is signalled through their purchasing behaviour, it is possible that businesses may exercise more caution when using drip pricing practices.

Example 1: Car rental intermediaries

A CMA case in 2018 investigated whether car rental intermediaries were breaching consumer law as part of an industry-wide review. Car rental intermediaries include meta-search websites that allow consumers to search car rental providers and broker websites that also allow them to make a booking. This work followed an earlier CMA investigation in 2017 of five major car rental businesses regarding hidden charges.

The CMA was concerned that consumers were routinely hit with hidden charges that should have been included in the headline price. Many car rental businesses were found to advertise very low prices to consumers by not including all costs incurred (eg young driver surcharges, one-way fees). Elements of online choice architecture used by car rental businesses include using drip and partitioned pricing to display price information, along with other issues related to the accuracy and clarity of information available to customers.

The lack of transparency in pricing meant that other compulsory charges were revealed only late in the booking process, leaving consumers to pay more than expected at checkout or at the pick-up desk. Although consumer harm may not be as severe as in the case where the consumer learns of the existence or amount of the charge only at the pick-up desk, the practice of initially quoting a low headline price then subsequently adding other charges during the booking process can impair consumers' ability to compare prices. Consumers may "anchor" to the headline price, while taking insufficient account of the additional costs revealed later. After going through multiple stages of the booking process, consumers may also feel committed to the transaction, sometimes leading them to unwittingly pay a higher total price than they would have done if they had initially been able to easily compare total prices. After the booking (whether paid for or not), consumers may be unable or unwilling to change their minds due to their existing commitment to the transaction.

Following the CMA's intervention, the three car rental businesses that gave undertakings agreed to incorporate mandatory charges like fuel surcharges, young driver fees and out-of-hours pick-up charges, where applicable. Those businesses also agreed to present all essential information, including the amounts of any deposits and insurance excesses, policy on fuel charges, and what exactly the insurance covers.

(source: Competition and Markets Authority, 2017e)

Reference pricing

7.23 As consumers use cues from the context to assess whether a particular offer is a good or bad deal, prices can be framed to influence decision making. An example of price framing is reference pricing, whereby businesses attempt to demonstrate that they offer good value by referring to another, typically higher, price (see ***Figure 21***). The Office of Fair Trading (2010) identified four broad types of reference pricing practices:

i. comparing an advertised price to a price the retailer formerly charged for the product (eg "was £9.99 now £5.99")

ii. comparing an advertised price to a price charged by other retailers in the same trade area (eg "OCA Ltd price £9.99. Our price £5.99")

iii. comparing an advertised price to a manufacturer's recommended retail price

iv. comparing an advertised price to a price the retailer intends to charge in the future (eg "after sale" price).

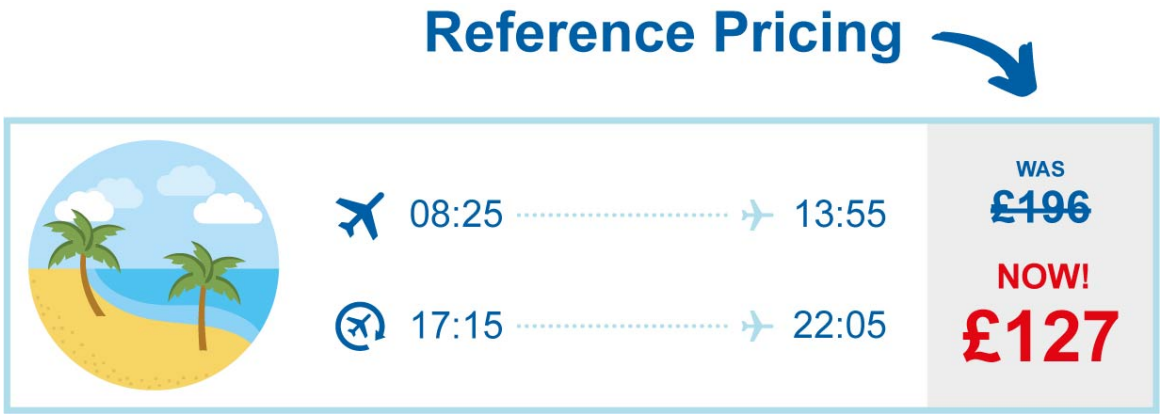

Figure 21. Example of reference pricing practice

(source: mock-up designed for the purpose of this paper)

7.24 Consumers commonly use the reference price to assess the value of an offer, and may interpret it as the "normal", most commonly charged, or un-discounted price (Ahmetoglu et al., 2014). When the offer is explicitly portrayed as a bargain in comparison to the reference price, consumers tend to evaluate the offer more favourably and may reduce their efforts towards shopping around and comparing prices.

Effect on consumers and businesses

7.25 A large body of evidence demonstrates that the presence of a reference price raises consumers' valuations of the offer and their purchase intentions, and lowers efforts to search for a better deal (Ahmetoglu et al., 2014). This effect is attributed to "anchoring", which describes consumers' tendency to use externally available information as anchors to adjust their own valuations when making decisions (Simonson and Drolet, 2004; Tversky and Kahneman, 1974). By including a reference price in an offer, businesses create an anchor that consumers can use as a starting point to judge the value of an offer (Furnham and Boo, 2011). The higher reference price may then serve as a signal for quality and enhance the attractiveness of the current offer.

7.26 Even irrelevant anchors have been found to have a disproportionate influence on consumers' valuations. An experiment found that adding a higher "was" price, which in the study was meaningless because there was no previous sales period to refer to, still led participants to overvalue the offer and reduce shopping around (Huck and Wallace, 2015). This change in perception arises because consumers do not fully adjust their perceptions of the offer away from the reference (or "anchor") price. Furthermore, reference prices influence consumer behaviour even when they are exaggerated or when consumers are sceptical of their truthfulness (Kopalle and Lindsey-Mullikin, 2003; Urbany et al., 1988).

7.27 Consumers also evaluate outcomes and express preferences relative to a reference point, or status quo (Apesteguia and Ballester, 2009; Tversky and Kahneman, 1974). Depending on how high or low the reference price is set, an offer can be evaluated as a gain or a loss. A reference price, typically a higher value than the current offer, has been found to encourage consumers to make a purchase they may not otherwise have made by increasing their perceptions of the inferred saving (ie gain compared to the reference point) (Ahmetoglu et al., 2014). For example, a field experiment in a shopping centre found that consumers exposed to a reference price estimated that they were receiving 75% higher savings than those who were not exposed to a reference price (Blair and Landon, 1981).

7.28 The effect of reference pricing on decision making has been shown to be greater when consumers are less familiar with the product or brand (Biswas et al., 1993; van Exel et al., 2006). A consumer survey commissioned by the OFT (2010) found that respondents reported being more influenced by the reference price when buying products infrequently (maximum once a year) than those bought at least once a month. While learning does seem to play a role, it does not sufficiently shield consumers from the effects of reference pricing.

Harm to Consumers and Competition

7.29 Where the reference price is used accurately and fairly, it can be a useful signal to consumers about the existence of genuine savings, and help them reduce search costs associated with getting a good deal (Office of Fair Trading, 2010). However, consumers can also be misled when the reference price is fictitious or not easily verifiable, or when consumer expectations about the reference price, such as the length of time it was applied for, are not in line with the reality of the offer (Office of Fair Trading, 2010). Misleading reference prices can harm consumers by deterring them from finding a better deal and raising the overall price paid. In fact, consumers have been shown to be attracted to the reference price even when it was exaggerated or implausible (Biswas et al., 1993).

7.30 Consumers may also have misguided expectations of the reference price. For example, an OFT (2010) consumer survey found that 43% were unaware that the "recommended retail price" referred to a manufacturer-recommended retail price rather than a sale or previous price. In addition, a majority (75%) believed that the reference price they encountered was genuine and that the product would have been available at the higher reference price for more than one month. These findings suggest that consumers can be misled by reference pricing practices that depart from their expectations.

7.31 Misleading reference pricing can reduce competition by discouraging consumers from shopping around. Therefore, businesses that use a reference price may win more consumers, but not necessarily on merit. When consumers who are willing to switch do not because of the misleading reference price, then businesses offering a better deal will be insufficiently rewarded. Consumers can be expected to make only reasonable decisions, and thus drive competition, if they are not misled by businesses (Fletcher, 2016).

Literature on potential remedies

7.32 The harms identified above relate to when reference prices are inaccurate or misleading. Hence, potential remedies in this context focus on the accuracy and validity of the reference price. In the UK, the *Guidance for Traders on Pricing Practices* (Chartered Trading Standards Institute, 2016), which replaces the *2010 Pricing Practices Guide*, provides advice to businesses on fair pricing practices. For example, it suggests a reference price to be a genuine comparison if applied less than two months ago, with no intervening prices. Moreover, as a general principle within the guidance, the period of the new lower price should not exceed the period in which the higher reference price was available. Following the OFT's investigation into pricing practices in

furniture and carpet retailers, a list of several factors was established to test whether the reference prices are genuine, including duration, relative volume of units sold, and repeated use (Competition and Markets Authority, 2014).

7.33 In the UK, the *Consumer Protection from Unfair Trading Regulations 2008* (CPRs) protects consumers from unfair commercial practices that mislead – or are likely to mislead – the average consumer into making a transactional decision they would not have made otherwise. Such practices include a misleading representation of price or misleading price promotion. There have been some prosecutions under the CPRs. For example, in 2013 the supermarket chain Tesco was fined £300,000 over its “half price” strawberries offer after a court case brought by Birmingham City Council (Competition and Markets Authority, 2015b). Tesco’s £1.99 offer ran for 14 weeks when its original higher price strawberries – £3.99 – were sold for a much shorter length of time. Such enforcement cases can signal to businesses that, to reduce the risk of fines, they should aim to communicate prices and promotions in a way that is readily understandable to consumers and that meets their expectations.

Example 2: OFT market study on advertising of prices

In October 2009, the OFT launched a market study of the use of price framing and misleading price advertising. This example has relevance to reference pricing and drip pricing, among other practices.

Price framing practices can be effective at altering consumers' perception of the value of an offer, and there were concerns that such practices may lead to consumer harm. The OFT emphasised that consumers should be able to trust that such price comparisons are fair and meaningful and that the advertised savings (or "price advantage") were genuine. Improper use of reference prices can mislead consumers, eg in circumstances where the "discounted" price is in fact the normal retail price of a product. To investigate this, OFT ran consumer surveys and experimental research – collecting evidence about, and examining, the following pricing practices:

- Reference pricing (ie "where there is a relatively high reference price compared to the displayed sale price")
- Partitioned drip pricing (ie "where price increments "drip" through during the buying process")
- Baiting sales (ie "where only very limited, or no, products are available at the discount price and consumers may ultimately purchase a full-priced product")
- Time-limited offer (ie "such as sales that finish at the end of the month or special prices available for one day only")
- Volume offers (ie "where it may be difficult for consumers to assess an individual price")
- Complex offers (ie "such as package prices with many separate elements to the price")
- Price comparison sites (ie "that may use some of the practices above").

There is a large body of evidence to show that the presence of an advertised reference price increases consumers' valuations of a deal and purchase intentions, and can lower their search intentions (Ahmetoglu et al., 2014). In the market study, the OFT had concerns that certain pricing techniques when used in a misleading way could result in consumers making purchasing decisions that they would not have made had prices been more clearly advertised, or to spend more than they needed to. The investigation concluded that some pricing practices were more likely to lead to consumer harm than others. In particular, the OFT gauged that the pricing practice with the greatest potential to cause harm was drip pricing and time-limited offers. However, these practices are not automatically deemed to be unlawful by the OFC. Whether any given offer may be misleading depends on

a number of factors that should be accounted for, such as the specifics of an advertisement or the ease of cross-market price comparisons.

Consumer surveys showed that among other things, nearly all consumers had experienced a volume price offer, and most had experienced a time-limited or reference price offer. A significant proportion of consumers felt they had coped poorly with price framing. For example, many consumers believed when faced with the same purchasing decision again, they would do something different or would be more careful next time. Most strikingly, consumers objected most strongly to practices such as drip pricing and time-limited offers that were identified within the experimental research to be most harmful because they may lead to the greatest financial loss. The OFT therefore concluded that there is compelling evidence that price framing exerts a powerful effect.

More specifically, OFT's research provided evidence that reference pricing reduces the extent to which consumers shop around and compare prices. By affecting the searching behaviour of consumers, fictitious or misleading reference pricing can result in consumers paying higher prices and purchasing more of a product than they would have if they had fully understood the offer. The evidence showed that although consumers learn, this learning is not complete and does not protect them from suffering detriment from false or misleading reference pricing. The OFT specified that they consider a reference price to be misleading and/or harmful to consumers where the reference price is fictitious or not easily verifiable, or where consumer expectations about the reference price, eg the price establishment period, are not in line with the reality of the offer.

(source Office of Fair Trading, 2010)

Framing

7.34 Consumers tend to base their evaluation of information not only on the content of the information, but also on the way in which it is presented, or framed (Levin et al., 1998). For example, the presentation of risk information – whether losses or gains are highlighted – has been shown to influence inclination to take risks (Tversky and Kahneman, 1981b). In the domain of privacy, how disclosure settings are labelled – whether it highlights or downplays privacy concerns – has been shown to influence consumers' choice of disclosure settings (Adjerid et al., 2019).

7.35 Given consumers' susceptibility to framing, businesses can frame options in a way that influences choices. A report by the Norwegian Consumer Council found that when Facebook prompts users to consent to turning on facial recognition features, the purpose of the technology is framed as to "help protect you from strangers using your photo" and to "tell people with visual impairments who's in a photo or video" (Forbrukerrådet, 2018). The report suggests that, as the alternative is deliberately framed as risky or ethically questionable, consumers may be persuaded to go with the option favoured by the business (ie consenting to share biometric data).

7.36 When biased framing misrepresents options or casts one in an unfairly positive light, consumers may reach decisions without fully understanding the trade-offs or consequences. Biased framing can be particularly concerning in areas like privacy protection, where industry and policymakers tend to rely on one-off "choice mechanisms" to determine preferences and subsequent outcomes (Adjerid et al., 2019).

Effect on consumers and businesses

7.37 Framing effects are generally attributed to changes in how consumers interpret a decision context (Tversky and Kahneman, 1981). Because consumers tend to base their judgments on the most salient cues presented to them, highlighting a particular aspect of a decision context or altering its perceived norms or goals can lead to different decisions (Adjerid et al., 2019).

7.38 Casting the same information in either a positive or negative light has been shown to lead to different evaluations of it. For example, the perception of the quality of ground beef was found to be more favourable when it was labelled as "75% lean" vs. "25% fat" (Levin and Gaeth, 1988). In the domain of medical treatment, people were more likely to rate a given treatment favourably when the focus was on survival rates compared to mortality rates (Marteau, 1989). These effects are hypothesised to arise because a positive frame is likely to lead to information processing that tends to evoke favourable associations in

memory, whereas a negative frame is likely to evoke unfavourable associations (Levin et al., 1998). Hence, businesses can use positive (or negative) language to sway consumers toward (or away from) choices that benefit their bottom line.

7.39 Consumers are also influenced by whether the framing of the decision problem focuses on the positive consequences of performing an action (enhancing gains) or the negative consequences of *not* performing an action (minimising losses) (Levin et al., 1998). Research has found that judgments tend to be influenced by gains and losses relative to a reference point, and that gains may not have the same psychological impact as equivalent losses (Gal and Rucker, 2018; Tversky and Kahneman, 1981). For example, even though the goal may be the same in both cases (eg promoting the purchase of energy-efficient products), the negative frame that focuses on avoiding losses (eg the extra cost or environmental damage from using inefficient products) has been shown to be more powerful than the positive frame in persuading people to act (Ropret Homar and Knežević Cvelbar, 2021).

7.40 How the decision task or the options are labelled can also influence behaviour by evoking different perceived norms or goals (Liberman et al., 2004). For example, in a series of experiments that used the various decision frames common in privacy, it was found that even subtle changes in labels or language can significantly influence consumers' choice of disclosure settings (Adjerid et al., 2019). The experiments showed that labelling disclosure settings in ways that highlighted privacy concerns (ie "Privacy Settings") increased the likelihood of protective disclosure settings being selected compared to labelling that diminished privacy concerns (ie "App Settings").

7.41 Given consumers' susceptibility to framing effects, businesses – with a vested interest in collecting as much consumer data as possible – may use biased framing to enable more data collection. It has become common practice for businesses to focus on only the positive aspects of the choice related to greater data sharing, while glossing over any negative aspects (Forbrukerrådet, 2018). Examples include labelling privacy-related decisions as "ad personalisation" to focus on the benefits of data sharing (ie seeing more relevant and useful ads), and describing data sharing for advertising in unconnected positive terms, like "social" (Competition and Markets Authority, 2020; see ***Figure 22***). Such biased framing can deter consumers from properly understanding the trade-offs and consequences, potentially resulting in decisions they may later regret.

Harm to Consumers and Competition

7.42 When the interests of businesses diverge from those of consumers, biased framing can make it difficult for consumers to act in line with their actual preferences. A common dark pattern that uses biased framing is "confirmshaming", which describes a situation where consumers are made to feel guilty about making a certain choice (Brignull, 2021b). For example, a prompt to take up a healthy food subscription might present two options: "Yes" or "No thanks, I don't like healthy food." When the option to decline is framed as a shameful choice, consumers who prefer to decline are discouraged from doing so (Konsumentverket, 2021; Luguri and Strahilevitz, 2021).

7.43 Businesses may also use biased framing to dissuade consumers from making choices that could result in them sharing less data. For example, when consumers try to turn off ad personalisation, businesses may use negative language to highlight all the benefits they will *lose* if they proceed with disenabling the feature (Forbrukerrådet, 2018). Google's warning mentions only loss of benefits, such as "You'll still see ads, but they'll be less useful to you" and "You may see more ads" (Competition and Markets Authority, 2020b). The strictly negative framing may persuade some consumers that disenabling ad personalisation will lead to mainly worse experiences.

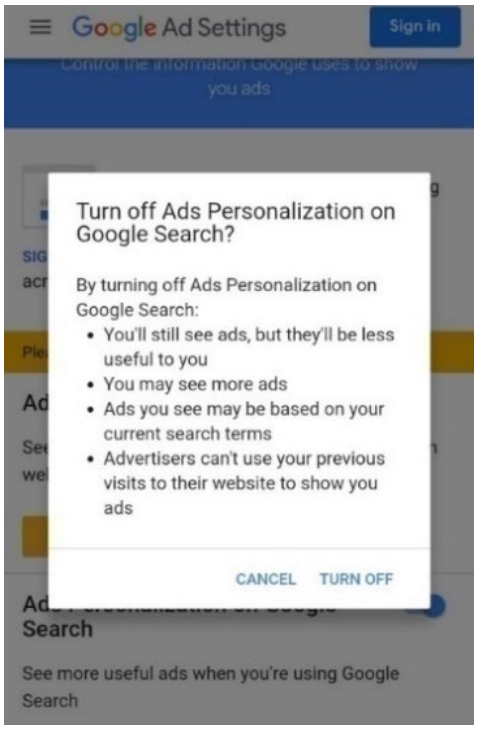

Figure 22. Example of Google's use of warning language

(source: screenshot, Google. Final Report on Online Platforms and Digital Advertising Market Study, Appendix Y, Figure Y.9, Competition and Markets Authority, 2020b)

7.44 By using biased framing to misrepresent options or to cast one in an unfairly positive or negative light, businesses prevent consumers from processing and assessing the relevant information independently. Because consumers often base their judgments on the most salient information cues presented to them (Bettman et al., 1998), they are likely to adhere to the businesses' wishes, even though they may have chosen differently if the framing had been more neutral or balanced. A large-scale online experiment found that participants were more likely to subscribe to a dubious service when the option to decline used "confirmshaming" than when it used more neutral framing (Luguri and Strahilevitz, 2021).

7.45 When consumers can be influenced into making decisions that may not be in line with their interest, but rather because of biased framing in the advertisement, businesses with market power may abuse that power to diminish competition (Mathur et al., 2021). For example, they can use biased framing to persuade consumers that remaining with the current provider is the "smart" thing to do and then lock them in. In the domain of privacy protection, businesses can deliberately frame options related to data sharing to extract more data from consumers. With more consumer data and attention, they can then use network effects to gain even more market power, without necessarily doing so on the basis of merit.

7.46 Biased framing for upstream privacy-related decisions, such as choosing disclosure settings or consenting to enabling facial recognition features, can be particularly concerning because they tend to be one-off choices with many downstream consequences (Adjerid et al., 2019). For example, data-based network effects can create powerful lock-ins to current providers – such as online social networking platforms – and may result in less feasible outside options for consumers with different privacy preferences (Acquisti et al., 2020).

Literature on potential remedies

7.47 While a balanced presentation is a good start, some choices can benefit from being deliberately framed to enhance consumer welfare. For example, some countries have introduced regulations limiting the marketing of cigarettes, including advertising bans and plain packaging mandates, while also requiring graphic health warning labels on packaging to make the harmful aspect more salient (Bonfrer et al., 2020). In domains like online privacy where consumers are less prone to consider the costs of surrendering data, researchers found that highlighting privacy protection goals while downplaying other competing goals and norms, such as obtaining some immediate benefit from disclosure, can result in behaviour more in line with privacy protection goals (Adjerid et

al., 2019). Further, results from a field experiment demonstrated that consumers were shown to place greater value on privacy when it is framed as something they stand to lose, compared to when it is framed as something that was not theirs to begin with (Adjerid et al., 2013).

Complex language

7.48 Decision-relevant information can be deliberately or unintentionally made difficult to understand by using complex language. It may involve the use of complex grammatical structures, more and longer words, or rarely used words that are likely to be understood by only a few people with a specialised knowledge or interest (Oppenheimer, 2006). It is important to note that some information is genuinely complex and difficult to convey, but this practice encompasses situations only where information is presented in a more complex way than necessary; it is "complexified".

7.49 Examples of this practice can be found in privacy disclosure notices of websites. While containing decision-relevant information on how consumers' data will be used and shared, the language in these agreements is often not written at the level of the average consumer. A review of over one million English language privacy policies found that, on average, these agreements require a college-level reading ability, a level far higher than that of the average UK citizen (Amos et al., 2021). The readability was also found to have worsened over the past 20 years, with policies doubling in length and increasing a full grade in the median reading level (Amos et al., 2021).

7.50 A market study by the Competition and Markets Authority (2020e) examining privacy policies of online platforms suggested that the lack of accessibility and clarity in language could lead consumers to draw incorrect conclusions and make decisions that do not align with their preferences. The Swedish Consumer Agency (Konsumentverket, 2021) also identified that these "hidden legalese stipulations" written in complex language usually mask some information from consumers and are a concerning practice in digital markets. While this section focuses on using complex language, there may also be situations where use of *oversimplified* language can mislead.

Effect on consumers and businesses

7.51 When information is written in complex language, consumers will have greater difficulty processing it. Complex language lowers processing fluency, which is the subjective experience of how easy it is to process information (Oppenheimer, 2006). Even when complex language does not necessarily increase the amount of information – eg by varying only the complexity of vocabulary while leaving the content unchanged – processing fluency is found to be lowered (Oppenheimer, 2006).

7.52 Fluency may influence which information consumers attend to when making decisions. In a series of experiments, Shah and Oppenheimer (2007) showed that consumers weighed fluent or easy-to-process information more heavily

than disfluent ones when making judgments. For example, participants who were shown a negative customer review of a product in an easy-to-read font valued the product less than those who were shown the same review in a difficult-to-read font. Given limited cognitive resources, consumers may prioritise information that requires less effort to process. Other studies have shown that consumers evaluate fluent information to be more valid than disfluent information (Reber and Schwarz, 1999).

7.53 Conversely, some empirical studies have shown that disfluency can lead to greater comprehension and recall of material. However, these findings may be less applicable outside of classroom settings in which the studies were conducted. The findings showed that disfluency (eg text written in smaller, less legible font) led participants to slow down and read more carefully than when the text was easier to skim (Alter et al., 2007; Diemand-Yauman et al., 2011). While applicable to educational settings where reading material is assigned, it may not transfer to contexts where consumers can easily ignore the disfluent information. That is, while those who take the time to read disfluent information may remember it better, very few people may read it in the first place. Indeed, most online users ignore complex privacy policies of online platforms before consenting to them, and the few who do spend very little time reading them (Bakos et al., 2014; Obar and Oeldorf-Hirsch, 2020).

7.54 Fluency may also influence mood states and elicit emotional responses (Cacioppo and Winkielman, 2001). For instance, low processing fluency is associated with negative feelings and can result in less favourable evaluations of the information (Winkielman et al., 2003). A series of experiments by Oppenheimer (2006) showed that the loss of fluency due to unnecessary complexity in a text impairs readers' assessments of the text's authors. To avoid negative feelings, consumers may give up trying to read information that they expect to be disfluent and, instead, rely on other available and more fluent information.

7.55 Greater fluency also induces stronger reactions to the information provided, both for positive and negative information. For example, findings from the domain of investments show that when disclosures are more readable, the changes in valuation by investors are more positive when the news is good, and more negative when the news is bad (Rennekamp, 2012). Hence, businesses may be incentivised to present positive information in clear and plain language to induce even stronger positive reactions. At the same time, businesses may deliberately use complex language to obscure negative information to reduce negative reactions by consumers.

Harms to Consumers and Competition

7.56 The greater time and effort required to process information written in complex language can deter consumers from actively engaging with it and incorporating it into their decision making. For example, most consumers agree to the terms of privacy policies without fully understanding the associated costs and benefits of the exchange they are making with online businesses (Acquisti, 2004). When consumers cannot sufficiently understand and assess the decision-relevant aspects of the exchange, their choices may not reflect their true preferences. The imbalance in the exchange may lead to unexpected harm for consumers. For online privacy, businesses and third parties may misuse consumers' personal data without their knowledge (Acquisti et al., 2015).

7.57 Businesses may also strategically use consumers' tendency to undervalue information that is difficult to process. For example, they may deliberately use complex language to reduce awareness of aspects of their product or service that may be perceived negatively by consumers. When consumers have less information about the exchange than businesses do, the market will not function properly (Fletcher, 2016). Competition will be dampened because the market insufficiently rewards businesses that have better practices, and insufficiently penalises those that have worse practices on the aspects that are less accessible to consumers. Moreover, businesses also have little incentive to improve and compete on the dimensions that consumers are less likely to assess (Fletcher, 2019).

Literature on potential remedies

7.58 While it may be tempting to turn to simplification as a panacea for complexification, there are limits to simplification. Simplification has been shown to improve accessibility of the content where it had previously been presented using unnecessarily complex language (Stricker et al., 2020). For example, use of plain language in healthcare has been shown to help patients better understand and act upon health information, such as when evaluating treatment options (Holmes-Rovner et al., 2005). However, when the underlying decision remains too complex, simplification may be insufficient. For online privacy policies, there may be a baffling range of legal agreements about how businesses will collect, store, use and share consumers' personal data. While clear and plain language can help to a certain extent, most consumers lack the specialist experience and skills necessary to evaluate the information (ASIC and AFM, 2019). To reduce the burden on consumers, a potential remedy may be to foster the growth of third-party intermediaries that will sort through the information on consumers' behalf, and highlighting terms

that are misaligned with their specified preferences (Costa and Halpern, 2019).

7.59 There are also other potential dangers to simplification. Complex information may become oversimplified, potentially lowering the accuracy of information, similar to how some popular media may misrepresent research findings (Stricker et al., 2020). There is some evidence that consumers may be too quick to accept information that is easy to process (Rennekamp, 2012), which may be problematic if the information is misleading. For example, using oversimplified terms like “green” or “eco-friendly” without explanation can suggest an overall positive environmental impact of the product or service, which can be inaccurate (Competition and Markets Authority, 2021b). In other instances, information that may have otherwise improved a decision may be omitted from disclosures in an attempt to simplify (Ben-Shahar and Schneider, 2014). Recognising the dangers of oversimplification, the CMA’s recent guidance for businesses when making environmental claims about their products or services stated that claims should not omit or hide information that consumers need to make informed decisions (Competition and Markets Authority, 2021b).

7.60 When simpler language is insufficient to engage consumers with complex decisions, experts can step in to assist in evaluating the information. For example, healthcare professionals help patients to understand medical information and advise them on complex health decisions. However, there can be drawbacks to relying on experts for advice, particularly in situations where the expert has misaligned incentives (ASIC and AFM, 2019). A financial adviser, for instance, may provide investment advice that maximises their own commission, rather than prioritising the consumer’s interests. In complex domains like investments, consumers have shown difficulty in judging the quality of advice (ASIC and AFM, 2019).

7.61 Instead of focusing on whether businesses disclosed decision-relevant information, it has been suggested that regulators focus on the desired result – ie whether consumers understand it. In this performance-based approach, regulators can set measurable outcomes for businesses to meet, without specifying how they should meet those targets (Willis, 2015). For example, a performance comprehension standard for a bank might require that a defined proportion of their customers understand they may be charged overdraft fees. This approach can incentivise businesses to educate rather than mask information using creative means, and to develop simple and intuitive products that align with consumer expectations (Willis, 2015).

Information overload

7.62 Counterintuitively, providing too much information may also serve to obscure it. When businesses provide too much information about a product or service, consumers may have difficulty finding and assessing the most relevant information. Most consumers, who have limited capacity to process all available information, are likely to consider only a few aspects in their decision making (Becher, 2007). Hence, excess information can confuse and distract while leading consumers to ignore less salient aspects they would have otherwise chosen to consider (Eppler and Mengis, 2008).

7.63 This practice is evidenced in the long terms and conditions of online subscriptions where it can seem impossible to find information on cancellations. A study commissioned by the European Commission (2016) identified that pre-contractual information that consumers must be made aware of as required by the *Consumer Rights Directive* (2011/83/EU), including conditions for terminating the contract and cancellation procedures, is often not presented prominently before the consumer subscribes. Instead, key information on cancellation may be hiding in small print within the long terms and conditions.

7.64 For effective competition, consumers need to be able and willing to access and assess key information about the various options available and select the one that is most suited to their needs. The Competition and Markets Authority (2017a) notes that risk of information overload is a barrier to consumers finding the right information and choosing the best deal for them. The risk may be greater in the information-rich environment online, where there is little to no cost of storing or displaying information.

Effect on consumers and businesses

7.65 Information overload occurs when decision-makers face a volume of information that is greater than their information processing capacity (Eppler and Mengis, 2008). In studies on the effect of information load on consumer decision making, evidence of an inverted U-shaped relationship is often documented between the amount of information and decision quality (Roetzel, 2019). Researchers across multiple disciplines have found that information improves decision making up to a certain point, beyond which decision making becomes poorer, and the motivation or ability to decide declines (Eppler and Mengis, 2008; Misuraca et al., 2020).

7.66 When overwhelmed by information, consumers are less likely to engage meaningfully with it. They may process just enough information to meet a need, or choose to ignore it altogether (Bawden and Robinson, 2009). To

avoid processing information fully, consumers may rely on simplifying heuristics or other decision-making shortcuts, such as going with the default or recommended option (Cronqvist and Thaler, 2004). Excess information can also make it difficult for consumers to identify the relevant information to integrate into their decision making (Eppler and Mengis, 2008).

7.67 Processing information requires attention. When consumers cannot attend to all available information, their decision making may hinge on what they pay attention to (Maćkowiak and Wiederholt, 2009). The literature on "rational inattention" analyses the trade-off decision-makers face between the benefits of choosing the best option and the costs of identifying the best option (Sims, 2003). A rational decision maker, for instance, would select pieces of information that are most relevant and ignore the rest. Yet, research has found that consumers may be drawn to the most salient aspect of the options they face, leading them to overweigh these aspects in decision making (Bordalo et al., 2016). This tendency may, in turn, incentivise businesses to strategically select which information to make more or less salient to consumers (Persson, 2018).

7.68 Businesses may take advantage of consumers' unwillingness or inability to understand large amounts of information to shroud decision-relevant information in a way that benefits their bottom line. Shrouding is when businesses make the information difficult to find, even though it can be revealed at almost no cost (Gabaix and Laibson, 2006). For example, businesses may prominently advertise virtues of their subscription offer while burying the terms of their cancellation policies in a large volume of less relevant information. Moreover, a business mandated to disclose information may find it advantageous to deliberately induce information overload to conceal certain information that may hurt their bottom line (Persson, 2018).

Harm to Consumers and Competition

7.69 When decision-relevant information is buried in a large amount of less relevant information, consumers may be less likely to find and integrate it into their decisions. Instead, their choice might be based on other less relevant factors, such as which provider approached them first or which business name they know best. When consumers are unable to make choices on a basis that reflects their true preferences, they may meet unpleasant surprises down the road, such as unexpectedly high exit fees for those who want to switch (Fletcher, 2016). A growing number of dissatisfied consumers having difficulty finding or switching to a better option may lead to lower trust in the market (Fletcher, 2021).

7.70 Businesses will tend to compete harder on more salient dimensions and act more monopolistically on less salient dimensions (Fletcher, 2019). When decision-relevant aspects are not salient, and hence not the drivers of choice, businesses have little incentive to improve and compete on those aspects. Persson (2018) goes further to argue that a business mandated to disclose information may find it advantageous to deliberately induce information overload to conceal certain information. In such cases, requiring businesses to disclose the hidden, undesirable features of their product may have no impact on consumer welfare; the business will simply disclose these features along with an overload of irrelevant information.

7.71 This practice of information shrouding can flourish even in highly competitive markets, as long as there are myopic or less active consumers (Gabaix and Laibson, 2006). In such markets, market segmentation may be observed, whereby there is plenty of competition for consumers who are willing to search more actively (ie “active” consumers), but less competition for “inactive” consumers who face higher search costs (Fletcher, 2019). Relatedly, economic models have suggested that when there are both informed and uninformed consumers, businesses may respond accordingly by separating into those that sell at a discount to informed consumers and those that overcharge the uninformed (Varian, 1980). Fairness considerations arising from such a market may be problematic.

Literature on potential remedies

7.72 A potential remedy may be to prioritise decision-relevant information to help consumers allocate their attention more efficiently. An online experiment that tested different formats of a clinical trial consent document found that the version that started with a summary box of the most relevant facts led to greater recall of important information (Yu et al., 2019). The summary box helped prioritise the long information that followed. However, even with a more accessible information format, consumers may still pay little attention to it. A review of the credit card market found that, despite the introduction of a standardised summary box, there was little competitive pressure on fees and charges because consumers focused instead on introductory promotional offers and rewards when choosing a provider (Financial Conduct Authority, 2016).

7.73 Decision-relevant information may be made more salient and accessible via visual cues. An online experiment demonstrated that, once a search platform displayed privacy policy information in a more prominent and accessible manner using a traffic light visual, some consumers were willing to pay a premium to buy from more privacy-protective websites (Tsai et al., 2011).

Requiring relevant information to be made visible and accessible can also lead businesses to improve on those aspects. For example, when Los Angeles County introduced grade cards to be displayed in restaurant windows, the restaurants' health inspection scores improved and the number of hospitalisations due to foodborne illnesses dropped by 13% (Simon et al., 2005).

7.74 Information on key features of alternatives can be collated by third parties or automated solutions to facilitate search and comparison (Fletcher, 2016). An experiment using a simulated online store found that the use of digital comparison tools enables shoppers to make better decisions while expending substantially less effort (Häubl and Trifts, 2000). Using these tools, consumers can easily compare the most important features side-by-side between alternatives, rather than having to sift through large amounts of irrelevant information. The CMA's market investigations into energy and banking also indicated that digital comparison tools are becoming increasingly important facilitators of switching providers, enabling consumers to find and reap the benefits of cheaper and/or better deals (Competition and Markets Authority, 2017b).

7.75 When it comes to recurring choices, eg setting privacy controls, some researchers suggest there is potential for consumers to gain control over their data in a more intuitive way using advancements in machine learning. For example, apps like "personalized privacy assistants" can learn the privacy preferences of the consumer over time and help configure available privacy settings to bridge the gap between the consumer's privacy preferences and settings (Das et al., 2018).

8. Choice Pressure

8.1 Choice architects can pressure decision-makers towards certain choices by using factors that are indirectly linked to the content or structure of a specific choice. For example, say you have decided to eat healthier food and lose weight. While browsing through an online store, you find an app with many positive ***reviews*** that guarantees achievement of your goals in three months if you follow their programme. You also receive a **prompt** from the app asking you to commit to self-reporting your actions every day. By asking you to share your daily calorie intake, this app is an example of a **commitment device**. You are also prompted to buy or use various recipes suggested by "famous" chefs and "celebrities" – an example of inducing social pressure through influential **messengers.**

8.2 The app also presents **personalised** offers for specific products (eg a digital weighing scale), and presents time-limited discounts, such as a purchase in the next 24 hours, with a countdown clock ticking. This **time pressure** might lead to greater impulsivity. Within the "buy products" section of the app, next to the product information, you see a claim: "94% of our customers have purchased this item", which is an example of high-demand **scarcity claim**. As you continue to use this app, you receive tailored **feedback** on your app usage. You also receive daily **reminders** to provide details of your actions. Each of these practices can exert strong psychological pressure on consumers, leading them to make decisions that may not align with their preferences.

Table 7. Choice pressure OCA practices

Choice Pressure		
Category	**Description**	**Strength of the Evidence[1]**
Scarcity and popularity claims	The choice architect informs consumers about limited stock, limited time to buy or high popularity of an item.	★★★
Prompts and reminders	The choice architect contacts the consumer to induce an action and/or follow up on a previous interaction.	★★
Messengers	The choice architect provides a platform on which a specific person or group can communicate with consumers.	★★
Commitment	The choice architect facilitates commitment by consumers to a particular behaviour in the future.	★★
Feedback	The choice architect provides consumers with feedback.	★★
Personalisation	The choice architect uses data to personalise offers.	★★
The notes from Table 1 above also apply to this table.		

Scarcity and popularity claims

8.3 Businesses can place pressure on consumers to buy products or services by making claims about their scarcity or popularity (see ***Figure 23***). Scarcity claims can include signals about low supply (eg “5 left in stock!”), high demand (eg “14 people have added this to their bag in the last 24 hours!”), and limited time (eg “sale ends on Friday”). There are also popularity claims signalling that many other consumers like or have bought a product or service, without necessarily creating a sense of scarcity. For example, businesses might call a product a “best seller” or indicate how many people have used or signed up to a service within the last year (Konsumentverket, 2021).

Figure 23. Example of scarcity and popularity claim practice

(source: mock-up designed for the purpose of this paper)

8.4 Scarcity and popularity claims are a well-known and widely used marketing practice by businesses (Teubner and Graul, 2020). Yet, the claims may not always accurately reflect the real supply or demand for a product. For example, a large-scale web crawl by Mathur et al. (2019) identified multiple instances of deceptive low-supply messages whereby websites randomly generated stock amounts on page load. They also found multiple websites where high-demand messages appeared consistently, regardless of the product displayed on the website.

8.5 Scarcity and popularity claims may also be artificially created to apply pressure on consumers. For example, businesses may design time-limited offers to artificially create a sense of urgency to engage with the offer (Petrovskaya and Zendle, 2021).

Effect on consumers and businesses

8.6 There are multiple types of scarcity claims – including low-supply, high-demand, and time-limited messages – whose effect on consumer behaviour has been explored (Teubner and Graul, 2020). Research has often indicated that scarcity claims lead to a greater perceived value of the deal, greater intent to purchase, and shorter searches (Aggarwal et al., 2011; Peng and Liang, 2013). For example, an online field experiment by Drossos et al. (2019) with more than 1,000 users found that both low-supply and high-demand scarcity messages boosted the likelihood of clicking the add-to-cart button. Further, Aggarwal and Vaidyanathan (2003) showed that using experimental and scanner panel data limiting the duration of a promotional offer accelerated purchases, increased willingness to buy, and reduced the likelihood of searching for more information. They also found favourable attitudes towards the promotional deal and the businesses that offered them. On the other hand, in two large-scale online experiments by Luguri and Strahilevitz (2021), the appearance of scarcity messages combining low supply and limited time did not lead to higher acceptance rates for a subscription service.

8.7 The effectiveness of scarcity claims likely depends on the context in which they are used. For example, Teubner and Graul (2020) found using an online experiment on online travel booking that the sense of urgency induced by scarcity messages translated into booking intentions for business-to-consumer (B2C) platforms such as Booking.com, while it had no effect in a consumer-to-consumer (C2C) setting such as Airbnb. They hypothesised that the finding may be driven by higher costs of making a mistake in the C2C setting. That is, while consumers on B2C platforms often reserve a room and have the right to cancel it at full refund, this option is much less common on C2C such as Airbnb, where at least the platform's service fee will be lost. Teubner and Graul (2020) therefore suggested that scarcity claims might be particularly powerful where a business has a generous cancellation policy, because this makes it easier for consumers to commit to a booking decision, after which they are less likely to critically re-evaluate their choice (Lukka, 2018).

8.8 The literature has also investigated the relative effectiveness of different types of scarcity claims, though there is mixed evidence. For example, an online experiment showed that limited-supply messages were more effective than

high-demand messages in increasing booking intentions on hospitality platforms (Teubner and Graul, 2020), whereas the reverse was the case in an experiment using an online travel booking context (Huang et al., 2020). Aggarwal, Jun and Huh (2011) found that quantity-based scarcity messages (driven by supply and demand) were more effective than limited-time scarcity messages at increasing purchase intentions. Experiments by Jeong and Kwon (2012) found that popularity signals, such as high hotel ratings and high-demand messages, led to higher booking intentions, whereas limited-supply messages alone did not influence booking intentions. The relative effectiveness of different types of scarcity and popularity messages is likely to reflect nuanced differences in context.

8.9 The power of scarcity claims to influence consumer behaviour derives from their ability to create a sense of time pressure and urgency (Teubner and Graul, 2020). This compulsion to act, and therefore the effectiveness of different types of scarcity claims, is driven by a combination of psychological mechanisms:

i. ***Heuristics***. Scarcity claims may limit the perceived amount of time available for the consumer to make a purchase decision. Under pressure, consumers may make decisions using heuristics, or mental shortcuts (Godinho et al., 2016). For example, consumers might restrict attention to a few characteristics (Lye et al., 2005), focus on characteristics that can be quickly and easily evaluated (Lenton and Francesconi, 2010), or decide on habits (Wood and Neal, 2009) – which includes not making a decision altogether. Scarcity claims may also serve as a heuristic to signal quality of the product (Stock and Balachander, 2005).

ii. ***Reactance****.* The principle of reactance suggests that, when consumers feel limited in their possible behaviours due to scarcity claims, they may experience a sense of urgency that triggers their willingness to perform the limited behaviour (Brehm and Brehm, 2013). As Teubner and Graul (2020) describe, “the behaviour will be performed due to a restriction which renders the action more attractive *because* it is limited”. Other studies have found that restrictions may activate an arousing state, leading consumers to pursue urgency over importance (Zhu et al., 2018).

iii. ***Risk, loss and regret aversion***. Scarcity claims may highlight the certainty of accepting products with limited time or quantity, as opposed to the uncertainty of declining the offer and seeing what is left, playing on consumers’ risk aversion. Consumers may also anticipate feeling a sense of loss by missing the limited deal, and think about the regret that they would experience accordingly.

Sugden, Wangan and Zizzo (2019) found that the primary mechanism driving consumers to accept time-limited offers is risk aversion, as opposed to impaired decision-making rationality. They, somewhat counterintuitively, found that consumers were more likely to select time-limited offers when the time interval was longer, suggesting that with more time to deliberate about the certainty of accepting, and the risk of rejecting, the time-limited offer may prime risk-averse attitudes (Sugden et al., 2019).

iv. ***Competition, pride and power***. Scarcity claims can lead consumers to feel a sense of competition with others who may also be interested in the offer and generate pride in getting the offer (Aggarwal et al., 2011; Roux et al., 2015). For example, taking advantage of a limited offer can create a sense of being a "smart shopper" (Babakus et al., 1988) because the buyer has "won" a bargain (Bawa and Shoemaker, 1987). Aggarwal, Jun and Huh (2011) showed that the sense of competition felt by consumers mediates the relationship between scarcity and purchase intentions. Note that this mechanism holds only for limited-quantity claims (driven by supply and demand), and not for limited-time claims, which do not usually involve competition between consumers. Moreover, Huang, Liu, Kandampully and Bujisic (2020) found that consumers with a greater sense of power, which is also associated with the tendency to be optimistic of risk and behave proactively towards competition, were more likely to increase purchase intentions when faced with high-demand scarcity messages, compared to those with lower sense of power.

8.10 Popularity claims (and to some extent high-demand scarcity claims) can draw on similar psychological mechanisms to scarcity claims, however, they generally rely more heavily on people being influenced by the behaviour of others (Cialdini and Trost, 1998). If consumers perceive that other people approve of a product (known as an injunctive norm) or that they buy it (known as descriptive norm), it can create a desire to comply with the social norm. Social norms can influence people's behaviour to be in line with those norms (known as "social proof" or the "bandwagon effect") through several mechanisms: people might (reasonably) believe others know something they do not; they might want to conform with others similar to them; or they might even wish to avoid negative judgment by others for diverging from the norm (Cialdini and Trost, 1998). Social norms can therefore be a powerful mechanism for behaviour change (Tankard and Paluck, 2016).

Harm to Consumers and Competition

8.11 Whereas scarcity and popularity claims can act as an informative signal to consumers about the availability and quality of the offer, they can mislead consumers when based on false or misleading data (Teubner and Graul, 2020). As a result, consumers may make decisions leading to outcomes that do not align with their preferences. Sugden, Wang and Zizzo (2019) found that participants who took timed deals rather than waiting to see wider options ended up, on average, with lower payoffs than those who waited. They also found participants' behaviour did not improve with experience, suggesting that consumers may find it hard to protect themselves by avoiding or ignoring such claims in future. In other situations, consumers under time pressure may delay making a choice altogether (Dhar and Nowlis, 1999).

8.12 Scarcity claims can increase the perceived search costs for consumers. Evidence suggests consumers end up shopping around less and are more likely to proceed with businesses that send time-limited offers than competitors (Aggarwal and Vaidyanathan, 2003; Sugden et al., 2019). This might be because once a scarcity claim has pressured a consumer into selecting a product, they might be less likely to look at competitors as they instead start to rationalise their decision, and therefore see the product more favourably than before the decision was made (Lukka, 2018).

Literature on potential remedies

8.13 Falsely stating that a product will be available only for a very limited time to elicit an immediate decision is already prohibited in the UK under Schedule 1 of *The Consumer Protection from Unfair Trading Regulations* (Statutory Instrument No. 1277, 2008). It applies to claims that are made "in order to elicit an immediate decision and deprive consumers of sufficient opportunity or time to make an informed choice".

8.14 The CMA investigated the online hotel booking industry in the UK, owing to concerns about some of their practices, including the use of scarcity claims, and developed sector-wide principles to address these concerns (Competition and Markets Authority, 2017c). The CMA noted that statements about popularity and availability should be designed with the purpose of informing consumers and not to create an artificial impression of scarcity. Further, the principles highlighted that statements about popularity and availability should be clear, disclose the assumptions, limitations and qualifications that are relevant to the statement, and be substantiated by the hotel booking website's data (Competition and Markets Authority, 2019a).

8.15 Further, a report by the Money and Mental Health Policy Institute (Holkar et al., 2021) suggests that providing consumers with more control can help reduce online harms. For example, they note that allowing consumers to adjust settings to disable information designed to create a sense of urgency or scarcity could be a valuable tool, particularly for customers with mental health conditions.

Prompts and reminders

8.16 Prompts are usually short stimuli (visual, graphic or auditory) aimed at grabbing attention to trigger specific behaviours or decisions. Reminders are a type of prompt that follow up on a previous interaction or engagement. For example, if a consumer puts an item in their basket or indicates interest in a product or service, a business may send a reminder message to encourage them to follow through with their purchase (see ***Figure 24***).

Figure 24. Example of prompt and reminder practice

(source: mock-up designed for the purpose of this paper)

8.17 Sending prompts has become much cheaper and faster in the digital environment, and businesses are now able to prompt consumers in real-time using notifications on digital devices (Iqbal and Horvitz, 2010). These notifications can include emails, text messages, website pop-ups, within-app pop-ups, and phone push notifications. Some prompts and reminders may require people to take immediate action, known as “forced action” (Konsumentverket, 2021). For example, on entry some websites may prompt people to decide whether to accept third-party cookies or terms and conditions, and will not let the user proceed without making a decision.

Effect on consumers and businesses

8.18 Evidence on the effect of prompts and reminders is often drawn from contexts where they are acting in the interests of consumers. For example, they can help consumers to follow through on their intentions and remind them to take action when it is in their interests (Milkman et al., 2011, 2021). This section describes the available evidence, as the same mechanisms involved can potentially be used in ways that cause harm. Yet, the evidence should be taken cautiously before extrapolating to contexts where they may be used to influence consumers against acting in their interests.

8.19 Following the stimulus-organism-response framework (Mehrabian and Russell, 1974), which is widely used in research related to online behaviour (Chan et al., 2017; Zhai et al., 2020), prompts act as an environmental stimulus that influences a person's internal state, which then triggers behaviour, such as making a purchase. This theory is consistent with concepts of prompts in the marketing world, such as the Hook model, where they are used by businesses as an external trigger to create, or align with, consumers' internal triggers (needs or desires) to generate and sustain habits that involve a business's product or service (Eyal, 2014).

8.20 The psychological mechanisms behind the effectiveness of prompts include:

i. ***Impulsivity and dual system***: In line with dual process theories (Gawronski and Creighton, 2013; Strack and Deutsch, 2014), prompts can trigger people's impulsive System 1 to act before the reflective System 2 can act. Where prompts are designed to make it easy for the consumer to take the business's desired action, this may mean consumers are more likely to engage with the prompt than if they reflected on their decision. Prompts can also trigger impulsive buying behaviours using the same process (Dholakia, 2000).

ii. ***Saliency***: Making messages salient can increase the likelihood that people engage with them (Service et al., 2014), and prompts are often designed to attract attention, including by using bright colours, prominent features, sounds and even vibration for mobile notifications. For example, an analysis by a push notification provider of 50 billion notifications sent to 900 million consumers found the likelihood of users clicking on notifications was 25% higher when they used rich formats (images, videos or GIFs), and 20% higher when they used emojis, although these formats were not randomly allocated (Accengage, 2018a).

iii. ***Social pressure***: When a consumer sees or hears a notification, they may feel social pressure to engage with it in case it is a personal

message. In an in-situ study with 15 smartphone users, Pielot, Church and De Oliveira (2014) found that users usually opened notifications within minutes, and gave the primary reason as being social pressure in personal communications.

8.21 There are also features of messages in prompts and reminders that can make them more effective. For example, prompts incorporating scarcity messages, such as time-limited promotions or low-stock alerts, have been shown to accelerate purchases (Aggarwal, Jun and Huh, 2011; see previous section on ***Scarcity***). The timing of prompts can also matter in driving consumer engagement (Accengage, 2018; Bidargaddi et al., 2018). Hence, businesses can use behavioural data to automate the timing of notifications to maximise the likelihood that each consumer engages with them. Aminikhanghahi et al. (2017) found that using a notification manager that identifies the best times to prompt smartphone users increased responsiveness from 13% to 93%.

8.22 As mentioned previously, existing academic literature on the effect of prompts and reminders is often drawn from contexts where they are acting in the interests of consumers. A meta-analysis of nine studies into the effect of prompts and reminders on enhancing engagement with digital health interventions found a slight positive effect (Alkhaldi et al., 2016). In a micro-randomised trial with time-varying push notifications, Bidargaddi, et al. (2018) found that users of a mobile health app were 3.9% more likely to engage with the app in the next 24 hours when a push notification was sent versus when it was not sent.

8.23 The Institute of Electrical and Electronics Engineers (IEEE) studied the effect of push notifications in the context of cart abandonment, whereby virtual consumers add goods to their shopping basket but give up on their shopping before making a payment. They found that push notifications increased the perceived value of a given product, and therefore the intention to purchase (Tiffany et al., 2020). Sahami Shirazi et al. (2014) analysed 200 million notifications over six months from more than 400,000 users who downloaded an Android app that connected the mobile phone notifications to their desktop. They found that users were 83% likely to click on a mobile notification within the first five minutes, and 50% within 30 seconds, suggesting notifications are extremely effective at gaining (at least short-term) engagement. However, the sample of participants who downloaded the app may not have been representative of consumers more broadly.

8.24 There is some evidence that prompts and reminders can encourage responsible gambling. In a laboratory experiment, Monaghan and Blaszczynski (2010) found that pop-up messages on electronic gaming machines encouraging participants to reflect on the time spent playing were

affecting their thoughts and behaviours during play. Cloutier, Ladouceur and Sévigny (2006) found pauses and messages on video lottery terminal screens can reduce erroneous beliefs about gambling and persistence to play.

Harm to Consumers and Competition

8.25 The existing literature in this area has focused on the use of prompts and reminders to benefit consumers, and is limited in its application to contexts where they can be used to harm consumers and competition. There is some evidence of psychological harm from excessive prompts and reminders, including distraction, loss of concentration, and negative emotions (Chu et al., 2021; Czerwinski et al., 2004; Pielot et al., 2014). However, more evidence will need to be gathered to explore situations where prompts and reminders by businesses may pressure consumers to make decisions against their best interests.

Literature on potential remedies

8.26 Notification scheduling and customisation could help to reduce the negative impacts of excessive prompts and reminders. In a user study with 30 participants in their real smartphone environments, Okoshi et al. (2016) found that an intermediate software that dynamically adapts notification scheduling according to users' interactions reduced frustration for users with greater sensitivity for interruptive notification timings by 28%.

8.27 Often, there are no constraints on the number of prompts businesses can send, apart from backlash from annoyed customers who may delete the app or cancel the service. Yet, restrictions on the number of prompts may be appropriate in some circumstances, such as when vulnerable customers or high stakes are involved (see, for example, Ronson, 2005).

Messengers

8.28 Consumer behaviour can be influenced not only by the content and structure of information, but also by who is sharing that information, due to the power of social influence. Social influence is the phenomenon by which the behaviour of an individual directly or indirectly affects the thoughts, feelings, and actions of others in the population (Song et al., 2007). Influential messengers, or opinion leaders – individuals from whom others seek advice or information (Rogers and Cartano, 1962) – can include well-known public figures, experts, friends and family, or even other consumers. Turcotte, York, Irving, Scholl and Pingree (2015) note that the creation of the internet has increased the role of opinion leaders. In this section, online reviews and social media influencers will be covered.

Online reviews

8.29 Consumers can use accurate and credible reviews by others to make better decisions using the wisdom of crowds. In digital markets, genuine user reviews can be particularly important when consumers have to buy products before actually seeing them for themselves (Manes and Tchetchik, 2018). Reviews can also act as a feedback mechanism for management to improve the future quality of a service (Chevalier et al., 2018). Online reviews are considered to have an impact on consumer behaviour in several different domains, including hotels, airlines, films, telephone companies, restaurants, and stocks (Guernsey, 2000). For example, Godinho de Matos et al.'s (2016) real-world randomised experiment in the video-on-demand market found that peer ratings have an impact on consumer decision making separately from underlying product quality.

8.30 The behavioural mechanisms underlying online reviews affect consumer decision making in similar ways to other OCA practices. There is wide-ranging evidence from behavioural science, behavioural economics and psychology on the impact of social norms on people's behaviour (Allcott, 2011; Melnyk et al., 2010). Behaviour of other people can be used as a social reference point for an individual (Cialdini and Goldstein, 2004). The behaviour of others can be observed as a group behaviour or behaviour of "valued" individual, such as knowledge, fame, group membership, or a specific role (eg parent, supervisor). Choice architects decide on the placement, content and prominence of the social information on a website; all of these deliberate design choices can influence consumer behaviour. Choice architects could use different types of social norms. For example, descriptive social norms portray what other people actually do, compared to injunctive norms that are used to describe what one should do (Bicchieri and Xiao, 2009). Online

reviews with the ratings written by others and visible on firm's websites fall under the category of descriptive norms.

8.31 Regardless of whether online reviews are created by the host platform, the platform can choose when and how to display information in ways that affect consumer decision making (Floyd et al., 2014). This includes which content to show, how it is framed, what type of content to incentivise people to post, and how the host platform will monitor/enforce any rules of engagement. For online reviews, there is an overlap with other OCA practices – eg ranking is often accompanied by other forms of visual manipulation, scarcity claims and reference pricing.

8.32 Apart from the choice structure and pressure elements of online reviews, their content can also be false, deceiving, or misleading (see ***Figure 25***). For example, businesses may write positive reviews for their own products, or post negative reviews of their competitors' products (Mayzlin et al., 2014). Similarly, some consumers may be incentivised – paid or otherwise – to write reviews for items that they have not purchased (Anderson and Simester, 2014). Reviews can also be written by deliberately designed machine learning algorithms that use a sample of truthful reviews to realistically imitate their language, tone and content (Hovy and Spruit, 2016). Luca and Zervas (2016) found that 16% of restaurant reviews on Yelp are identified by its filtering algorithm as fake or fraudulent, while Ott, Cardie and Hancock (2012) found a machine learning algorithm classed between 1% and 6% of reviews in six online communities as deceptive.

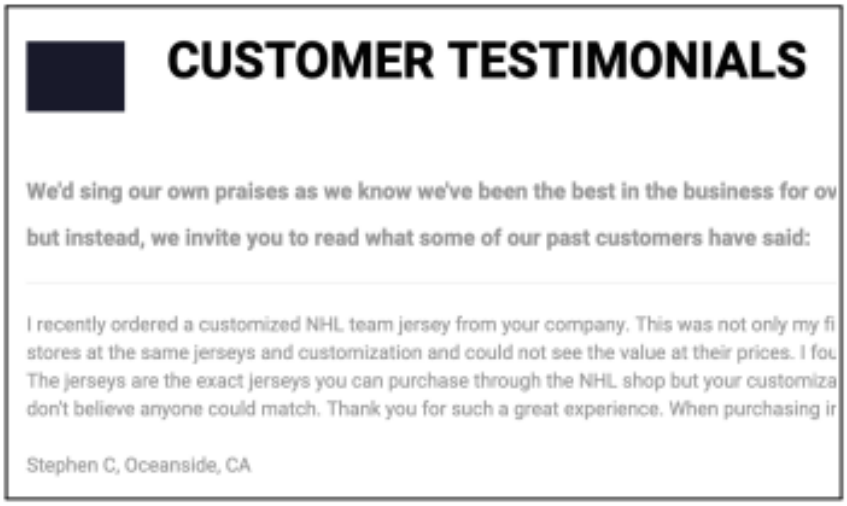

Figure 25. Example of an online review of uncertain origin, according to Mathur et al.

(source: Mathur et al., 2019)

8.33 Ott et al. (2012) suggested the ease of posting and viewing reviews can also affect the likelihood that they are fake: they found that communities with low

signal costs for reviews (low posting requirements, such as number of previous reviews posted, and high exposure) are more likely to be false than those with higher signal costs.

Effect on consumers and businesses

8.34 Online reviews can have a strong influence on consumer behaviours. In the context of hotel reviews, Veltri et al. (2020) found bookings increased by 107% when a hotel received the highest possible rating, and by 200% when user ratings and reviews were displayed in a prominent position. There is evidence to suggest the same is true for fake reviews: a Which? experiment offered five products with different Which? Recommendations ("Buy", "Don't buy", and three mediocre-rated products) to 10,000 participants on simulated webpages, and varied the level of fake review activity for each. They found that fake review activity increased the number of participants who bought the "Don't buy" product in every group. The condition that included an inflated star rating, fake review text and a platform endorsement more than doubled the likelihood that participants selected a "Don't buy" product compared to the control group (from 10.5% to 24.8%) (Lester, 2020). Users are also aware that they are influenced by reviews: a survey of 1,046 online consumers found 88% said their buying decisions are influenced by user reviews (Gesenhues, 2013). Flanagin et al. (2011) suggested this is the case despite most consumers not contributing to the review process themselves.

8.35 Manes and Tchetchik (2018) suggested that the effectiveness of online reviews is likely to vary by several contextual characteristics, including: product characteristics (eg new vs. mature goods; experience vs. search goods); consumer characteristics; platform characteristics (eg the level of anonymity provided to reviewers, the website's reputation); message configuration and distributional patterns (eg negative vs. positive; extreme vs. moderate ratings); and industry characteristics. There is limited rigorous evidence, however, on the effectiveness of combining other choice architecture practices with reviews systems (eg how reviews are presented or ranked) on consumer decision making.

8.36 Some of the psychological factors underpinning the effectiveness of online reviews in influencing consumer behaviour are:

i. **Social norms and similarity**. Consumer behaviour is strongly influenced by perceptions of the actions, attitudes and perceptions of others around them, particularly of those similar to them (Cialdini and Trost, 1998). An important component of why consumers find user reviews valuable is that they represent the experiences and views of other consumers like them, and therefore provide a social norm for

how they themselves should perceive the product or service. In the context of films, Duan et al. (2008) found that the number of online reviews was a more important factor in determining box office sales.

ii. **Information value**. First-hand information, such as online reviews and expert advice shared by others, can support consumers to make more-informed decisions and give them confidence in those decisions. Veltri et al. (2020) found evidence that when a hotel review was left by a user who was verified as having stayed at a hotel for at least one night, it led to a 40% increase in the chance of the participants choosing this hotel.

iii. **Heuristics**. Hlee et al. (2018) proposed that consumers interpret the value of reviews and the above factors using a combination of fast, comprehensive heuristic cues and more nuanced systematic cues. Heuristic cues include the reviewer's perceived identity, reputation, expertise and authority (eg as visible in their public profile), as well as the immediately obvious features of the review itself, such as the star rating or any images included. More systematic cues include different language styles used in the review, and its readability. Zhang et al. (2014) found that as well as the perceived informativeness and persuasiveness of reviews, heuristic cues (source credibility and perceived number of reviews) increased consumers' purchase intention. Similarly, Sparks and Browning (2011) found consumers tend to rely on easy-to-process information in online reviews: for example, being disproportionately influenced by early negative information, particularly when reviews are negative overall.

iv. **Trust and credibility**. Consumers often look to opinion leaders for information over other sources, such as advertising, because they are perceived to be trusted and credible (Flynn et al., 1996). Accordingly, Jiménez and Mendoza (2013) found that more credible reviews lead to higher purchase intentions, while Hu, Liu, and Zhang (2008) found Amazon consumers of books, DVDs and videos respond more favourably to reviews written by reviewers with a better reputation and higher exposure. Ismagilova et al. (2020) found in a meta-analysis of 20 studies on electronic word-of-mouth communications (which includes all types of information exchange between consumers about a product or service via the internet, social media and mobile communication) that perceived source expertise and trustworthiness were important factors in determining usefulness, credibility and intention to purchase.

Harm to Consumers and Competition

8.37 Similarly, the misleading presentation of reviews can make it harder for consumers to accurately assess information. Even when reviews are genuine, they can still present an inaccurate view of products and services due to selection, sorting and social influence biases (Muchnik et al., 2013; Schoenmueller et al., 2020). Hu et al. (2009) suggested that there are two self-selection biases that cause the mean rating of a product to be biased: purchasing bias, meaning consumers with a favourable disposition towards a product are more likely to purchase a product and submit a review; and underreporting bias, meaning consumers with polarised views (either positive or negative) are more likely to submit reviews. Although Fradkin et al. (2015) found that the bias in online reviews on Airbnb was small (ie they typically reflected the private ratings of reviewers), when negative guest experiences occurred, they were not captured in the review text 56% of the time due to sorting bias.

8.38 Fake reviews can also make it harder for consumers to accurately assess information. For example, where reviews are fraudulent or misleading, they can increase information asymmetry between the businesses selling products or services, and the consumers buying them (Zhuang et al., 2018). This difficulty in assessing information can in turn lead to consumers purchasing inferior products and services, which reduces competitive pressure. A Which? behavioural study showed that fake reviews can lead to consumers making purchase decisions on incorrect information, making them twice as likely to choose poor-quality products (Lester, 2020). He et al. (2021) also suggest fake reviews can indirectly affect competition through algorithmic ranking, which often uses review data to determine a product's ranking. This can lead to consumers purchasing inferior products, as well as anti-competitive effects where businesses making these inferior products are unfairly rewarded. There is some evidence that these effects can be significant in practice: Lappas et al. (2016) found that in some hotel markets, only 50 fake reviews would be sufficient for an entrant to surpass its competitors' visibility.

8.39 The effects of fake reviews can create a profit incentive for businesses to actively solicit, or not remove, positive fake reviews for their business, or to solicit negative fake reviews for competitors. For example, Luca and Zervas (2016) found that a restaurant is more likely to commit review fraud when its reputation is weak (ie if it has few reviews because it is not a chain restaurant, or recently received bad reviews), and they are more likely to receive negative fake reviews when facing greater competition. Fake reviews can also degrade consumers' trust in online platforms. A survey of 10,000 shoppers found 34% of participants said fake customer reviews would lead them to lose trust in a

brand, and after losing trust in a brand 82% of participants would not use that brand again (Rohrlich, 2020).

Literature on potential remedies

8.40 The existing literature and previous cases suggest that remedies could be targeted at several levels:

i. Ensure platforms sort and present reviews fairly. Fradkin, Grewal, Holtz and Pearson (2015) suggested several ways to address biases in how review systems sort reviews. To increase review rates and representativeness, marketplaces can change the way in which reviews are prompted and displayed, make reviews easier (or harder) to submit, strategically offer vouchers, or make them mandatory. They also suggest the possibility of displaying ratings that adjust for bias towards positive reviews, either by displaying the effective positive percentage or other indicators of customer satisfaction.

ii. Increasing the portability of reviews between platforms could potentially help to reduce the competitive advantage for incumbents from the number of reviews, and reduce the incentive for new market entrants to solicit fake reviews (Kathuria and Lai, 2018).

iii. The European Commission (2014b) proposed creating a public ranking system for different reviewing platforms and entities based on the authenticity of their reviews, encouraging consumers to switch to platforms with fewer fake reviews. This EC also proposed that fake reviews can come from consumers, review website operators, and e-reputation businesses (who help other businesses manage their online reputation) (European Commission, 2014b).

iv. There is growing literature around techniques to identify and remove fake reviews through machine learning and natural language processing (Kennedy et al., 2019; Vidanagama et al., 2020). For example, Li et al. (2014) identified some general differences in language between deceptive and truthful reviews using a multi-domain, large-scale dataset (including solicited fake reviews). They found truthful reviews are more likely to include nouns or adjectives, and less likely to include verbs, adverbs, first-person singular pronouns, or exaggerated sentiment than deceptive reviews. These techniques have been used to identify positive (Ott et al., 2011) and negative (Ott et al., 2013) deceptive opinion spam, groups of fake reviewers (Mukherjee et al., 2012), and fake app store reviews (Martens and Maalej, 2019).

v. Oak (2021) proposed how to target the network of sellers, agents and intermediaries that use a range of tactics to avoid fake reviews being taken down in relation to Amazon's online marketplace.

Social media influencers

8.41 Consumers increasingly use social media to gather information on which to base their decisions, and as a place to seek advice (Casaló et al., 2020). Businesses are therefore increasingly looking to social media as a marketing channel to advertise products and build brand awareness. As a result, an industry for social media influencers has arisen – firms pay social media users with large, or highly engaged, followings to post sponsored content. The social media influencer channel is seen to have several benefits for businesses over traditional advertising campaigns, such as generating more "authentic" and direct contact with potential customers (Lou and Yuan, 2019). As a result, the influencer marketing industry is growing rapidly, doubling from $6.5 billion in 2019 to $13.8 billion in 2021 (Coppola, 2022). However, there is wide variation in how influencers disclose their paid partnerships, which can potentially lead to consumers not realising content has been paid for by brands (Competition and Markets Authority, 2020e).

8.42 In the report for the Advertising Standards Authority carried out by IPSOS Mori, both qualitative and quantitative research was conducted to understand labelling of influencer advertising (IPSOS, 2019). The findings showed that most participants claimed to at least "think they knew" that some people are either paid or given products by brands in exchange for social media endorsement. However, findings also showed that a small majority of participants were able to identify the two brand adverts tested as "definitely adverts", and that they were less certain about classifying influencer adverts. The report also suggested that the wording and positioning of labels influenced people when they are trying to judge whether what they are seeing is an advert or not. In addition, all influencer advertising posts evaluated in that study were more readily identified as advertising, after labelling had either been added or repositioned. However, in their public opinion research, a significant percentage of participants were not able to identify influencer advertising posts as "definitely an ad", even where the ASA's current position on labelling is followed.

8.43 Some academic research has been conducted on the extent to which consumers' purchase decisions are influenced by unlabelled paid endorsements. In an experiment with 237 students, Evans et al. (2017) found that disclosure of a paid endorsement on Instagram adverts increased advert recognition, but also prompted a negative attitude to the brand and reduced

intention to share content. On the other hand, Boerman (2020) found in an online experiment simulating sponsored Instagram posts with 192 participants that disclosure, by increasing advert recognition, positively affected brand recognition and intention to engage with the post. The overall prevalence and growth of the influencer industry suggests it is an effective channel to drive consumer behaviour. For example, Twitter (2016) claims from user survey data that nearly 40% report making a purchase as a direct result of a Tweet from an influencer, and users who were exposed to brand Tweets had 2.7 times increase in purchase intention.

8.44 The relative effectiveness of influencers compared to other information sources (such as online reviews) might depend on the type of good: Wei and Lu (2013) compared the two in the context of female shopping behaviours, and found celebrity endorsements to be more effective at generating self-reported attention, desire and action for a search good (shoes), while online reviews were more effective for an experience good (skincare toner). However, it is worth noting that this paper captures the context in 2013, when social media influencers were not as prevalent as today.

Effect on consumers and businesses

8.45 The mechanisms through which influencers affect consumer behaviour are similar to online reviews, and in particular, they rely on:

i. ***Messenger effect***: Behavioural science literature has documented the effect of messengers on how people process information and make decisions across multiple domains (eg Hafner et al., 2019; Maclean et al., 2019; Whiting et al., 2019). A messenger can be described as "an agent who delivers information to the consumer" (Dolan et al., 2012). The main rational here is that the same information received from different messengers can have differential effects on consumer decisions. "Social media influencers", as part of the new digital channel expansion, are "messengers" influencing their followers by sharing their views and providing recommendations to their followers. Businesses that decide to use influencers to increase the popularity of their products are choice architects who are applying this behavioural practice.

ii. ***Trust, credibility and congruence***: Consumers often look to opinion leaders for information over other sources because they are perceived to be trusted and credible (Flynn et al., 1996). Lou and Yuan (2019) found in an online survey of 538 participants recruited through Amazon Mechanical Turk that social media users' trust in influencers' branded posts subsequently generated brand awareness

and purchase intentions. Trust and credibility for consumers can be built through several different mechanisms: for example, Casaló et al. (2020) found that uniqueness and originality were crucial features needed for Instagram influencers to be perceived as credible opinion leaders, while disclosing paid advertisements appeared to diminish influencers' credibility. Credibility could also be specific to the relationships between the influencer, the product and the consumer. Kim and Kim (2021) found that congruence between influencer and product can enhance attitudes towards the product while reducing advert recognition. Lou and Yuan (2019) found social media users' trust in influencers' branded posts was increased by social media influencers' perceived similarity to users and attractiveness. Furthermore, in a study of 372 followers of a famous Instagram fashion influencer, Belanche et al. (2021) found that consumers tend to align their perceptions of products with influencers' perceptions when the influencers reflect their own values, personality or image. They suggest that the benefits of congruence between influencers, consumers and products in this context implies that advertised products act as a link between consumers' actual self, reflected in consumer-product congruence, and attaining their ideal self, which resembles the influencer who endorses the product and functions as a role model. General factors contributing towards credibility identified in the literature include personal involvement, product familiarity, public individuation (how willing one is to act differently from others) (Chan and Misra, 1990), social identity, expertise, reputation or authority (Hlee et al., 2018).

iii. ***Persuasion knowledge***: Persuasion knowledge refers to how consumers use their experiences to recognise, understand and critically assess (Friestad and Wright, 1994; Lee and Kim, 2020). Disclosing paid partnerships is generally expected to activate consumers' persuasion knowledge, which enables them to make informed decisions on the understanding of the sponsorship arrangement and incentives. This activation has been found to be associated with a reduction in perceived credibility of the brand or product. On Instagram, both Evans et al. (2017) and Casaló et al. (2020) found disclosing paid advertisements activated persuasion knowledge and reduced influencers' credibility. Boerman et al. (2012) also found sponsorship disclosures with a longer duration activated consumers' persuasion knowledge and reduced their brand attitudes more than disclosures with a shorter duration. There is also some evidence suggesting that the specific disclosure language and prompts used can affect whether persuasion knowledge is activated.

In two online experiments with children and adults, the Danish Competition and Consumer Authority (2021) found participants were more likely to identify sponsored content when disclosures were made more salient. On the other hand, Lee and Kim (2020) found in an online experiment that different types of explicit and implicit disclosure language did not affect persuasion knowledge activation or advertising recognition.

Harm to Consumers and Competition

8.46 Like misleading or fake online reviews, unclear, absent or misleading sponsorship disclosures can make it harder for consumers to accurately assess information. If an influencer does not make it clear that a post contains paid-for partnerships, consumers might place more trust in that product and the influencer's opinion than they otherwise might have. This may lead to consumers purchasing inferior products and services, which reduces competitive pressure.

Literature on potential remedies

8.47 The CMA has recently taken action against social media platforms (eg Facebook and Instagram) and influencers to do more to prevent hidden advertising (Competition and Markets Authority, 2020e), and has published guidance for influencers on how to be transparent to followers (Competition and Markets Authority, 2019c). Remedies found in the literature suggested requiring social media platforms to detect undisclosed sponsored posts using machine learning algorithms and to apply sanctions to posts found to have unlabelled incentivised endorsements (Liao et al., 2021). This remedy aligns with undertakings previously obtained by the CMA from Facebook Ireland Ltd in respect of its Instagram platform (Competition and Markets Authority, 2020g)

Example 3: Trusted trader and care home review sites

The CMA's call for information (CFI) on online reviews and endorsements published in June 2015 raised some general concerns that apply to the entire review sector, including the potential for:

- some practices to prevent some genuine negative reviews from being published
- some websites not checking reviews adequately
- some sites not clearly and prominently explaining to users how they collect, check or publish reviews.

Following the CFI, the CMA engaged with five businesses across two sectors: two websites for finding tradespeople (ie Checkatrade and TrustATrader), and three care home review sites (ie Carehome.co.uk, Care Opinion, and Most Recommended Care). All five businesses have agreed to improve their practices, and below are selected examples of those improvements:

- ensure that all genuine, relevant and lawful reviews are published. For example, Checkatrade agreed to make it more apparent that if users want their negative reviews to be published, users can do so whether or not they would like further contact with the trader (which is in line with its existing policy).
- ensure that reviews received are checked properly on whether they are genuine. For example, Most Recommended Care agreed to strengthen their existing verification process by subjecting all reviews, good or bad, to the same checks.
- ensure that important information is brought to the attention of users. For example, TrustATrader agreed to change the way information is being laid out on the website by making the explanations about their review policy more prominent.

(source: Competition and Markets Authority, 2016)

Commitment

8.48 Given the many decisions consumers make each day, automated behaviours can be advantageous because less attention is required than conscious decision making. For this reason, choice architects may encourage consumers to commit to services that would benefit businesses, such as subscriptions where recurring payments and renewal are often automated. These arrangements may be beneficial when behaviours are aligned with consumers' intentions and preferences. However, they may be harmful when an initial commitment device (eg recurring payment) leads consumers to commit to actions that are not in their interests. It is important to note for this practice, similar to some other practices within the choice pressure section (eg see ***Prompts and reminders*** and ***Feedback***), much of the evidence cited is linked to contexts where choice architects are broadly seeking to support consumers to make beneficial choices.

8.49 Commitment devices are arrangements that aim to help consumers commit to a future behaviour (Bryan et al., 2010). These arrangements, when taken up by consumers, intend to influence or restrict decision making that acts against the consumer's better judgment by deploying tangible economic penalties ("hard commitment") or psychological penalties ("soft commitment"). Hard commitments may take the form of monetary payments, such as promising to pay a friend £100 for failing to stick to a smoking cessation plan. On the other hand, soft penalties include the emotional cost of failing to commit to a predetermined behaviour, such as the disappointment of breaking a New Year's resolution (Bryan et al., 2010). Public commitments may formalise and facilitate a particular goal (Bradford et al., 2017). Users can also share progress toward their goals, such as on social media websites or apps (Dellande and Nyer, 2007), and support communities can hold other members accountable for their actions (Bradford et al., 2017). For example, on a website called stickK.com, users can create "commitment contracts" and invite family and friends to monitor commitment progress (Bhattacharya et al., 2017).

8.50 Businesses can create explicit commitment devices, or implicitly pressure individuals to commit to using their products or services with the intention to generate business value. Some examples of commitment devices created by businesses include:

i. Long-term contracts, or subscription services with autorenewal (Oster and Scott Morton, 2005).

ii. Allowing consumers to set limits for accessing services, such as savings or financial trading accounts, or daily time limits for social media use (Ashraf et al., 2006)

iii. Receiving gifts or offers upfront to elicit reciprocity (Molm, 2010) or the "endowment effect". It includes, for example, providing new gambling customers with free resources (eg starting balance, free "spins") with the expectation that this investment will pay itself back when the consumer continues to use the service. Similarly, restaurants or travel accommodation providers might provide gifts to customers before asking them to post positive reviews. Moreover, consumers have been found to value free products more than comparable options, perceiving free products not only as lower cost, but also as having higher benefits (Shampanier et al., 2007).

iv. Asking consumers for a small request initially with the intention of making a bigger request later, ie "foot-in-door" techniques (Burger, 1999). For example, when consumers visit a retail website, the business can present a pop-up requesting them to enter their email address for a new customer discount. The consumer will then receive personalised marketing materials to this email address, encouraging them to make larger purchases. Businesses might also get consumers to agree to purchase an item at a "low-ball" price, then raise it slightly to take advantage of the initial commitment and the increased likelihood of following compliance (Cialdini et al., 1978).

Effect on consumers and businesses

8.51 Evidence on the effect of commitment devices is often drawn from contexts where they are acting in the interests of consumers. This section describes the available evidence, as the same mechanisms involved can potentially be used in ways that cause harm. Yet, the evidence should be taken cautiously before extrapolating to contexts where they may be used to influence consumers against acting in their interests. Further, several examples cited about commitment devices in this section are not necessarily from online environments.

8.52 Self-commitment devices are generally used to address time inconsistencies of decision making. Consumers tend to prefer short-term benefits to long-term benefits, ie they are *present biased* (O'Donoghue and Rabin, 2015). Combined with limited self-control, present bias can lead to inconsistent decision making over time – consumers prefer their future self to make choices in line with long-term interests, eg going for a run or eating healthily. However, when they reach that point, their preferences may switch to

prioritise short-term benefits. Self-commitment devices aim to address this inconsistency by providing the present self with influence over the future self's decisions.

8.53 Making commitments in public enhances their effectiveness by harnessing social pressure and norms. Consumers tend to value the opinions of their peers and adopt socially normative behaviours (Behavioural Insights Team, 2012; Sun et al., 2019). Then, publicising commitments can act on social pressures to coerce users with their ongoing commitment (Cialdini, 1993). Social identities can also play an important role in encouraging people to make and keep public commitments. They may include a combination of demographic characteristics (eg gender, ethnicity or nationality) as well as transient or psychological characteristics, such as political affiliations and newspaper subscriptions. In cases where consumption choices relate to social identities, consumers tend to choose options that are perceived to be connected with their community's attributes, ie identity-based motivation (Oyserman, 2009a, 2009b). Engaging with online communities may make a specific social identity salient, which in turn motivates individuals to publicly commit to goals that align with that identity. This can be to maintain their membership of a community (Bradford et al., 2017), or to avoid the cognitive dissonance – the psychological cost of inconsistent choices – of not doing so (Festinger, 1957). For example, someone who sees themselves as an "environmentalist" may feel obliged to commit to buying products that align with this identity. Public commitments that are closely tied to a consumer's identity may therefore be particularly powerful.

8.54 There is evidence that suggests self-commitment devices are effective at changing consumption behaviour across a wide range of fields. The majority of evidence generated to date focuses on the positive effects of commitment devices in areas where people are at particular risk of time-inconsistent decision making (ie where short-term benefits are clearly at odds with long-term interests). For example, self-commitment devices have been shown to help consumers to manage and overcome addiction to smoking (Giné et al., 2010), alcohol (Schilbach, 2019), online gaming (Chow, 2011), and gambling (Behavioural Insights Team, 2021b). Self-commitment devices can also support people to adopt environmentally friendly behaviour (Lokhorst et al., 2013), save more for retirement (Ashraf et al., 2006; Thaler and Benartzi, 2004), and improve productivity (Ariely and Wertenbroch, 2002; Marotta and Acquisti, 2017).

8.55 In some situations, however, self-commitment devices can backfire. For example, Savani (2018) found in a randomised field experiment that people who were assigned to a reputational commitment device lost weight at a slower rate than the control group, suggesting commitment beyond a certain

threshold could have an adverse effect, ie “commitment overload”. Further, Frik, Malkin, Harbach, Peer and Egelman (2019) found that although self-commitment devices (such as reminders and commitment nudges) can increase compliance with cyber security’s best practices by 85%, consumers may hold off installing security devices when given the opportunity to do so.

8.56 The evidence on strategies deployed by businesses to facilitate commitments that may not be beneficial for consumers is limited. Below are some examples of specific strategies:

i. Businesses can effectively increase purchase intentions with the use of gifts (Wu et al., 2008), and the case may be especially true for female consumers (Kovacheva et al., 2021). For example, gifts have been found to add to the benefits. In fact, businesses that provide free web services can use reciprocity-based messaging to increase consumer acceptance of targeted online advertising (Schumann et al., 2014). Even when there are non-monetary costs to free offers, such as providing personal information, consumers have been found to be more likely to accept them than non-free offers (Dallas and Morwitz, 2018).

ii. “Foot-in-door” tactics are well studied in laboratory settings, and their effectiveness may vary, depending on the specific procedures used (Burger, 1999). There is some evidence that the technique is effective in traditional brick-and-mortar businesses, eg handing out free samples in stores (Lammers, 1991), but there is limited evidence within context to digital applications.

8.57 While there is limited evidence on the effectiveness of specific strategies aiming to generate habitual use of a product or service, there is growing evidence that the combination of strategies used by social networking sites can lead to addiction (Hofmann et al., 2012; Kuss and Griffiths, 2011).

Harm to Consumers and Competition

8.58 The existing literature in this area has focused on the use of commitment devices to benefit consumers, and is limited in its application to contexts where they can be used to harm consumers and competition. There is some evidence to suggest that consumers may escalate their harmful public commitments to rationalise the high costs they have accumulated (the “sunk cost fallacy”) (Brockner, 1992; Ronay et al., 2017; Staw, 1981) or, to “save face” (Brockner et al., 1981; Sleesman et al., 2012). Identity can also play an important role in making harmful commitments: “in context, self-destructive behaviours can feel identity-congruent just as much as self-constructive ones can” (Oyserman, 2009a, 2009b). However, more evidence will need to be

gathered to explore situations where commitment devices by businesses may pressure consumers to make decisions against their best interests.

Literature on potential remedies

8.59 In certain circumstances, commitment devices can themselves be used as a remedy. The existing research on self-commitment devices in socially beneficial areas, such as savings, addiction and procrastination, as laid out above, offer a blueprint for how devices might be beneficially used in new areas of the online economy. In particular, they can be used as an alternative or complement to nudges. Whereas nudges involve choice architects having to decide or infer what is likely to be best for consumers, self-commitment devices can allow consumers to control their own choice architecture, providing greater autonomy over their reversibility and the preferences they represent (Reijula and Hertwig, 2022). For example, in online privacy, consumers could commit to reviewing their customisation selections in six months time. Similarly, in online gaming, players could commit to pre-specified in-app purchases or playing time limits. There is also evidence that increasing the observability of commitment decisions may serve as a signalling tool and increase uptake of commitment devices (Exley and Naecker, 2017).

Feedback

8.60 Feedback (ie information about consumers' own behaviours and their consequences) can help consumers make better decisions. For example, in their bank account statements, they can receive feedback on how much they spend to improve budgeting. Feedback can vary across several dimensions, including the frequency with which it is provided, its temporal or spatial proximity to the relevant behaviour, the ease with which it can be accessed, and how directly it links to someone's behaviour. Relevant behaviours and outcomes that consumers might receive feedback on may include the time or money spent, usage patterns of a product or service, how they have performed on a task (such as in an online video game) (Siemens et al., 2015) or physical activity (such as step counts and heartbeats) (Lubans et al., 2009). This section focuses on feedback as a means to create pressure on consumers, rather than the content of the specific feedback. It is important to note that, like in the previous section (see ***Commitment***), much of the evidence cited is linked to contexts where choice architects are broadly seeking to support consumers to make beneficial choices.

8.61 DiClemente et al. (2001) identified three basic types of feedback:

i. *Generic feedback*: information that is relevant for a population to which the individual receiving feedback may or may not belong, such as "1 million customers have signed up to our service".

ii. *Targeted feedback*: information that is relevant to a particular population that the individual belongs to, such as "users in your area have 1,000 miles this month".

iii. *Personalised feedback*: information that refers directly to an individual, such as "you have read 30 articles on our website this year".

Effect on consumers and businesses

8.62 Evidence on the effect of feedback is often drawn from contexts where it is acting in the interests of consumers, including reducing over-prescription of antibiotics by GPs (Hallsworth et al., 2016), enhancing educational outcomes (Hattie and Timperley, 2007), and improving mental health (Musiat et al., 2012). This section describes the available evidence, as the same mechanisms involved can potentially be used in ways that cause harm. However, people need to be cautious in applying to evidence to contexts where they may be used to influence consumers against acting in their interests.

8.63 Feedback has been shown to improve consumer decision making and behaviour in a range of domains. For example, feedback can help consumers to budget and adjust their spending to align with their preferences. Van Ittersum et al. (2013) found using a lab study, online experiment and field trial that real-time spending feedback stimulated "budget shoppers" to spend more (by buying more national brands) without breaching their budget and stimulated "nonbudget shoppers" to spend less (by replacing national brands with store brands). In the domain of energy conservation, real-time feedback for specific activities, such as energy and water use during showering, was found to promote conservation behaviour, and to a greater extent than when consumers were provided with aggregate feedback about a broader measure of energy use (Tiefenbeck et al., 2018). In a randomised trial, Jessoe and Rapson (2014) also found that consumers who received real-time feedback on energy usage through smart meters were more sensitive to price increases in terms of adjusting their energy usage.

8.64 Feedback can be particularly effective at addressing problem gambling. Wohl, Davis and Hollingshead (2017) tested the impact of providing personalised behavioural feedback to gamblers about their play and winnings from the previous three months, and found that players who underestimated their losses significantly reduced their play and the amount they lost in the follow-up period. Auer and Griffiths (2014) compared a group of 1,015 online gamblers at a European online gambling site who received personalised feedback from a responsible gambling tool to a matched control group, and found they spent significantly less time and money gambling. Auer, Malischnig and Griffiths (2014) also found data from a real-world gambling environment to suggest that gamblers are more likely to cease playing after seeing pop-up messages giving them feedback that they have played 1,000 games consecutively.

8.65 There is also some evidence that feedback can improve consumer experiences: Siemens et al. (2015) found video game players experience more enjoyment, effort and flow when feedback on progress is shown via building a character. Previous research had shown that introducing "operational transparency" solutions, and giving consumers feedback where they sit in the process, increases their satisfaction with the consumer journey (Gronier and Baudet, 2019) and their perception of waiting time (Bouch et al., 2000).

8.66 Feedback influences consumer behaviour through several psychological mechanisms:

i. *Cognitive capacity and learning*: Feedback can act as a memory aid to augment consumers' limited cognitive resources (including

memory, attention, and processing capacity) that make information about previous behaviours and outcomes inaccessible in daily life (Butler et al., 2008). In this sense, feedback can help to remind consumers of valuable information in light of these constraints. Consumers can also use feedback to learn and generate heuristics to inform future behaviour.

ii. *Budgeting, mental accounting and related biases*: Consumers often use budgeting as a form of spending control (Heath and Soll, 1996). Budgeting is a form of mental accounting, which refers to the way that people treat money as non-fungible, assigning different types of transaction activities to specific mental accounts and how they monitor spending in these accounts against predetermined mental budgets (Thaler, 1999). Feedback on spending can help with budgeting by giving consumers an opportunity to mentally register the amount to be paid and allowing them to track expenses against budgets more efficiently.

iii. *Self-determination and goal-gradient effect*: Self-determination theory highlights the importance of relatedness (connection to others), autonomy and competence in generating intrinsic motivation (Ryan et al., 2006). Feedback can give people a sense of self-determination and therefore generate intrinsic motivation for behaviours by reminding people of actions they have taken and, demonstrating their impact (Siemens et al., 2015). Similarly, giving feedback in combination with setting goals or reference points can take advantage of the goal gradient effect, where people make more effort when they know they are close to reaching a goal (Song et al., 2017). For example, Gronier and Baudet (2019) found in an online experiment that a progress bar displaying the time remaining for an online game to load that slows down over its duration, and therefore seems closer to completion earlier, improved user satisfaction more than those that moved constantly or sped up. These effects are particularly relevant for online and mobile video games, which often use features such as progression systems that provide regular rewards for reaching goals, such as “Battle Passes”, in combination with feedback to encourage players to keep playing (Petrovskaya and Zendle, 2021).

iv. *Social desirability*: The effect of feedback is likely to depend on how the behaviour or outcome at hand is perceived by consumers. When someone perceives a behaviour to be good for their long-term interest or is socially desirable, such as health behaviours or saving money, feedback might prompt them to engage further in those behaviours. For example, Apple’s Screen Time feature, which sends

users weekly reports about time spent on their iPhones, received a mixed response initially – some consumers were shocked and embarrassed by how long they spent on their phones and the apps they used the most (ITV News, 2018).

v. *Social norms*: Feedback, particularly generic and targeted feedback, gives people information about the behaviour of others, which can therefore create social norms and influence behaviour. For example, Hallsworth et al. (2016) gave feedback to GPs whose antibiotic prescribing rates were in the top 20% in their local area, informing them of this fact. This feedback alerted GPs that their behaviour was outside the social norm, which in turn reduced the likelihood that they prescribed in future.

vi. *Personalisation*: Personalisation can help to make feedback more salient. For example, Musiat, Hoffmann and Schmidt (2012) showed that, compared with targeted or generic feedback, personalised feedback is a more effective intervention component for computerised mental health interventions (see ***Personalisation***).

Harm to Consumers and Competition

8.67 The existing literature in this area has focused on the use of feedback to benefit consumers, and is limited in its application to contexts where they can be used to harm consumers and competition. More evidence will need to be gathered to explore situations where feedback from businesses may pressure consumers to make decisions against their best interests.

8.68 Conversely, hiding valuable feedback or providing biased feedback could cause potential harms to consumers and competition. For example:

i. An absence of feedback may lead to over- or underconsumption. As seen above, providing consumers with readily accessible information about the products in their basket and the total price can help consumers to stay within their budget and spend less (van Ittersum et al., 2013).

ii. Businesses may design feedback to influence consumption: for example, Dixon et al. (2010) highlight how gambling businesses can design feedback about game outcomes by making them harder to interpret, such as creating “losses-disguised-as-wins” where the gambler loses money overall but receives positive audio-visual feedback.

Literature on potential remedies

8.69 Where feedback is beneficial for consumers but is not being provided, remedies could potentially involve mandating feedback to be more visible or frequent. For example, to address the overspending and estimation biases provoked by non-cash payment methods such as credit cards, Hernández Escuer et al. (2014) highlight the potential benefits of sending text alerts each time a consumer makes a purchase. Some gaming businesses and technology software businesses have also begun to incorporate feedback elements as part of responsible gambling tools to reduce problem gambling.

8.70 Transparent feedback on inactive subscriptions can also help consumers make informed decisions, particularly as they approach auto-renewal. A recent consultation by the UK's Department for Business, Energy and Industrial Strategy (BEIS) discussed whether businesses should be required, after a reasonably long period of inactivity, to give notice of suspension of service and to stop charging money under the subscription contract (BEIS, 2021). The consultation also discussed potentially requiring businesses to remind consumers before the end of any commitment period that the contract will auto-renew unless cancelled, to help consumers be aware of their ongoing subscription and enable them to cancel on time.

Personalisation

8.71 Personalisation is a process through which information specific to an individual consumer is collected and used to tailor content to them, including search results and pricing. Tam and Ho (2005) describe personalisation as offering the "right content to the right person in the right format at the right time".

8.72 To understand consumers' preferences and to predict behaviour, businesses can leverage different types of online data. They include demographic information, geolocation, purchase history and browsing behaviour, as well as aggregated data across consumers (Castelluccia, 2012). Businesses can use this data to personalise aspects of their interaction with consumers, including which offers are shown or recommended to consumers, how search results are ranked, what promotions are provided and when, what adverts are shown (Competition and Markets Authority, 2020e), and the prices offered (Townley et al., 2017). Personalisation can benefit consumers, such as when tailored product offerings or relevant advertisements reduce search costs and save time (Ezrachi, 2017). At the same time, businesses may also use the data to identify consumers' vulnerabilities and biases that can later be exploited (Calo, 2014).

8.73 With the large amounts of data available on consumers, personalisation has become increasingly common in online advertising (Maslowska et al., 2016). In contextual advertising, for instance, content selection is based on what is currently being viewed online by the consumer. In segmented advertising, content selection is based on known characteristics, eg demographics that the consumer has provided. Further, behavioural advertising is when behaviours are observed over time to develop a consumer profile and provide consumers with advertisements tailored to match their inferred interests (Dwyer, 2009; Yan et al., 2009).

8.74 In digital markets, personalisation is often implemented automatically by artificial intelligence and machine learning algorithms (Zanker et al., 2019). Feedback to these systems can either be explicit (such as asking users to rate recommended products) or implicit (such as analysing purchase history or clickstream data). Depending on the nature of the data collected and how they are combined, businesses may be able to infer new personal data that consumers have not directly revealed (Coen et al., 2016). These algorithms may continuously improve over time, learning from previous personalisation attempts.

Effect on consumers and businesses

8.75 There is evidence that personalisation can influence consumer behaviour, including attracting visual attention (Bang and Wojdynski, 2016), increasing click-through rates (Bleier and Eisenbeiss, 2015), influencing consumer product choices (Tam and Ho, 2005), building brand loyalty (Shanahan et al., 2019), increasing willingness to disclose personal information (Chellappa and Sin, 2005), increasing satisfaction around existing services (Desai, 2016), and increasing purchase intention (Thongpapanl and Ashraf, 2011).

8.76 Personalisation influences consumer behaviour through several psychological mechanisms:

i. ***Salience***. Personalised messages are believed to attract attention and induce more-attentive processing (Hawkins et al., 2008; Liu-Thompkins, 2019). For example, a field experiment by Sahni, Wheeler and Chintagunta (2018) found that adding the recipient's name to a marketing email's subject line increased the probability of them opening it by 20%. Maslowska, Smit and van den Putte (2016) also suggested that personalised messages are more effective when the recipient is aware of the personalisation elements.

ii. ***Credibility and trust***. Personalisation may lessen consumers' advert scepticism and avoidance by increasing the businesses' credibility (if consumers believe they have made extra effort to target them) and creating a sense that they have had previous contact with the business (Baek and Morimoto, 2012). The effectiveness of online personalised advertising is also influenced by how transparently businesses collect data. If consumers believe businesses have collected the data covertly, they are less likely to click through because of stronger feelings of vulnerability (Aguirre et al., 2015). On the other hand, Chellappa and Sin (2005) found that if businesses build trust, they can reduce consumers' privacy concerns and create a positive feedback loop where consumers disclose more information, enabling greater personalisation in the future.

iii. ***Self-perception and social labels***. Where consumers notice that a business has targeted them from their previous behaviour, it can itself act as a social label. Where there is a plausible connection between the label and past behaviour, it can lead consumers to adjust their self-identity towards the label and potentially increase purchase intentions (Summers et al., 2016). Accordingly, Yan et al. (2009) found that behavioural targeting of adverts (based on users' web search and browsing behaviours) improves click-through rates by up to 670% over other types of targeting.

8.77 The more businesses know about their consumers, the more they can create an experience that is closer to the preferences of each consumer. Hence, personalisation can be an attractive strategy for businesses to improve business outcomes by increasing engagement, revenue or user satisfaction (Dias et al., 2008; Garcin et al., 2014; Jannach and Hegelich, 2009; Kaptein and Parvinen, 2015). Personalisation has become a key element of digital competition: for example, Google found that where publishers in the open display market are not able to offer personalised advertising (using third party cookies) but compete against others who can, their revenues fall by around 70% in the short run (Competition and Markets Authority, 2020e).

8.78 Personalisation can also yield benefits for consumers, for example by increasing the likelihood of being shown offers that are of interest to them and reducing search time (Treiblmaier and Pollach, 2007). In digital services, personalisation features, such as recommendation systems, can reduce information overload, facilitate finding new, relevant content and products, and increase user engagement and satisfaction (Domingues et al., 2013; Gomez-Uribe and Hunt, 2016; Häubl and Trifts, 2000; Webster, 2010; Xiao and Benbasat, 2007). There is also some evidence that consumers may be willing to disclose information about their preferences in exchange for benefits, such as convenience (Mazurek and Małagocka, 2019; Robinson, 2018).

Harm to Consumers and Competition

8.79 With advances in technology and a greater number of decisions made in a digital context, businesses can make better use of personalisation to increase the effectiveness of OCA practices (Calo, 2014). With the ability to design every aspect of the interaction with the consumer, businesses can personalise both the choice being nudged toward and the delivery of nudging itself (Mills, 2022). Whereas personalisation can nudge consumers toward choices that align with their preferences (eg by setting smart defaults), consumers could also be nudged away from their interests. For example, once businesses identify consumers' vulnerabilities and biases through multiple online interactions, they may use the information to determine which nudges work best to steer behaviour for their own benefit (Susser et al., 2019a).

8.80 Potential harm from personalisation may be stronger when consumers are in vulnerable states. For example, personalised online shopping recommendations that appear at key points in the consumer journey might increase the pressure to make an impulsive decision, particularly for those who struggle to control impulses (Holkar and Lees, 2020b). An online survey found that approximately 25% of consumers who had recently experienced a

mental health problem reported that seeing online adverts made it more difficult to be on top of their household budget (Holkar and Lees, 2020b).

8.81 Businesses can also personalise features of the consumer experience to steer consumers into decisions that are profitable for businesses. This is likely to be particularly effective when combined with other choice architecture practices, eg personalising the framing or ranking of products (Gomez-Uribe and Hunt, 2016), or the timing and content of prompts and feedback to improve business outcomes (Competition and Markets Authority, 2021a). This type of personalisation might be harmful to consumers where they unfairly prioritise more profitable or expensive products, or where they exploit consumer biases in a way that disadvantages consumers (Susser et al., 2019a). For example, personalisation could reinforce the exclusivity and scarcity of offers by giving different consumers different time-limited offers in order to maximise their effectiveness. Personalisation may also make it harder for consumers to identify when other types of harmful choice architecture are being used (see ***Effectiveness of OCA practices*** on combining multiple practices, beginning paragraph 46).

8.82 Personalisation may also affect competition because there is some evidence that personalisation can lead to consumers engaging less with choices between competitors. For example, Bodoff and Ho (2015) found that personalisation led to consumers sampling fewer products. Similarly, in a large field experiment, Lee and Hosanagar (2019) found that recommendation systems can lead to an overall reduction in the diversity of products sold, and an increase in market share for the most popular products.

8.83 Further, businesses with market power can benefit from a larger pool of customer activity and behaviour data, which can be used to train more effective personalisation algorithms (Geradin and Kuschewsky, 2013). It may, in turn, increase the cost to the consumer of switching to other businesses that do not already have the user's personal information (Chellappa and Sin, 2005). For example, in the CMA's Online Platforms and Digital Advertising market study (2020e), the CMA found that Google sees much more click-and-query data than other search engines, which supports its ability to produce more comprehensive and personalised search results. Although this competitive advantage can manifest in businesses providing a better service or product for consumers, the decrease in competitive pressures can also result in excessive market power.

Literature on potential remedies

8.84 Potential remedies to reduce the harm caused by personalisation can include increasing consumers' control over their privacy and data protection. Privacy policies could be made easier for consumers to engage with, and businesses could be required to give consumers choices around whether to share their information. For example, the CMA's Online Platforms and Digital Advertising market study (2020e) highlights that some social media platforms operate a take-it-or-leave-it model so that users are unable to turn off personalised advertising. The market study therefore suggests a choice requirement remedy, requiring platforms to give consumers the choice not to share their data for personalised advertising. However, transparency and choice may not be sufficient. For example, transparency and choice can result in the "control paradox": individuals who perceive more control over sharing their data pay less attention to that information's actual accessibility, and consequent use, by others (Brandimarte et al., 2012). Some scholars have suggested imposing research ethics on businesses or banning certain behavioural advertising practices (Calo, 2014; Zuiderveen Borgesius, 2015).

8.85 Moreover, to reduce the competitive advantage that businesses with large datasets of consumer behaviour have to personalise and target activities more effectively, remedies could look to "level the playing field". This could involve limiting the ability of businesses with market power to share data between their constituent entities or requiring them to share anonymised consumer data with smaller businesses. Along these lines, as part of the Online Platforms and Digital Advertising Market Study (2020e), the CMA recommended that the Digital Markets Unit (DMU) should have the power to require Google to share click-and-query data with third-party search engines to allow them to improve their search algorithms. The study also highlighted that this remedy could be designed to ensure it did not require transferring personal data, addressing some of the potential privacy concerns. This approach could similarly be used in other areas of personalisation.

9. Cross-cutting topics

9.1 Some topics are cross-cutting and apply to most if not all OCA practices, including:

i. Algorithms and how they interact with the delivery of OCA, eg in the ranking of search results

ii. Privacy and the relevance of OCA to privacy choices, including the use of defaults and data privacy choice screens

iii. Examples of how OCA has been used in different online contexts

iv. Consumer vulnerability and identifying where some consumer groups or consumers in situational contexts may be particularly affected by OCA practices

v. Consumer attention and how it relates to OCA

vi. How the impact of OCA affects and is affected by consumer awareness, learning, and trust

(i) Algorithms

9.2 Algorithms refer to sequences of instructions to perform a computation or to solve a problem. The objective of this section is to discuss how OCA interacts with the use of algorithms, building on the CMA's previous work on algorithms (Competition and Markets Authority, 2021a). Indeed, algorithms have become central to the operations of many large businesses (eg Google's search algorithm and Facebook's News Feed algorithm); even smaller businesses are increasingly using machine learning tools developed by third parties or themselves (Competition and Markets Authority, 2021a). Additionally, businesses' growing ability to compile data on consumer preferences, behaviour and resources enables the opportunity for smart sales algorithms to target consumers with personalised offers (Wagner and Eidenmuller, 2019).

9.3 Many algorithmic systems provide substantial benefits to consumers. People now spend much of their lives online, be it consuming news, socialising, dating, ordering food, or arranging travel. In many contexts the use of algorithmic systems overlays with the use of OCA to the benefit of consumers. Algorithmic systems can provide individualised recommendations including within search results, save people time, and allow them to focus more on what matters to them. Many of the products that enable these activities could not exist without algorithms and the data that powers them. Such optimisation can be beneficial, as it may enhance the quality of products and services for

consumers and allow the company to make effective improvements based on empirical evidence. However, algorithms can also cause harm. (Competition and Markets Authority, 2021a).

9.4 The interaction of OCA and algorithmic systems are a critical area for authorities to understand. The remainder of this section discusses evidence on example areas of OCA and algorithm interactions.

Ranking and positioning of search results

9.5 The ranking and presentation of search results is a key example of the interaction of OCA and use of algorithmic systems (see ***Ranking*** for more details on the impact of ranking as an OCA practice). Ranking and positioning of search results is an OCA lever, but is also fundamentally driven by the algorithms determining which results appear where. The ranking of results can affect consumer click-through rates and conversion rates (the likelihood of a consumer buying a product) (Agarwal, Hosanagar, et al., 2011; Ghose and Yang, 2009; Yang and Ghose, 2010). Ranking algorithms are thus crucial for search engine revenues. Ghose et al. (2014) found that a consumer utility-based ranking mechanism, in the context of a travel search engine, resulted in the highest overall search engine revenue, compared to existing benchmark systems, such as ranking based on price or star ratings.

9.6 The interaction of OCA and algorithms can also cause potential harms. The CMA's previous work on algorithms (Competition and Markets Authority, 2021a) identified unfair ranking and related design of online platforms as the "use of algorithmic systems to modify rankings or other design features to influence what a consumer sees to gain commercial advantage, but that ultimately degrades or misrepresents the offering to the consumer."

Personalisation

9.7 Advances in data and machine learning also allow businesses to personalise interactions with consumers. As discussed above this can be beneficial for consumers (eg timely reminders to prompt them to deliberate), however, there is also the potential for harm.

9.8 Personalisation may enhance the effectiveness of OCA (eg see Dalecke and Karlsen (2020) for a discussion on the design of dynamic digital nudges that are personalised to the users' needs). Academics have also explored how consumer data can be used to personalise both the choice being nudged towards and the method of nudging itself, with opportunities for personalised nudging increasing with greater access to data (Mills, 2022).

9.9 Calo (2014) argued that the combination of personalisation at scale and intense systematisation creates the potential for influence that was previously not feasible. Other work has discussed the potential to target consumers at beneficial times (such as prompting users to leave a rating when they are in a good mood) (McGee, 2020). Willis (2020) further argued that the expansion of machine learning algorithms to optimise business communications and processes for profit can inadvertently lead to deceptive practices.

9.10 There can be various uses of algorithmic systems aimed at personalising the choice architecture of online platforms, such as personalised recommendation systems, which can save consumers' time and effort but, in some circumstances, could result in outcomes that are not in the users' best interests. For example, Banker and Khetani (2019) found across five experiments that consumers frequently depend too much on algorithm-generated recommendations, even when those recommendations are inferior to their own intuitions (see ***Personalisation*** for more details on the impact of personalisation as an OCA practice).

9.11 One specific use of algorithmic personalisation is personalised prices, including personalised offers that use reference pricing. Algorithmic consumer price discrimination refers to the phenomenon where digital retailers use machine learning algorithms to predict the price individual consumers are willing to pay for specific items and offer them different prices accordingly (Townley et al., 2017). The CMA has previously discussed personalised pricing in a range of contexts (Competition and Markets Authority, 2021a). The CMA (2021a) noted that there can be some benefits to personalised pricing, such as reducing consumer search costs, facilitating more precise matches between consumers and products and services, allowing businesses to sell to some consumers at lower prices than would otherwise have been possible, or helping new entrants to compete by offering targeted discounts. However, the CMA (2021a) also noted that there can be potential harms from personalised pricing, particularly where it is complex or lacking transparency, including loss of trust in online markets, or increase in search and transaction costs (arising from consumers trying to avoid the personalised prices they see by shopping around).

Other examples

9.12 Aside from ranking and personalisation, there are other prominent OCA practices that are delivered using algorithms and automated systems. The CMA (Competition and Markets Authority, 2021a) discussed the example of scarcity messages that can be generated by simple algorithmic systems to calculate metrics, such as limited availability of a product. While scarcity

messages can be informative, false or misleading scarcity messages can result in consumer detriment (see ***Scarcity and popularity claims*** for more details on the impact of scarcity messages as a choice architecture tool). Decisions related to bundling of products or services for targeted sales can also rely on algorithmic systems (Tunali et al., 2021) (see ***Bundling*** for more details on the impact of bundling as a choice architecture tool).

(ii) Privacy

9.13 This section discusses evidence on how consumers engage with privacy decisions, and the OCA that surrounds those decisions. Such privacy decisions may impact on the whether a consumer is served personalised advertising and how their activity can be otherwise tracked. This is a non-exhaustive view of the evidence, and to note this is an area of OCA where Information Commissioners (including the UK ICO), governmental bodies, NGOs as well as competition and consumer authorities are all interested parties in rapidly developing the current evidence base. In addition, there are ongoing developments in the online privacy context, for example Apple's 'Intelligent Tracking Protection' and its potential impacts (Competition and Markets Authority, 2021e), which are not covered in this paper.

9.14 Although most consumers report that they care about privacy, there is evidence that they do not always reflect this preference in their behaviour (Norberg et al., 2007; Spiekermann et al., 2001). Businesses are required to provide consumers with privacy policies detailing how they collect and process personal data. However, there is evidence that very few consumers read these policies in practice due to their complexity and length (Bakos et al., 2014). Similarly, the Competition and Markets Authority (2020e) found less than 5% of users access Google or Facebook privacy settings with many not aware of how to change the setting.

9.15 Acquisti et al. (2022) argue that when individuals navigate digital privacy choices, the privacy responses common in the physical world (such as detecting and reacting to the presence of others) can be largely absent or subdued. These responses can even be intentionally manipulated through dark patterns. The authors argue that this may explain the difficulties involved in protecting privacy online as well as the seemingly careless online behaviours of individuals who claim to be concerned about privacy.

9.16 Moreover, with various OCA practices, businesses can potentially reduce the likelihood that consumers' attention is drawn to relevant privacy information: for example, privacy policies often require several clicks through different pages to reach. Utz, Degeling, Fahl, Schaub and Holz (2019) found that businesses placed privacy settings choices most frequently in positions that

generate the lowest levels of interaction. Adjerid et al. (2013) also found in a series of experiments that the way privacy notices are designed – such as whether the notice highlights entities who could view embarrassing disclosures or whether choices are delayed allowing evaluation of the trade-offs – can be used to nudge individuals to disclose greater amounts of information.

9.17 Three online experiments by the Behavioural Insights Team (BIT) and Centre for Data Ethics and Innovation (CDEI) found that varying choice architecture of privacy and personalisation settings can affect users' ability to align choices with preferences as well as their comprehension of consequences and feelings of control (Behavioural Insights Team, 2021a). For example, the study found that simplifying and bundling privacy settings can improve users' ability to adjust settings to match the preferences of a fictional persona and their understanding of consequences, while their feelings of control either improved or did not change.

9.18 Ioannou et al. (2021) conducted a systematic review of empirical studies on privacy nudges for disclosure of personal information in digital environments. The authors identified 78 papers that used four categories of nudge interventions: presentation; information; defaults; and incentives, either individually or in combination. The authors also conducted a meta-analysis (on 54 of these papers with available data), which revealed that interventions aiming to increase the amount of information disclosed were more effective than interventions aiming to decrease the amount disclosed.

9.19 If a business can choose when to prompt consumers for consent, this may influence consumers' responses. Analysis of businesses' considerations for how and when they show users prompts to maximise opt-in rates suggested there is a trade-off between prompting users earlier (which allows businesses to benefit from greater optimisation capabilities) and later (which may increase opt-in rates due to greater user engagement) (Rosenfelder, 2021).

9.20 The CMA has previously examined the choice architecture of online privacy choices. The CMA's market study on Online Platforms and Digital Advertising discussed the importance of choice architecture of data privacy prompts or choice screens and the underlying psychological mechanisms that influence user behaviour (Competition and Markets Authority, 2020e). The CMA also proposed the potential for choice architecture principles, grouped under the name of 'Fairness by Design', to guide the design of privacy choices by digital advertising platforms, and to enhance user awareness and control over their data. These were formed in recommendations to any future Digital Markets Unit.

9.21 Furthermore, the CMA's interim report on its Mobile Ecosystems market study discussed concerns that the specific choice architecture of current data privacy prompts in mobile ecosystems, including framing of information related to the choice, ordering of options, information length and salience of the information provided, could influence users' privacy choices (Competition and Markets Authority, 2021e).

(iii) Examples of how OCA is used by digital businesses

9.22 Digital businesses have created significant value for consumers, who can access a range of valuable services that were not previously available, such as search, video streaming and social media. The data captured by these services also enables products and services to be more personalised, which can provide a better customer experience by reducing friction through automation and serving more relevant advertising (Harris Interactive, 2019). Accessing these services is also often free, despite consumers' willingness to pay up to an estimated multiple thousands of dollars (Brynjolfsson et al., 2019).

9.23 Businesses operating in online and digital contexts are constantly creating OCA. Even if a business is not aware of OCA, they will be creating it in the way they describe changes in their prices, describe the attributes of their products and services, as well as how they provide customer service. In addition, businesses themselves will often interact with the OCA of other businesses, for example when advertising space online or a creating platform for their website. OCA is an ingrained part of any online business, and having OCA in platforms, interfaces, websites and apps is neither inherently good nor bad. It is also the case that some businesses dedicate considerable time and resource into constructing their OCA (Ghosh, 2021), and as described above, this is often beneficial to consumers.

9.24 In this section we look first at some of the specific literature related to how businesses might come to use OCA in potentially harmful ways, and then look at some specific sectoral examples. This section should not be read as suggesting that most businesses are utilising harmful OCA, and as discussed above OCA is often deployed in a beneficial way for consumers. However, there is emerging evidence that manipulative online choice architecture practices are prevalent (Mathur et al., 2019) and effective in ways that would benefit business (Luguri and Strahilevitz, 2021). However, the majority of evidence around the effectiveness of these practices both in benefiting consumers and potentially harming them is likely to be held within businesses (Luguri and Strahilevitz, 2021).

The potential impacts of firms operating in digital markets with an understanding of behavioural biases

9.25 The development of digital markets has expanded the opportunities for businesses to use choice architecture, in ways that may or may not be in the consumers' best interests. The section above on interaction of algorithms and OCA key opportunities discusses some of the new opportunities of operating in digital markets for example to build recommender tools.

9.26 In parallel to these developments, Calo (2014) highlighted the rise of the "mediated consumer" who "approaches the marketplace through technology designed by someone else". Calo (2014) suggested this feature of digital markets enables businesses to:

i. Capture and retain detailed intelligence on interactions with consumers

ii. Design every aspect of the interaction with consumers

iii. Choose when to approach consumers, rather than waiting for the consumer to enter the market.

9.27 Other work has considered the potential of consumer cognitive biases for businesses; including the potential that taking advantage of these biases might be important for staying competitive (Hanson and Kysar, 1999). While digital markets can benefit consumers in many ways as discussed above, such as through providing easier access to products and information, they can also pose several challenges such as more intense and invasive marketing and more impulsive consumption due to a lack of decision points (Danish Competition and Consumer Authority, 2021).

9.28 When competing in the market, research has suggested that it may not always be optimal for businesses to educate consumers on the negative attributes, including OCA (eg drip pricing), of competitors' products and services. Gabaix and Laibson (2006) posited that in a market where businesses often shroud the negative attributes of their products, such as high prices for complementary add-ons (eg the cost of ink for printers), it may not be profitable for businesses to educate consumers about the price of competitors' add-ons. The authors argued that this is because educating customers will teach them how to profitably exploit these schemes, thus making it hard for the educating business to profitably attract the newly educated customer (the "curse of debiasing").

9.29 Intermediaries have an important role in digital markets, but their impact on the OCA around purchasing decisions can be complex. Heidhues and Kőszegi (2018) noted that even if consumers cannot navigate complex market

environments by themselves, they can rely on expert advisors or information intermediaries, such as price comparison websites, for help. However, the authors noted that the effectiveness of such intermediaries can be affected by how businesses react to their presence. For example, Ellison and Ellison (2009) found evidence suggesting that businesses can list low-quality products at low prices on a price search engine to attract consumers, and then try to persuade them to upgrade to a more expensive product by directing them to a webpage that illustrates several ways in which the low-quality product is inferior to other products the company sells (at higher markups).

Examples of digital business sectors and how online choice architecture has been used

9.30 The prevalence of OCA practices described in the above sections suggests that active use of OCA potentially plays an important role in some businesses' digital business models. There is limited existing evidence that systematically links the use of OCA practices to specific business sectors. However, some initial examples of the use of OCA in specific business sectors.

Online retailers, marketplaces and e-commerce platforms

9.31 Retailers are increasingly selling products and services online. This includes traditional products and services such as groceries, clothes, electronics and holiday packages, but also digital products such as software licences, e-books, online courses or mobile applications. Several digital business models have evolved to support businesses to take advantage of this new channel, including online marketplaces that allow individual retailers to list products on a common consumer-facing platform, or e-commerce platforms that provide frameworks and functionality for third-party retailers to sell via the retailers' own websites.

9.32 Online retailers, marketplaces and e-commerce platforms use a variety of OCA practices while designing their user interfaces. These practices can be used to benefit consumers, for example to bring together a much wider set of product and service options in a searchable format by attributes. Opportunities for potentially harmful uses also exist. For example, platforms can use a range of visual techniques to place more profitable items in places where customers are more likely to click on them, such as in the top search results (Craswell et al., 2008). Another example is drip pricing that has been well documented across different sectors, such as airline, hotel, rental car, event ticketing, and financial service industries (Santana et al., 2020). ***Example 4*** below describes how the use of certain OCA practices in the

online hotel booking industry could result in consumer harm, and is directly relevant to retail.

Example 4: Online hotel booking

A CMA investigation, launched in 2017, looked at four practices used by the largest businesses active in the hotel online booking sector in the UK (eg Expedia, Booking.com, Agoda, Hotels.com, ebookers and trivago). They are websites that, on the basis of a user's search, return a list of hotels, rooms and prices and facilitate the user's booking.

The four practices were:

(a) Listing and ranking

(b) Reference pricing and price discounts

(c) Drip pricing and partition pricing

(d) Scarcity claims

The focus of the investigation was on how businesses present information, and whether it is truthful and communicated in a clear and transparent manner, and at what point of the user's online journey the information is provided. For example, the CMA was concerned that reference prices were sometimes misleading, such as when businesses did not use standard rates or the 30-day rule as the reference comparison for price discounts. The 30-day rule means that prices on the date the consumer made the search were compared with a price 15 days on either side of that date.

For online hotel booking platforms, choice architecture practices were used to change the order in which search results for hotels are presented to users. The search results are often presented as a 'recommended' ranking of hotels. The CMA was concerned that some businesses enable hotels to improve visibility of their listings under the default search results by allowing businesses to pay commission. This, alongside other factors such as price, location, star rating and consumer reviews, plays a role in the ranking algorithm. As a result, the default ranking results were never truly 'natural' because they took into account something other than the consumer's search criteria/preferences. In addition to paid commission, businesses in some cases allowed paid placements (closely linked to 'adverts') that were not clearly distinguishable from natural results.

By including these hotels in the default listing and ranking (without clearly explaining to consumers that commissions affected the listing and ranking), some businesses could unfairly benefit and attract greater bookings than otherwise. This

is because consumers may misconstrue paid-for advertisements or promoted hotel listings as if they are recommendations made in the consumers' interest.

In this investigation, the CMA was concerned that users of hotel online booking websites do not change the default ranking, and choose hotels that are listed higher up in the ranking.

The outcome of the investigation was that the online hotel booking businesses provided voluntary undertakings to the CMA in 2019, without admitting liability, and agreed to make a number of changes, most of them related to providing more or better information. For example, hotel online booking businesses agreed to make their popularity and availability messaging more precise, to avoid creating the impression that a hotel was more popular or had worse availability than was actually the case. They also agreed not to show sold out rooms in an artificially inflated position in the ranking and to include all compulsory charges in the headline price.

(source: Competition and Markets Authority, 2017c)

Subscription-based models

9.33 Subscription-based business models charge customers per month or per yearly basis for services or products. Some of these models provide a free trial period after which customers can upgrade to the full paid subscription, while others also provide a permanent free service to users that includes advertising.

9.34 Subscription-based models can be beneficial to consumers. In addition, new business models are developing, for example creatives have connected with consumers through platforms and utilise subscription models to fund content production.

9.35 However, it is also possible to utilise a very wide set of OCA practices harmfully within subscription models including certain forms of defaults and sludge. ***Example 5*** below describes the CMA's investigation into the anti-virus software sector which had an OCA dimension which may harm consumers.

Example 5: Anti-virus software

A CMA consumer law investigation, launched in December 2018, looked into the anti-virus software sector following concerns that some businesses in the industry may not be complying with consumer law. The investigation examined whether the

business practices and terms and conditions associated with the automatic renewal of subscriptions were fair.

In particular, the investigation considered:

- whether automatic renewal was set as the default option;
- whether notification of renewal was sent and, if so, the timing of the notification; and
- when renewal payments were taken and whether the renewed subscriptions were charged at a different price to the original subscription.

Relevant OCA elements included the content of reminders that were given to consumers and whether it was easy for consumers to exit their subscriptions. In addition, it was considered if the relevant information about the obligations and risks relating to automatic renewal was adequately provided at the critical decision points, such as when consumers were deciding whether to purchase the anti-virus product subscription.

Following CMA action, the CMA accepted undertakings in 2021 from leading anti-virus software providers McAfee and Norton. As a result, while not admitting liability, both businesses agreed to implement changes designed to make their automatically renewing contracts easier to understand and exit, including:

- giving consumers whose contract has auto-renewed for another year an ongoing right to exit the contract and obtain a pro-rata refund of the amount they have been charged, after their existing refund window has expired
- making refunds available through a simple and easy-to-use automated system;
- ensuring consumers are made aware, upfront, that their contract will auto-renew, the price they will be charged for the product upon automatic renewal and when the money will be taken; and
- where the price will be higher on auto-renewal, not giving the impression that the initial price represents a saving by comparison.

(source: Competition and Markets Authority, 2018b)

The CMA also published new Compliance Principles (Competition and Markets Authority, 2021d) for anti-virus software businesses that use automatically renewing contracts with consumers in the UK to help them comply with consumer law.

In-game purchases (eg mobile games, online competitive games)

9.36 Console, computer and mobile games have historically followed a traditional product business model in which consumers can buy a game at a given price. In recent years, the business model for some of the most popular games has

shifted to be free-to-play (F2P), and monetised either through in-game advertising (eg showing banner adverts or video adverts between levels), or in-game purchases (eg stronger items, new playable characters, often via loot boxes [randomised rewards such as items or expendables], in-game currencies or season passes). This allows consumers to play a game free of charge, with the option to pay to enhance their gaming experience. Games accounted for 71% of total app revenue in 2020, remaining the primary source of app store revenue generation for both iOS and Android. iOS generated $47.6 billion revenue in 2020, while Google Play made $31.9 billion (Iqbal, 2022).

9.37 Zendle et al. (2020) explored the growth of microtransactional business models (ie offering gamers the ability to buy items, bonuses or services within the game) in desktop games. They observed a substantial growth in exposure to cosmetic microtransactions (purely aesthetic purchases with no in-game advantage) and loot boxes, while pay-to-win microtransactions (purchases that provide in-game advantage) did not grow similarly. Other variations of F2P business model, such as in-game advertisements, may also be used to generate revenue. However, Hofacker et al. (2016) showed that the intrusive nature of mobile advertisement may disrupt the narrative experience of F2P games and make the game less appealing to consumers, which potentially makes this a less profitable revenue strategy for developers.

9.38 Online game developers can use OCA practices to attract attention and encouraging people to download F2P games. Further, Petrovskaya and Zendle (2021) argued that businesses that depend on in-game purchases may have an extra incentive to influence consumers' purchasing decisions using OCA to maximise their revenue.

9.39 The literature suggests there is a complex interrelationship between game enjoyment and in-game purchases. In a study, Hamari's (2015) empirical analysis used survey responses from 2,791 participants from three different game types, finding that perceived enjoyment of the core service (the free part of the service) was statistically significant and negatively associated with purchasing intentions. These findings suggest that consumers may be less likely to consider purchasing in-game items when they already enjoy the F2P game. Other findings from research, suggest it is likely to incentivise consumers to make in-game purchases if they believe they will enjoy the game more without these inconveniences (Guo and Barnes, 2011; Hamari, 2015).

9.40 The literature also suggests that businesses may create virtual goods that degrade over time, have limited usage, or have an expiry date. This maintains demand for virtual goods and, as such, the artificial currency needed to

purchase them (Hamari and Lehdonvirta, 2010). Contrived durability or planned obsolescence enables firms to control when an item may cease to exist or function. This gives firms the ability to artificially increase the number of microtransactions consumers may feel they need to make to optimise their enjoyment of a game.

9.41 Another example of an OCA practice used in online games is virtual currency. As discussed more broadly above (see ***Virtual currencies in gaming***), virtual currency can make it harder for consumers to track their transactions (Hsee et al., 2003). Further, games can also employ feedback (eg progress bars) to encourage players to reach the next level or using time-limited rewards (such as character skins or items) (Zendle et al., 2019). ***Example 6*** below describes CMA's investigation into the children's online and app-based games market that looked at the use of potentially harmful OCA practices in this market.

Example 6: Children's online games

A CMA investigation, between 2013 to 2015, monitored the children's online and app-based games market. This followed an OFT investigation of the ways in which online and app-based games encourage children to make in-game purchases. It investigated whether there was general market compliance with consumer protection law, and explored whether online and app-based games included commercial practices that might be considered misleading, aggressive, or otherwise unfair under that legislation. The main focus of this case was on freemium games, which can be played online or downloaded for free, but incorporate the ability to make in-game purchases for advanced features or functionality, such as additional levels, in-game currency or the ability to speed up the game's progress. These games often appealed to children, who are likely to be more susceptible to harm from OCA practices because the pricing practices identified (eg the potential that children may not be aware that buying virtual items within game play involves real money) exploit the inexperience and vulnerability of children.

The OCA dimension of this market was of interest to the CMA, particularly in its pricing structures and how this affected children's purchasing behaviour. The initial appeal of a free game or download may be misleading if, after free download or access, players are later presented with in-app purchases, especially if these purchases are required to be able to play the game in its entirety (rather than simply to enhance gameplay). These in-app purchases are designed to appear highly desirable to users and have similarities to drip pricing – additional fees are not presented to the consumer at the same time as the product price, but 'drip' through the buying process, and therefore consumers are unable to compare accordingly. Furthermore, this also takes advantage of users' commitment to a game that may influence behaviour in making in-app purchases. Children may be confronted with extra costs only after they have spent a significant amount of time and effort within the game, making them more likely to buy virtual items.

The OFT had published a set of principles for online and in-app games that aimed to help game designers and platforms better comply with their legal obligations. The principles emphasised that consumers should be told upfront about costs associated with a game or about in-game advertising, and any important information such as whether their personal data is to be shared with other parties for marketing purposes. The principles also make clear that in-game payments are not authorised, and should not be taken, unless the payment account holder, such as a parent, has given their express, informed consent.

The concerns articulated in the principles were:

- a lack of transparent, accurate and clear upfront information relating, eg to costs, and other information material to a consumer's decision about whether to play, download or sign up to a game;
- misleading commercial practices, including failing to differentiate clearly between commercial messages and gameplay, and between the requirement to spend real money rather than in-game currency;
- exploiting children's inexperience, vulnerability and credulity, including by aggressive commercial practices;
- including direct exhortations to children to buy advertised products or persuade their parents or other adults to buy advertised products for them; and
- payments taken from account holders without their knowledge, express authorisation or informed consent.

The CMA also published guidance for parents to ensure children are not pressured to make in-app purchases, and to reduce the risk of their making unauthorised payments such as checking “payment options” settings on devices. Working with others in the international community, the CMA helped to secure changes to app stores to give parents better control over the in-app purchases that children may want to make.

(source: Competition and Markets Authority, 2015a)

(iv) Consumer vulnerability

9.42 Some online choice architecture practices can disproportionately affect vulnerable consumers, who may be particularly susceptible or exposed to certain practices. For instance, people in lower socio-economic groups (measured by educational qualifications or income) are more likely to display behavioural biases, such as loss aversion and present bias (Lunn and Lyons, 2010), making them more vulnerable to harmful OCA. Furthermore, Sunstein (2020) noted that sludges (ie excessive or unjustified friction in the decision-making process) can impose psychological costs, such as frustration, stigma or humiliation, which could be exacerbated in vulnerable individuals who are poor, elderly or disabled.

9.43 When transacting online, *all* consumers can be vulnerable because of the efficient, task-focused, and habitual way in which they interact with online material, and due to the (cultural) perception that digital interfaces (machines) are neutral and without agency (Willis, 2020). Thus, while considering vulnerable consumers in digital markets, it should be recognised that *all* consumers are at risk of being vulnerable to harmful OCA (Konsumentverket, 2021). For example, Konsumentverket (2021) noted that consumers can be contextually vulnerable*,* perhaps because of a long shift at work or the physical environment where the individual is, which can create opportunities for harmful OCA.

9.44 Nadler and McGuigan (2018) argued that digital marketers seek inspiration from behavioural economics research, such as understanding of behavioural biases and real-world A/B testing of choice architecture practices, to decide how to design their online interfaces to optimally activate consumers' cognitive biases. Furthermore, Nadler and McGuigan (2018) noted that such behavioural experiments help not just to identify the different cognitive biases, but also to potentially identify specific individuals who are most prone to certain biases or specific contexts that maximise consumers' vulnerability to such biases. Calo (2014) also acknowledged that in digital markets, businesses can exploit vulnerability in consumers, thus highlighting the necessity for regulatory intervention. For example, digital price discrimination can use consumers' personal characteristics to differentiate pricing and marketing conditions, thus making them potentially vulnerable to misleading claims about product price, availability and conditions (Helberger et al., 2021).

9.45 Consumers may also be temporarily vulnerable on situational factors. The FCA (Financial Conduct Authority, 2021a) offered a broad definition of a vulnerable consumer as "someone who, due to personal circumstance, is especially susceptible to harm, particularly when a firm is not acting with appropriate levels of care". As explained by the FCA, these personal

circumstances can include health conditions, significant life events, resilience, and consumer capabilities, such as literacy or digital skills.

9.46 The rest of this section explores the impact of online choice architecture practices on two groups: (i) people with personal characteristics-based vulnerability; and (ii) people with context-dependent vulnerability. This categorisation is in the spirit of CMA's (Competition and Markets Authority, 2019b) distinction between two broad categories of consumer vulnerability: (i) vulnerability associated with personal characteristics; and (ii) market-specific vulnerability.

Personal characteristics-based vulnerability

Mental Health

9.47 Individuals with mental health problems can be at a higher risk of damage to their finances and their mental health from harmful online choice architecture practices, including design and management of online shops, gambling websites and social media (Holkar et al., 2021). A nationally representative survey in the UK found that individuals with mental health problems are three times more likely than the rest of the population to have fallen for an online scam, particularly during the pandemic (Holkar and Lees, 2020a). Online gambling can also be disproportionately more harmful for individuals with mental health conditions. The choice architecture of online gambling platforms (such as ease of access, minimal friction when making bets and deposits, games designed to nudge continued play through time pressures and offers mid-game) when interacted with certain common symptoms of mental health problems, such as impulsivity and lower problem-solving ability, can make it difficult for individuals to stay in control (Holkar and Lees, 2020c).

9.48 Further, Holkar and Lees (2020b) observed that people with mental health issues, particularly those experiencing low mood, greater impulsivity or less cognitive ability, can find it difficult to control spending while shopping online. These difficulties can be affected by choice architecture practices that minimise friction, such as by encouraging customers to save payment details, enabling purchases through one click, or offering buy now pay later options, employing pressure tactics, such as limited stock messages and timers, and personalising the shopping experience through recommendations and adverts for online shopping.

Age

9.49 Consumers can be at risk of harm from online choice architecture practices because of their age. Children and teenagers often spend time on gaming and

social networking apps that are free-to-play (ie with no cost for initial download and use), given their limited spending powers (Fitton and Read, 2019). A qualitative study with teenage participants by Fitton and Read (2019) observed the presence of various dark patterns in the design of such apps, including what the authors labelled as an "inappropriate" category of dark patterns, which are particularly concerning for younger users. Examples of such inappropriate dark patterns include advertisements unsuitable given the users' age (eg dating sites) and psychological manipulation to encourage users to purchase in-app content (eg providing insulting remarks through in-game narration or other characters if content was not purchased). Further, a report published by the 5Rights Foundation noted that persuasive design features used by platforms to hold users' attention (eg reward features, pop-ups or locked screen messages, auto-play) can be especially harmful to children, resulting in anxiety, sleep deprivation, and harm to educational outcomes, health and wellbeing (Kidron et al., 2018).

9.50 Older consumers can also be at risk of harm in online markets. Some older consumers can face difficulty in engaging in modern markets because of limited digital capabilities or digital exclusion (Competition and Markets Authority, 2019b). Some older consumers can also face different forms of cognitive impairment, such as dementia, making them more vulnerable (Competition and Markets Authority, 2019b). Further, physical infirmity with old age could increase reliance on online services, and increase risk of exposure to harmful online choice architecture practices.

9.51 Older consumers who may be lonely are more susceptible to scams, which could include misleading online financial promotions (Financial Conduct Authority, 2021b). Additionally, a Citizens Advice survey (Citizens Advice, 2016) found that women aged 50 to 64 years are most susceptible to subscription traps (a growing concern with online shopping), which offer health- and beauty-related products.

Education

9.52 Educational qualifications can provide another dimension of consumer vulnerability in online markets. In an experimental study on a nationally representative sample of American participants, Luguri and Strahilevitz (2021) observed that less-educated individuals in their sample were significantly more vulnerable to dark patterns, with the result being particularly pronounced for subtler dark patterns. People with lower educational qualifications can also be more likely to display present bias and loss aversion (Lunn and Lyons, 2010), possibly exposing them to greater risk of harm from online platforms exploiting such biases, eg drip pricing practices that rely on loss aversion.

However, for loss aversion, there is also research finding a positive correlation between loss aversion and cognitive ability (Chapman et al., 2018; Stango and Zinman, 2021a).

Income and financial resilience

9.53 Consumers with low income can face more barriers to engagement in markets because of constrained finances, limited access to enabling products, such as the internet, and correlation with other vulnerabilities, such as mental health issues and low educational levels (Competition and Markets Authority, 2019b). A survey found that consumers with low income are more likely to report that they did not shop around for better deals relative to consumers earning higher incomes (The Money Advice Service, 2018), potentially exposing low-income consumers to greater harm from online choice architecture practices, such as reference pricing, which can deter the tendency to shop around (Office of Fair Trading, 2010). There is also research indicating that consumers in low-income households pay more than higher income households for the same essential goods and services (ie a "poverty premium") (Corfe and Keohane, 2018; Davies et al., 2016). This means that the impact of harm, such as financial loss, from practices that cause consumers to spend more could be greater among low-income consumers.

9.54 This list of personal characteristics (discussed above) is by no means exhaustive. Further, consumers could also be in a vulnerable situation because of a combination of personal characteristics, possibly enhancing the risk of harm from online choice architecture. For instance, older people experiencing cognitive decline (ie "cognitive ageing") may face difficulties in processing information and making complex decisions (McLoughlin and Stern, 2017), and may therefore be particularly vulnerable to or affected by OCA practices such as complexification of language or defaults.

Context-dependent vulnerability

9.55 Owing to the nature of digital markets, where consumers make choices at any time of the day and in any physical environment, it is instructive to consider the context in which decisions are made. Changing personal circumstances and major life events, such as bereavement or divorce, can leave consumers vulnerable.

9.56 OCA practices may be used to target people at key moments when they are most susceptible. For example, some authors have noted the context-based use of OCA by Uber. In 2017, Uber acknowledged having a "route-based pricing" policy whereby it calculates passengers' willingness to pay for specific routes at specific times of the day and charges accordingly (Mahdawi, 2018).

9.57 There are other examples of temporal moments of vulnerability. For example, an article in The Atlantic described a study claiming that women feel least attractive on Mondays (Rosen, 2013). Thus, during what they term as “prime vulnerability moments” on Mondays, they recommended framing beauty product advertisements as messages of encouragement, followed by a marketing strategy revolving around empowerment on Thursdays, when women purportedly feel their best.

9.58 Moreover, Konsumentverket (2021) noted that contextual factors, such as time pressure, and psychological elements, such as mood changes and stress caused by external factors, can also make consumers temporarily vulnerable to harmful online choice architecture practices for a certain period of time. Extensive data collection practices enable online platforms to learn more about consumers’ contextual vulnerabilities so that their direct targeted marketing is based on the consumer’s present state. Calo (2014) argued that digital market manipulation recognises that vulnerability can be contextual, and thus businesses can target consumers when they are most vulnerable, such as being exposed to a scarcity message from a trusted source after a long workday, or after having made several other decisions earlier in the day. Because online platforms are accessible (and often accessed) at all times of the day vulnerability to OCA practices may be more likely. For instance, impulsive behaviour, which is a common symptom of several mental health conditions, can be exacerbated for online shoppers at night (Holkar and Lees, 2020b).

9.59 Furthermore, certain major life events, such as marriage or divorce, can induce time scarcity or temporary emotional states (Nadler and McGuigan, 2018), which can make individuals temporarily vulnerable to harmful online choice architecture practices. A scarcity mindset (ie the experience of insufficient resources such as time, money or food) (Mullainathan and Shafir, 2013), can affect consumer decision making (Huijsmans et al., 2019). Scarcity can alter how people allocate their attention, resulting in greater engagement in decision problem where scarcity is most salient and attentional neglect of other matters (Shah et al., 2012). There is research suggesting that the burdens of financial scarcity can impose cognitive load and affect cognitive functions (Kaur et al., 2021; Lichand and Mani, 2020; Mani et al., 2020; Ong et al., 2019). Thus, a scarcity mindset can hinder a consumer’s decision-making process, leaving them more vulnerable to a variety of online choice architecture practices, including messages about scarce stocks and time-limited offers.

Heterogeneity in susceptibility to behavioural biases

9.60 In addition to the discussion on the two broad categories of consumer vulnerability (above), it is also worth noting that there can be heterogeneity in consumers' susceptibility to different behavioural biases (ie some consumers are more likely to be affected by a certain bias than others). This would imply that individuals who are more susceptible to a behavioural bias could be more vulnerable to certain OCA practices. Stango and Zinman (2021b) found that most individuals exhibit multiple biases, with substantial heterogeneity across individuals in the number of biases displayed, even within similar demographic groups. For example, they observed that there is more bias variation within the highest education group than between the highest and the lowest education groups.

9.61 Stango and Zinman (2021b) showed that cross-consumer heterogeneity in biases is poorly explained by a list of other consumer characteristics, including classical decision inputs, demographics, and measures of survey effort (constructed using survey response time). However, they found some important correlations between biases and classical inputs. For example, they observed that cognitive skills are strongly negatively correlated with most biases, but positively correlated with loss aversion and ambiguity aversion. Other examples were the links between patience and present bias, risk aversion and aversion to uncertainty and losses, and risk aversion and math biases that can lead to undervaluation of returns to risk-taking. Later work that used the same methods three years apart (eg repeated elicitations) showed that biases tend to be stable within individuals over time (Stango and Zinman, 2021a).

Potential remedies

9.62 What can be done to protect vulnerable consumers from harmful OCA practices? The list below explores some potential interventions that could improve outcomes for vulnerable consumers in digital markets. These remedies have been suggested by other regulators or researchers. CMA noted that the appropriateness of a remedy will depend upon the circumstances of the case at hand; the list below does not represent the CMA's view about which remedies are appropriate. This is in addition to the discussion on the design of potential remedies set out in CMA's report on Consumer Vulnerability (Competition and Markets Authority, 2019b).

i. The FCA's Guidance for firms on the fair treatment of vulnerable customers (Financial Conduct Authority, 2021a) suggested that businesses could develop an internal vulnerability policy by compiling information about the likely vulnerabilities faced by their customers.

The FCA suggested that formalising this information in a policy can help raise awareness throughout the business. The FCA recommended that businesses can use market research, such as survey or focus groups, or use existing research by the third sector, trade bodies and regulators, to improve their understanding of the risks of harm for vulnerable consumes, or how to make it easier for vulnerable consumers to share information about their needs with the business.

ii. Providing consumers with more controls they can engage with when they are feeling less vulnerable, such as ability to opt out of seeing advertising for certain products or services and adjusting settings to disable scarcity messages, while ensuring these controls are readily available, can be useful (Holkar et al., 2021).

iii. Regular evaluation of outcomes for vulnerable groups can help identify when current defaults are proving to be ineffective in reducing consumer harm (Holkar et al., 2021).

iv. Holkar and Lees (2020b) recommended online shopping platforms add more friction to the purchase process to give consumers more time to consider their purchases, and to help them keep track of their spending.

(v) Consumer attention

9.63 Datta and Mullainathan (2014) suggested that attention is a central “mental constraint” that serves as one the starting points for OCA interventions.

9.64 The visual system can shape consumers’ decisions long before the options are actively considered, often meaning that people can develop judgments in fractions of seconds from their first impressions (Sela, 2019). Thus, with “the mechanics of sight preceding the deliberations of the mind” (Benartzi and Lehrer, 2015), where attention is drawn to is key. Attention itself can be defined as selectivity in perception, and is the mechanism by which information in the environment is selected for further processing (Hutchinson and Turk-Browne, 2012). Directing cognitive processing or working memory towards a sensory input or directing overt visual attention to a specific stimulus can precede decision making and choice selection, and is therefore highly valuable to businesses (van Knippenberg et al., 2015). This similarly follows Kahneman’s (2011) outline of System 1 vs. System 2 thinking.

9.65 There are two broad categories of stimuli that contribute to the capture of visual attention: bottom-up factors in the stimulus, and top-down factors in the person. These are commonly defined as stimulus-driven and goal-driven attention respectively (Orquin and Mueller Loose, 2013), with bottom-up processing being related to ‘where’ information is located, and top-down processing to ‘what’ the information is (Itti and Koch, 2001). The contents of working memory are heavily influenced by goal-directed attention processes; however, stimulus-driven attention processes can also work to capture or reorient attention (Hutchinson and Turk-Browne, 2012).

9.66 Direction of attention has become increasingly important in the digital age because it has resulted in a shift towards a supply of information that is both easily accessible and abundant. This can become constricting because, while human decision-making performance does improve with increasing amounts of information, it is limited to a certain saturation point. Beyond this point, further information exposure causes a rapid degradation in capability (Eppler and Mengis, 2008), with consumers becoming overwhelmed and resulting in ‘information overload’.

9.67 The disproportionate relationship between an ever-increasing sphere of information and diminution of attention time due to the incline in the number of things that compete to capture people’s attention has led to today’s world being dubbed an “attention economy” (Davenport and Beck, 2001; Goldhaber, 2006). Herbert Simon describes it this way: “In an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes (Simon, 1969 pp. 40-41). What

information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it". This has meant that human attention is considered a scarce and competed-for commodity; the economy revolves around "attention transactions", which businesses attempt to initiate and maintain in order to counteract consumers' limited receptiveness to information.

9.68 Attention may be valued, not just because it is scarce, but because of its ability to influence preferences and decision making. For example, many studies have found that manipulating visual attention can bias simple choices. Armel and Rangel (2008) demonstrated that higher visual attention increases the likelihood of choice: manipulating subjects to spend more time fixating on items made them up to 11% more likely to be chosen in their experiment. Consequently, many of the common features of online choice architecture are designed to combine this attention-capture and ease of use; with likes, notifications, and gamification techniques increasingly used to increase salience (driven by 'bottom-up' attention) and motivation (driven by 'top-down' attention) (Adams and Smart, 2017), and thus to enhance or simplify decision making.

9.69 Consistent with bounded rationality theory, heuristics can shape patterns of attention. For example, various placement biases can cause the user's visual system to attend to various items. Popular effects include the primacy effect and the recency effect (serial position effects) where people tend to remember the first and/or last items presented in a series (Münscher et al., 2016). Reutskaja et al. (2011) found a visual bias where participants were much more likely to choose the option presented in the middle of the screen, even when it was not their stated preference.

9.70 Individuals also tend to read in an F-shaped pattern. For example, the Nielsen Norman Group measured how consumers allocate their attention on the Google Search results page (Nielsen, 2006). This study found a clear F-shaped scan pattern on the Google search results page where consumers devote far more attention to content on the left side of the search results page than to content on the right side of the page. While this is arguably not entirely representative because this finding is theorised to be constrained to western language pattern reading habits (or to languages that read from left to right) (van der Wagt, 2021), it demonstrates ways in which businesses are able to take advantage of the effect of placement biases upon attention and to drive decision making. It is worth noting here that depending on cultural reading habits (ie left-to-right readers vs. right-to-left readers), consumers' online

experiences and their attention towards online choice architecture practices may vary.

9.71 OCA practices that draw consumer attention can be a cause for concern when they foster excessive and potentially harmful usage. Costa and Halpern (2019) noted that many of the most common features of OCA are built to combine ease of use and attention capture: for example likes or retweets capture attention and prompt frequent rechecking, bottomless pages encourage users to keep scrolling, and swipes and streaks can make browsing appear like a game. This all facilitates greater use of services, removing breaks that might otherwise prompt a natural end to the task and that allow consumers' attention to shift elsewhere (Costa and Halpern, 2019).

9.72 Moreover, the increase of information saturation has been shown to promote cursory reading, distracted thinking, superficial learning, and an overemphasis on the immediate, reducing consumers' capacity for sustained critical thinking, and leading to overall suboptimal decision making (Brown and Beruvides, 2020). This can push users to select the easiest available choice in order to mitigate the competing claims on their attention at the expense of the user's best interests (eg dark nudges: Mathur et al., 2021). A common example of this is an easy method for users to accept long terms and conditions that may hide potentially manipulative policies.

9.73 OCA that works in the general interests of consumers can help them to make better decisions that require less working memory capacity and reduce the cognitive load. For instance, this might be through systems that show genuinely appealing options to consumers, or default buttons that represent the most common choice. Other arguments suggest nudging enables people to devote their limited attention spans to the most important concerns through choice architecture algorithms and digital paternalism – narrowing focus and highlighting the salience of a desired option to inspire positive action (Brown, 2018). An example of this would be encouraging ethical decision making by bringing to a user's attention the number of individuals who perform beneficial actions (Cooper et al., 2008). Also, a Danish Competition and Consumer Authority lab experiment demonstrated that consumers in an online shopping environment notice terms and conditions more and use them more actively in their purchases when they are presented in an upfront and simplified format (Danish Competition and Consumer Authority, 2018).

9.74 On the other hand, introducing 'desirable difficulties', such as friction, can also be crucial in slowing down and encouraging informed decision making, and has been shown to improve later memory retention (Bjork and Bjork, 1992) and motivation to continue (Shirzad, 2009). A much-cited desirable difficulty is

the spacing effect (Gaspelin et al., 2013) where participants are more likely to recall items when retrieval is spaced out in time.

(vi) The impact of consumer awareness, learning and trust

9.75 In addition to consumers' attention, other concepts such as awareness, learning and trust have been identified to *mediat*e the effect of OCA practices by the business on the consumer. This section describes the role of these variables in decision making and consumers' susceptibility to OCA practices.

Awareness

9.76 This subsection discusses the impact of consumer awareness of OCA practices on their behaviour. It should be noted that the existing literature in this area has focused on the uses of choice architecture tools to benefit consumers, and is limited in its application to contexts where they can be used to harm consumers.

9.77 Most consumers are unlikely to be aware of the influence of OCA practices in their decision making (di Geronimo et al., 2020; Smith et al., 2013), with many often believing that their decision making is generally rational (Hill, 2019). Moreover, many who are being nudged are unlikely to notice the presence of a nudge (Hunter et al., 2018; van Gestel et al., 2020).

9.78 However, some studies also suggested that making consumers aware that they are being nudged may not reduce the effectiveness of OCA practices. For example, Bang et al. (2020) investigated whether verbally disclosing to decision-makers that a particular choice architecture technique is in place reduces its effectiveness. In this study, researchers used three common choice architecture practices, including framing and defaults, and found that disclosure of their use did not reduce their influence on decision making. Study participants also perceived the effectiveness of choice architecture practices to be higher for others than for themselves, suggesting overconfidence about their ability to avoid being influenced. Another study by LeBoeuf and Shafir (2003) found that inducing reflection does not make people less susceptible to framing effects. Other examples include Kroese et al. (2016), who found that disclosure of a nudge aiming to promote healthy food choices did not affect its effectiveness, and Bruns et al. (2018), who found that transparency did not affect the effectiveness of a default-based nudge to promote pro-environmental behaviour.

9.79 Transparency of choice architecture techniques was further investigated by Loewenstein et al. (2015), who assessed whether informing people about the presence of default options to steer decisions about a hypothetical advance

medical directive weakened the impact of the defaults. The authors found that individuals were susceptible to the impact of the defaults, even when they were made aware of its presence, either before making the choice or after and then giving them the opportunity to revise their decision. This finding led authors to conclude that "such defaults can be transparently implemented, addressing the concerns of many ethicists without losing defaults' effectiveness" (Loewenstein et al., 2015).

9.80 Furthermore, other studies have shown that proactive transparency may actually enhance the effectiveness of choice architecture practices, perhaps by decreasing consumers' perception of being deceived (Paunov et al., 2019). For example, one study found that the effect of a nudge was even greater when its presence and purpose were revealed, with twice as many participants sticking with the default, a pre-selected option (Paunov et al., 2019). The authors attribute this finding to participants feeling potentially less deceived due to the disclosure. This is further supported by Steffel et al. (2016), who found that disclosure of a default-based nudge can enhance consumers' perceptions of ethicality and attitudes toward the default-setter. Steffel et al. (2016) argued that disclosure alone may not counter default effects because consumers are unaware of the mechanism through which defaults impact behaviour. They suggested that disclosure should be combined with interventions that target the processes underlying defaults to offer effective protection.

9.81 It is worth noting here that for consumer awareness of potentially harmful OCA practices, a transparent choice architecture approach may not be favoured by businesses. Gabaix and Laibson (2006) argued that it may not be profitable for businesses to educate consumers about the negative attributes of a competitor's add-on schemes because educating customers will teach them how to profitably exploit such schemes. For example, there has been substantial work by the CMA and others on the "loyalty penalty", whereby long-term, inert consumers can end up paying significantly more than new customers, subsidising sophisticated consumers who switch away to better deals (Competition and Markets Authority, 2018a).

9.82 Businesses might also be less inclined to disclose their OCA practices for fear of negative customer reaction. Luguri and Strahilevitz (2021) posited that companies may experience consumer backlash when they use dark patterns. In fact, in an experimental study where the subjects were exposed to dark patterns, Luguri and Strahilevitz (2021) found that exposure to aggressive dark patterns lead to a strong backlash from consumers while mild dark patterns did not. Additionally, Karabas et al. (2021) found that customer awareness of deceptive online review practices used by e-retailers led to less-favourable product attitudes and fewer purchase intentions.

9.83 Moreover, disclosure of OCA practices can also backfire, resulting in concerns such as information overload from long and complex information (see Financial Conduct Authority, 2015; Persson, 2018). Information disclosure can also make consumers more trusting and potentially less vigilant (de Meza et al., 2021), or cause consumers to switch off and avoid engaging in the market altogether (Mullett et al., 2018). The Australian Securities and Investments Commission (ASIC) and the Netherlands Authority for the Financial Markets (AFM) (2019) jointly discussed why disclosure and warnings may not be effective in changing consumer behaviour, and argued that disclosure can sometimes place a heavy burden on consumers, such as overcoming complexity and sophisticated sales strategies.

Learning

9.84 This subsection attempts to explore whether learning from experience, repeated exposure, or education can enable consumers to protect themselves against manipulative online choice architecture practices.

9.85 Di Geronimo et al. (2020) explored dark pattern recognition on mobile applications and found that, while most users did not spontaneously recognise dark patterns, recognition improved if they were initially informed about the issue of manipulative practices. Alan et al. (2018) found that even when consumers' attention is brought to messaging that mentions add-ons, such as overdraft costs and availability, there is no durable effect of learning. They found that consumers tended to react strongly but temporarily when their attention was drawn to add-ons, with changes in behaviour not persisting once the messages were stopped.

9.86 Sasaki et al. (2021) explored the impact of repeated exposure to a nudge. The authors examined the effectiveness of different nudge-based messages in influencing self-reported preventive behaviours to control the spread of COVID-19, particularly focusing on the impact of repeated displays over time. The authors found a positive behavioural effect of gain-framed altruistic messages; however, the behavioural effect disappeared in later waves of the study, although impact on intention to comply persisted. This finding suggests that repeated exposure to information nudges may not lead to persistent behavioural impact.

9.87 Further, evidence suggests that interventions aiming to educate consumers may not always have strong effects. For example, a meta-analysis of 168 papers covering 201 prior studies found that interventions to increase financial literacy explained only 0.1% of the variance in financial behaviours evaluated, with weaker effects in low-income samples, and the effects of financial education declining over time (Fernandes et al., 2014).

Trust

9.88 This subsection explores how trust in digital businesses can affect consumers' decision making and their susceptibility to OCA practices.

9.89 Trust is defined as the subjective belief of a "favourable expectation regarding other people's actions and intentions" (Waldman, 2016). While issues of establishing credibility and trust are not unique to digital businesses, online transactions and platforms may subject consumers to a greater set of uncertainties than to offline transactions. For example, in the process of "disintermediation", individuals are now forced to evaluate vast amounts of online information on their own (Eysenbach, 2008; Metzger and Flanagin, 2013). In an online context, consumers can be left on their own without the help of sales clerks or travel agents (Metzger and Flanagin, 2013), and routinely engage with sellers with whom they have little or no prior interaction (Pavlou and Gefen, 2004).

9.90 Generally, surveys have shown that one of consumers' top concerns relates to issues of privacy and trust (Pennington et al., 2003) (also see section on ***Privacy***). Online businesses may therefore wish to present themselves positively; some might attempt to achieve this undeservedly. It can be done covertly, such as cueing trust through professional design while hiding invasive data collection practices within inscrutable privacy policies (Waldman, 2018). However, priming privacy concerns (ie cuing people to think about privacy) can also reduce propensity to disclose information (Acquisti et al., 2012) because it can lead to greater consideration of the potential for fraud and data abuse.

9.91 Other tactics that encourage a false or greater sense of trust are by emphasising data protection policies, government regulation, highlighting ethics policies and social responsibilities. Iglesias et al. (2020) showed that consumers have positive expectations of an ethical business that exercises social responsibility and cares about public wellbeing. Such perception can be cued easily, such as by using visual manipulation techniques like using a green background to invoke thoughts of environmental concern and to enhance a brand's ecological image, irrespective of reality (Parguel et al., 2015) .

9.92 The use of manipulative OCA by platforms, when detected by consumers, can also lower trust in the platform. For example, a Which? (2021) survey of a sample of 2,078 UK consumers found that a quarter (24%) of respondents had thought negatively about an organisation using dark patterns, with 16% stating that they stopped using a website and/or app (either temporarily or permanently) as a result of their use of dark patterns. The study also found

that 15% of respondents reported that they their trust in an organisation had weakened because of the use of dark patterns. As discussed in the *Awareness* subsection above, the fear of negative customer reaction, including less trust, could discourage businesses from disclosing their OCA practices.

9.93 Moreover, there is evidence suggesting that it might also matter who the choice architect is because individuals can differentially trust choice architecture design decisions, depending on the source. For example, a study on nudge acceptability by consumers demonstrated that nudges implemented by researchers are more trusted than nudges issued by government (Osman et al., 2018). Similarly, Junghan et al. (2015) reported greater trust in nudges implemented by private parties over nudges issued by government. However, Bang et al. (2020) argued that the intentions of the source can matter more than the source itself. For example, they found that design decisions for financial reasons that benefit the choice architect were seen as less acceptable than those applied for sustainability or health reasons.

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11. Appendix

Glossary of behavioural biases

Term	Definition
A	
Affect Bias	Specifically refers to how individuals tend to rely on their emotions or instincts when making decisions, which allows for quick conclusions without much thought
Allocation Bias	Systematic difference on how partakers are assigned to comparison groups in a clinical trial
Anchoring and Adjustment Bias	Occurs when an individual uses a specific value or target number as a starting point (anchor) and subsequently adjusts that information until a satisfactory value is reached over time
Authority Bias	The tendency to attribute greater accuracy to the opinion of an authority figure (see Opinion Leaders)
C	
Choice Overload	Depicts how people tend to get overwhelmed when presented with many options to choose from
Cognitive Scarcity	Term to suggest that the human mind has a finite capacity for making decisions to maximise utility
Commitment Bias	Describes an individual's tendency to remain committed to past behaviours, particularly those exhibited publicly, even if they do not have desirable outcomes
Compromise Effect	The tendency to avoid an extreme choice that results in a compromise where the mediocre option is preferred

D	
Default Effect	Explains the tendency for an individual to generally accept the default option in a strategic interaction
Decoy Effect	When faced with a choice between two alternatives, the addition of a third, less appealing option may influence the perception of the original two choices
Denomination Effect	A form of cognitive bias relating to currency, suggesting that individuals may be less likely to spend larger currency denominations than their equivalent value in smaller denominations
Diversification Bias	The tendency for individuals to seek more variety when choosing multiple items for future consumption simultaneously than when they choose sequentially
E	
Endowment Effect	Describes how individuals tend to more highly value an item they own than they would if they did not own it
F	
Framing Effect	Occurs when decisions are influenced by the way information is presented
Fuzzy-trace Theory	A theory suggesting that information is determined on a continuum from precise traces to fuzzy traces
H	
Hot-cold State	A hot-cold empathy gap occurs when people underestimate the influence of visceral states (eg anger, pain, or hunger) on their behaviour or preferences
I	
Inertia	The endurance of a stable state associated with inaction and the concept of status quo bias

Information Asymmetry	A situation where there is imperfect knowledge; specifically, where one party has different information to another
Information Overload	Occurs when an individual receives too much information that causes difficulty in storing and encoding it
L	
Limited Attention	The implication that the brain can process information only for a finite time
Loss Aversion	Refers to an individual's tendency to prefer to avoid losses than to acquire equivalent gains, ie losses loom more than gains
M	
Mental Accounting	Explains how individuals tend to assign subjective value to money as a violation of basic economic principles
Mental Scarcity	see Cognitive Scarcity and Limited Attention.
Messenger Effect	Occurs when the messengers themselves have important implications for how the receivers process information and make decisions
O	
Opinion Leaders	Individuals or organisations that are experts within an industry, or otherwise have views that are both widely known and trusted
Opinion Seeking	see Authority Bias
Overconfidence	A bias in which an individual's subjective confidence in their judgment is reliably greater than the objective accuracy of those judgments
Overoptimism (Optimism Bias)	Refers to an individual's tendency to overestimate the likelihood of experiencing positive events, and

	underestimate the likelihood of experiencing negative events
P	
Present Bias	The tendency to settle for instant gratification than to wait for a larger future reward in a trade-off situation
Priming	Occurs when an individual's exposure to a certain stimulus influences their response to a subsequent stimulus, without any awareness of the connection
Prospect Theory	Describes how people make decisions when presented with alternatives that involve risk, probability, and uncertainty. It suggests that their decisions are based on perceived losses or gains relative to an existing reference point
Psychological Myopia	The tendency for individuals to focus on information immediately related to their judgment and ignore other, less prominent, pieces of information
R	
Ranking Effect	Differences in an individual's behaviour from experiencing different conditions in a specific order
Reference Dependence	A central principle in Prospect Theory, which holds that individuals evaluate outcomes and express preferences relative to an existing reference point or status quo
S	
Saliency Bias	Describes the tendency to focus on more noteworthy items or information while ignoring others
Scarcity Bias	The tendency for individuals to perceive scarce items as more valuable than items in abundance
Self-serving Bias	The tendency to attribute positive events and successes to the individual's own character or

	actions, but blame negative results to external factors unrelated to personal character
Social Influence	Refers to the way in which individuals change their behaviour to meet the demands of a social group
Social Norms	Collectively held beliefs about what kind of behaviour is appropriate in a given situation
Social Proof	A psychological phenomenon where people assume the actions of others to reflect correct behaviour in a given situation
Status Quo Bias	Describes an individual's preference for the current situation resulting in resistance to change

Table 8. Overview of studies on effectiveness of positive OCA interventions

Papers	Sector/domain	Key findings	OCA practices
Wright and Bragge (2018)	Food consumption: Effectiveness of interventions in dining out settings (reduction of calorie consumption)	Found that healthy eating interventions that harness social modelling, social norms and/or provision of health information in conjunction with interpretative information are effective in reducing calorie consumption.	Framing, eg manipulating portion/ dishware/cutlery size Messengers, eg linking poor diet to particular social groups Feedback, eg traffic light system or exercise equivalence statements
Carter, Bignardi, Hollands, Marteau (2018)	Food consumption: Consumption of food, alcohol and tobacco-based products	Placing information-based cues in the environments in which people select and consume food, alcohol and tobacco-based products can influence selection of those products, eg bright coloured images had a significant effect on increasing selection of fruit and vegetables, although significant uncertainty remains due to gap in literature for eg tobacco and alcohol products.	Visual manipulation cues, eg bright colours with images of the product of interest Saliency effects – drawing users' attention to the target products
Al-Khudairy, Uthman, Walmsley, Johnson and Oyebode (2019)	Food consumption: Choice architecture interventions to increase healthy purchasing and/or consumption of food and drink by NHS staff	Found that choice architecture interventions that involve a proximity element appear to be frequently effective at changing behaviour. Availability and sizing are also choice architecture elements that are likely to be effective for NHS organisations. Found no strong evidence for the effect of pricing on behavioural change.	Dark nudges and sludge – making behavioural options easier or harder to engage with Framing – sizing interventions Scarcity claims – availability of products
Nørnberg, Houlby, Skov and Peréz-Cueto (2016)	Food consumption: Choice architecture interventions promoting vegetable consumption among adolescents	Found inconclusive results from the 12 included studies in relation to the effects of nudge interventions on adolescent vegetable consumption (and included studies were of weak or moderate quality). Factors such as improved conveniency (eg price and accessibility of fruits) have variable effects on consumption.	Visual manipulation, eg changes to lunchroom to make vegetables more convenient and attractive Framing, eg plate sizing

Bucher, Collins, Rollo, McCafrey, De Vlieger, Van der Bend and Truby, Perez-Cueto (2016)	Food consumption: The effects of positional changes of food placements on food choice	Testing variations in proximity or order of the food, they found that where these were manipulated, participants were nudged towards a healthier food choice. However, the strength of the evidence depends on the type of positional distance (order vs. distance) and the magnitude of the change or how far away they are placed. However, this may result in compensatory behaviours (eg reduction of eating chips leads to greater consumption of starch among foods that remained proximal).	Sludge – Inducing friction, eg placing unhealthy foods further away from the consumer Ranking, eg changes in product order
Byerly, Balmford, Ferraro, Hammond Wagner, Palchak Polasky, Ricketts, Schwartz and Fisher (2018)	Pro-environmental behaviour: Influencing people's choices in ways that will affect the environment	Found that, in relation to water conservation, sustainable land management and reduced meat consumption information about social norms and changes to the decision context can encourage pro-environmental behaviour. Interventions aimed at affecting norms or defaults produced consistent effects on behaviours across multiple studies and domains. Switching default buffet plate size, printer settings, menu offerings, and cost-share baseline amounts made it easier for individuals to act in a pro-environmental manner. However, the evidence for effects of commitments and salience were less straight forward.	Commitment, eg written or oral promises Defaults, eg changing default menu to vegetarian only and moving meat to a separate menu Visual manipulation, eg priming, saliency Prompts and reminders, eg daily reminders to use contraception
Blaga, Vasilescu and Chereches (2018)	Lifestyle risk factors: Public health policies designed to reduce overeating, excessive drinking, smoking, and physical inactivity.	Found inconclusive evidence of the success of behavioural economics strategies in reducing alcohol consumptions. However, several strategies may have policy-level implications, eg that could be used to reduce smoking, improve nutrition and increase physical activity.	Commitment – commitment contracts Feedback – offering feedback regarding the status of their physical activity Visual manipulation – traffic light labels

Forberger, Reisch, Kampfmann and Zeeb (2019)	Physical activity: Scope of interventions using choice architecture techniques to promote physical activity	The aim was to provide an overview of interventions used for physical activity promotion and to classify the approaches. Concluded that most studies use nudging at an individual level, concentrating on point-of-decision nudges (eg motivational signs near stairs) with a smaller number combining several nudges.	Reference pricing, eg whether or not personal physical activity level is in accordance with recommendations Framing, eg gain/loss message framing Feedback – biofeedback through external monitoring device or computer generates Commitment, eg allowing participants to track their success

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