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# Message and Environment: a framework for nudges and choice architecture

LUCA CONGIU*

*Department of Economics, University of Insubria, Varese, Italy*

IVAN MOSCATI

*Department of Economics, University of Insubria, Varese, Italy*

**Abstract:** We argue that the diverse components of a choice architecture can be classified into two main dimensions – Message and Environment – and that the distinction between them is useful in order to better understand how nudges work. In the first part of this paper, we define what we mean by nudge, explain what Message and Environment are, argue that the distinction between them is conceptually robust and show that it is also orthogonal to other distinctions advanced in the nudge literature. In the second part, we review some common types of nudges and show they target either Message or Environment or both dimensions of the choice architecture. We then apply the Message–Environment framework to discuss some features of Amazon's website and, finally, we indicate how the proposed framework could help a choice architect to design a new choice architecture.

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## Introduction

The publication of the book *Nudge* (2008) by Richard Thaler and Cass Sunstein has generated several debates, ranging from the question of whether nudge-based policies are ethically acceptable, through the issue concerning the exact relationships between nudge policies and the political view that Thaler and Sunstein call 'libertarian paternalism', to the problem of defining exactly what a nudge is.[1] Concerning the latter point, following Hansen (2016) and Mongin and Cozic (2018), we conceive of nudges as any attempt at influencing people's behaviour that instrumentally exploits their rationality

* Correspondence to: Department of Economics, University of Insubria, via Monte Generoso 71, 21100 Varese, Italy. Email: lcongiu@uninsubria.it

1 Barton and Grüne-Yanoff (2015) offer a review of these debates.



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failures, such as their cognitive boundaries, biases and habits. According to this conception, nudges may be created for a variety of purposes (e.g., for commercial purposes), and not only for libertarian paternalist goals. For instance, a firm may nudge potential customers to buy a commodity that, according to their own declared self-interests, they would not buy.

Besides the notion of nudge, Thaler and Sunstein's book made popular another concept, namely that of 'choice architecture'. The choice architecture encompasses all elements and aspects that characterise the context in which people make choices and that therefore influence these choices. For instance, the architecture of a given choice situation includes the number of available alternatives, their location, the order in which they are arranged, the way they are presented and so on. A nudge operates by modifying some element of the choice architecture. However, not all modifications of the choice architecture can be considered nudges. For instance, in the standard setting of consumer-choice theory, where a fully rational agent attempts to maximise her well-behaved preferences under the budget constraint, the budget constraint is part of the choice architecture. However, a tax modifying the consumer's budget constraint is not a nudge. The tax, in fact, does not affect the consumer's behaviour by exploiting her rationality failures that, in the standard consumer-theory setting, are absent.

The present paper is about choice architecture, nudges and the relationships between them. We argue that the diverse components of a choice architecture belong to two main dimensions, which we call 'Message' and 'Environment'. The Message dimension includes all communications that the choice architect sends to decision-makers and that describe the choice situation or provide some information about it by using words or numbers. Examples are messages such as 'Smoking damages the lungs', 'Suggested donation: £10', 'Buy now with 1-Click' and 'Most of your peers already bought it'. The Environment dimension includes all elements of the choice architecture that the decision-maker can encounter in her physical or virtual surroundings, perceive through her senses or interact with. Examples are the way in which food items are arranged in a cafeteria line, background music playing in stores, speed bumps on roads and pictures of a pair of eyes on boxes that collect donations.

The distinction between Message and Environment is certainly very simple but, to the best of our knowledge, it has not yet been employed in the behavioural economics literature. In principle, it can also be used to analyse interventions that are not nudges; that is, interventions that target rational motivations rather than exploit rationality failures. Thus, for instance, the tax modifying the budget constraint of the rational consumer affects her Environment. However, we find that the distinction between Message and Environment becomes fruitful when it is applied specifically to nudges. Accordingly, in this

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paper, we look at several existing nudges through the lens of the Message–Environment distinction and show that these nudges operate by manipulating either the Message dimension or the Environment dimension or both dimensions of the choice architecture. Finally, we suggest that the distinction between Message and Environment is useful not only in order to better understand how existing nudges work, but also to design new nudges.

This paper is organised as follows: the first section provides a full-fledged definition of a nudge and addresses some further conceptual issues concerning the nudge notion. The second section explains in detail the distinction between Message and Environment and shows that this distinction is conceptually robust. The third section clarifies why the Message–Environment distinction is orthogonal to other classifications advanced in the nudge literature. The fourth section reviews some common types of nudges and shows that they operate either at the Message level or the Environment level or at both levels of the choice architecture. The fifth section uses the Message–Environment framework to discuss some features of Amazon's website. The sixth section indicates how the distinction between Message and Environment can help a choice architect to design new nudges. The seventh section summarises and concludes.

## What is a nudge?

Thaler and Sunstein (2008) provide two definitions of a nudge. According to the first, a nudge "is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (p. 6). According to the second definition, a nudge is "any factor that significantly alters the behavior of Humans [i.e., individuals that may be affected by rationality failures] although it would be ignored by Econs [i.e., individuals that are perfectly rational]" (p. 9). The exact content of these definitions, their mutual relationship and, more generally, the issue of defining exactly what a nudge is have generated significant debate. For instance, Hausman and Welch (2010) as well as Hansen and Jespersen (2013) pointed out that the clause "without significantly changing people's economic incentives" in the first definition is problematic because, according to it, interventions that change people's non-economic incentives would count as nudges. For example, the threat of an electric shock does not change people's economic incentives, but considering it as a nudge is implausible. Mongin and Cozic (2018) remark that the reference to Humans and Econs in the second definition is misleading because it suggests that individuals can be divided into two distinct populations – fully rational Econs versus non-fully rational Humans – while the behaviour of each individual may be influenced by both rational and non-fully rational drivers.

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Probably the most articulated discussion of the notion of nudges is that provided by Hansen (2016), and we adopt the definition of nudge he puts forward at the end of his analysis. According to Hansen, a nudge is any attempt at influencing people's behaviour "(1) that is made possible because of cognitive boundaries, biases, routines and habits [...] posing barriers for people to perform rationally in their own declared self-interests and which (2) works by making use of those boundaries, biases, routines, and habits" (p. 20). Hansen's definition is broadly consistent with what Mongin and Cozic (2018, p. 2) call 'Nudge 2'; that is, "an intervention that uses rationality failures instrumentally."

Hansen's definition makes the notion of nudge independent of the notion of libertarian paternalism and allows the separation of issues concerning the functioning and design of nudges from issues concerning their ethical acceptability. Thus, according to Hansen's definition, both the cafeteria director attempting to increase the consumption of healthy food among kids by exploiting their habit of picking the first items in the line and the marketing director attempting to increase the sales of a mobile phone by exploiting customers' herd behaviour are implementing nudges. Our paper focuses on issues concerning the functioning and design of nudges and does not address issues concerning their ethical acceptability or libertarian paternalism.

As noted by Mongin and Cozic (2018, pp. 5–9), one possible problem in Hansen's definition of a nudge, as well as in their own definition of 'Nudge 2', is that the distinction between rational behaviour and behaviour determined by some rationality failure is not always straightforward. Consequently, deciding whether a given intervention exploits some rationality failure and is therefore a nudge, or whether it is not a nudge because its efficacy can ultimately be explained on rational grounds, can be tricky. To complicate the picture, the efficacy of a given intervention may depend on both rationality and failures of rationality. For instance, the marketing director attempting to increase the sales of the mobile phone may communicate to potential buyers the following message: "Most of your peers already have it." This message may convey some relevant information about the phone ("If most of my peers already have it, the phone must be of high quality") and thus induce the individual to buy it on purely rational grounds. Yet, the message could also induce the individual to buy the phone because of sheer herd behaviour ("I do whatever my peers do"). Sheer herd behaviour might be made compatible with full rationality, but only by introducing very convoluted hypotheses about the individual's preferences.

Determining in general what is and what is not a rationality failure and therefore a nudge is a challenging question that we do not need to address here. In fact, the Message–Environment framework we use in this paper refers to the choice architecture and so can be used to analyse not only nudges, but also standard interventions such as a tax affecting the behaviour

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of a rational consumer. Therefore, even in the hypothetical case in which we apply the Message–Environment framework to analyse a 'false-positive nudge' (i.e., an intervention that can be reinterpreted as relying on rationality-based drivers), this would not undermine the framework. At any rate, we shall attempt to avoid false-positive nudges by focusing our analysis on interventions that most scholars would presumably consider nudges.

Having clarified these conceptual issues concerning the notion of a nudge, we can now illustrate the distinction between Message and Environment in more detail.

## Message and Environment

We argue that all elements of a choice architecture can be deconstructed into two main dimensions, which we call Message and Environment. The Message dimension includes all verbal communications – both oral and written – that the choice architect sends to decision-makers and that describe the choice situation or provide some information about it.

Certain messages, such as 'Smoking damages the lungs', attempt to influence people's behaviour by targeting their rational motivations. Other messages try to influence people's behaviour by exploiting their cognitive boundaries, biases and habits. Examples are 'Suggested donation: £10', which aims at establishing a reference level or anchor for donations; 'Buy now with 1-Click', which attempts to present the item as immediately accessible; or 'Subscribe, and cancel online anytime', which aims to exploit consumers' inertia. As already noted, other messages, such as 'Most of your peers already have it', may target both rational and boundedly rational drivers of behaviour.

The other dimension of the choice architecture, namely Environment, includes all elements and aspects of the choice situation that the decision-maker can encounter in her physical or virtual surroundings, perceive through her senses or interact with. Elements of the Environment are the way the choice alternatives are arranged (e.g., items on a shelf); the presence of constraints (e.g., budget constraints), obstacles (e.g., speed bumps) or default options (e.g., double-sided printing); and the exposure to certain sensory stimuli such as music (e.g., background music playing in stores) or images (e.g., a picture of eyes on a donation box to increase charity contributions).

As in the case of the Message dimension, certain elements of the Environment dimension influence people's behaviour through the 'rationality channel'. This is the case, for instance, with speed bumps: rational drivers are expected to slow down when approaching bumps because they do not want to damage their cars. Other elements of the Environment, such as default options, influence people's behaviour by exploiting their rationality

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failures. Finally, some further elements of the Environment may affect both the rational and boundedly rational drivers of behaviour. For instance, locating a vending machine in a more remote room may decrease a decision-maker's consumption of crisps, not only because the larger distance she has to cover increases the opportunity cost of crisps, but also because the activation of reflective cognitive processes capable of controlling the decision-maker's craving for crisps might become more likely if she has to cover a larger distance.

Some further clarifications about the distinction between Message and Environment and its conceptual robustness are in order. First, messages have two components: their meaning and the physical form through which this meaning is conveyed. In semiotics, these two components are called, respectively, the 'signified' and the 'signifier'. For instance, the signifier of the written message 'Danger!' is a word written somewhere (e.g., on paper or on a screen), in a certain size (10 or 100 points), in a certain colour (black or red) and so on. In our framework, the signifier of a message is part of the Environment, and we acknowledge that the environmental features of the signifier are relevant for behaviour. Thus, the message 'Danger!' may have different effects on behaviour accordingly to whether it is written in black at a 10-point size or in red at a 100-point size. In contrast, the signified of the message is part of the Message, not the Environment. That is, Message is the dimension of the choice architecture that specifically refers to the meaning of messages and the effect of this meaning on people's behaviour. Returning to our example, we conceive of the meaning of the message 'Danger!' as independent of whether the word is written in black at a 10-point size or in red at a 100-point size, and the Message dimension specifically pertains to such a meaning.

Second, a single nudge may operate on both the Message dimension and the Environment dimension of the choice architecture. As just discussed, a communication nudge that primarily operates at the Message level through its meaning ('Danger!') to some extent also operates at the Environment level through the signifier conveying that meaning (a 100-point size, red word printed on a poster). On the other hand, a nudge such as the setting of 'double-sided' as the default printing option operates primarily at the Environment level. However, insofar as the default option is communicated to the computer user, typically through an entry in the printing preference box, the nudge also operates at the Message level. The fact that a single nudge may operate on both dimensions of the choice architecture does not represent a problem for our framework. The crucial point is that the two possible directions of a nudge's action can be kept conceptually distinct.

Third, both Message and Environment might be deconstructed into finer subdimensions. For instance, messages could be divided into 'social messages',

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which highlight the social dimension of the choice situation (e.g., 'Most of your peers already have it'), and 'individual messages', which do not make any reference to what others do or think (e.g., 'Buy now with 1-Click'). Likewise, the elements of the Environment may be divided into 'sensory elements', which are actually visible, audible or, more generally, perceivable through some of the five senses (e.g., background music playing in stores), and 'abstract elements', such as budget constraints, which shape the choice situation without being directly perceived through the senses. Although potentially interesting, these subdivisions are less robust than the main distinction between Message and Environment. The main problem is that various plausible subdivisions are conceivable, while the reasons for adopting one specific subdivision rather than another are far from straightforward. Because of this issue of robustness, and also because subdivisions are not essential to understanding how to apply the main Message–Environment framework, in this paper we do not use them.

A final clarification concerns the relationship between the Message–Environment distinction and the distinction through which rational choice theory models decision-making; namely, the distinction between preferences and beliefs on the one hand and choice set on the other. These two distinctions are related but do not coincide. Some messages, such as 'Smoking damages the lungs' or 'Danger: 400 volts!', influence the decision-maker's behaviour by modifying her preferences or beliefs. Other messages, such as the automatic reminder featured in most email clients 'Do you really want to send this message without a subject?', do not appear to change the decision-maker's preferences or beliefs and affect her behaviour by contrasting some rationality failure, such as forgetfulness or inattention. Similarly, although the choice set is part of the Environment, certain elements of the Environment, such as the background music playing in stores, are not part of the choice set. Admittedly, the choice set could be redefined so as to include environmental elements in the description of the choice alternatives. For instance, the choice item 'coat' may be redefined as 'coat with background music'. However, as the time-honoured debate about revealed preferences and menu effects has shown, such redefinition strategy easily backfires and risks transforming rational choice theory into a tautological theory devoid of any actual content.[2]

2 For examples, see some classic articles by Sen (1973, 1993, 1997). Even Samuelson, the initiator of the revealed preference approach to choice behaviour, was well aware of the tautology problem associated with the redefinition of the choice alternatives. In 1952, he wrote: "In what dimensional space are we 'really' operating? If every time you find my axiom falsified, I tell you to go to a space of still higher dimensions, you can legitimately regard my theories as irrefutable and meaningless" (Samuelson, 1952, p. 677).

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With the above clarifications in mind, we are now ready to compare our Message–Environment distinction with other classifications advanced in the nudge literature.

## Comparison with other classifications

In this section, we review three alternative classifications of nudges that have already been advanced in the nudge literature and that may be related to our Message–Environment framework. In chronological order of publication, these classifications are those proposed by Johnson *et al.* (2012), Hansen and Jespersen (2013) and Mongin and Cozic (2018). As we will argue, these alternative classifications overlook the distinction between Message and Environment and are therefore disconnected from our framework.

Johnson *et al.* (2012) divide the tools available to the choice architect into two main categories, which they call tools for 'structuring the choice task' and tools for 'describing the choice options'. This naming may suggest that the two categories correspond, respectively, to our Environment and Message dimensions. This is not the case, and in effect, both types of tools belong to what we call Environment. In particular, by 'structuring the choice task', Johnson and co-authors refer to the question of determining the optimal number of options to present to the decision-maker, the use of defaults and the introduction of technology aids such as search engines. By 'describing the choice options', they refer to the way the options are partitioned into groups or categories (e.g., stocks, bonds, real estate), the way their attributes are presented (e.g., monthly or yearly interest rates on credit payments) or how the decision environment can be customised in order to target different types of decision-makers. All of these elements of the choice architecture belong to what we call Environment, and in fact, Johnson and co-authors devote little if any room to the Message dimension of the choice architecture.

Based on the two-system theory of cognitive processes popularised in economics by Kahneman (2011), Hansen and Jespersen (2013) first distinguish between Type 1 and Type 2 nudges. Type 1 nudges target our fast, automatic and intuitive cognitive processes; that is, what in the two-system theory is called System 1 of the mind. Type 2 nudges target our slow, calculative and deliberative process; that is, System 2. Hansen and Jespersen then introduce an additional distinction, namely that between transparent and non-transparent nudges. A nudge is transparent when the agent being nudged could reasonably be expected to understand the intention and the means of the nudge. In contrast, a nudge is non-transparent when the agent cannot reconstruct either the intention or the means of the nudge. The two distinctions taken together (Type 1/Type 2, transparent/non-transparent) allow Hansen and

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Jespersen to distinguish four kinds of nudges. In the final part of their article, they use the resulting fourfold framework as a basis for ethical considerations and policy recommendations about the use of different nudges.

There are three main differences between our framework and Hansen and Jespersen's. First, and most importantly, our distinction between Message and Environment is orthogonal to Hansen and Jespersen's distinction, in the sense that each of their types of nudge can operate either on the Message dimension or the Environment dimension of the choice architecture. Thus, there are Type 1, transparent nudges that operate on the Message dimension (e.g., announcing 'on time' when the train is punctual, so people note and remember the positive result). Other Type 1, transparent nudges operate on the Environment dimension, as when relaxing music is played in airports to calm passengers when they board a plane. Similarly, certain Type 1, non-transparent nudges are messages announcing, for example, a waiting time for a train that is longer than actually expected so that if travellers adopt the announced time as a reference point, they are pleasantly surprised when the train arrives earlier. Other Type 1, non-transparent nudges operate on the Environment, such as when background defaults are changed (e.g., when the default consent in a procedure is changed from informed to presumed). It is easy to show that Type 2, transparent nudges and Type 2, non-transparent nudges can also operate either on Message or Environment.[3]

The second difference is that Hansen and Jespersen construct their framework so as to address ethical and political issues concerning nudges. As explained in the introduction, this kind of issue is beyond the scope and goals of our paper. Thirdly and finally, while Hansen and Jespersen's framework relies on the two-system theory of cognitive processes, which in effect is quite controversial in psychology, our framework is independent of it.[4]

Mongin and Cozic (2018) distinguish three aspects of the nudge concept as construed by Thaler and Sunstein (2008). The first aspect, which Mongin and Cozic call Nudge 1, refers to the idea that nudges are interventions that do not significantly alter the choice conditions; that is, the physical set of options, the financial constraints or the decision-maker's beliefs and preferences. Nudge 2 refers to the view that nudges use rationality failures instrumentally. As

3 Sunstein (2016) distinguishes between System 1 nudges and System 2 nudges, which correspond, respectively, to Hansen and Jespersen's Type 1 and Type 2 nudges. Since our Message–Environment distinction is orthogonal to Hansen and Jespersen's Type 1–Type 2 distinction, it is also orthogonal to Sunstein's System 1–System 2 distinction; that is, each type of Sunstein's nudge can operate either on the Message dimension or the Environment dimension of the choice architecture.

4 For example, see the criticism of the two-system theory by Kruglanski and Gigerenzer (2011) and the reply by Evans and Stanovitch (2013).

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mentioned above, our definition of nudge is broadly consistent with Mongin and Cozic's concept of Nudge 2. Finally, Nudge 3 is associated with libertarian paternalism and the idea that nudges alleviate the negative effects of rationality failures. The goal of Mongin and Cozic's paper is to articulate the three aspects of the nudge concept and show that they are mutually independent.

Like the classification of nudges advanced by Hansen and Jespersen, that of Mongin and Cozic is also orthogonal to our framework. In fact, Mongin and Cozic do not distinguish between the Message and the Environment dimensions of the choice architecture, and each of their three types of nudges can operate either on the Message dimension or the Environment dimension. For instance, a Nudge 1 may consist of a message slightly altering the decision-maker's belief ('Danger!') or a tax slightly altering the decision-maker's financial constraints; that is, her Environment. Again, a Nudge 2 may consist of a message ('Buy now with 1-Click') or an environmental intervention (e.g., placing the advertised links in the top part of the screen and the non-advertised links at the bottom). The same holds for Nudge 3 (i.e., libertarian paternalist nudges): the 'Look left' and 'Look right' reminders for tourists on London's streets are messages, while placing healthy food at the beginning of the cafeteria line is an environmental intervention.

We can now take stock and summarise what we have covered so far. We have advanced the distinction between Message and Environment, explained it in detail and shown that it is conceptually robust and that, despite its simplicity, it has not yet been employed in the nudge literature. In the next two sections, we apply the Message–Environment framework in order to analyse some common types of nudges and discuss some features of Amazon's website.

## A Message–Environment analysis of some common nudges

In this section, we review five types of nudges that are often discussed in the behavioural economics literature through the lens of the Message–Environment distinction. In particular, we focus on nudges that target accessibility, introduce decoys or defaults and exploit anchoring or framing effects.

### *Accessibility*

Accessibility nudges alter the ease of access to the available options or the salience of the options. Examples of nudges targeting Environment accessibility are the arrangement of items so that some are easily spotted and encountered first (e.g., putting fruit at eye level or at the beginning of a cafeteria line); strategies that reduce accessed quantities (e.g., reducing the dimensions of serving utensils in a buffet or reducing the dimensions of plates and other

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food containers); and the simplification of procedures (e.g., cutting the number of steps involved). At the Message level, accessibility is typically targeted through communications that influence the perceived ease of a task, such as 'Donate with 1-Click' or 'Follow the two-step procedure'.

### *Decoys*

'Decoys' are options that a rational decision-maker would never choose because they are inferior in all respects to other options, but whose mere presence in the choice set can modify the decision-maker's choice among the remaining options. Ariely (2009) studied the case of the following subscription offers to a journal: 'Online version for $59', 'Printed version for $125' and 'Printed and online version for $125'. Here, the middle alternative ('Printed version for $125') is a decoy. In fact, a rational decision-maker would never choose the printed version for $125, since at the same price she could have both the online and the printed version. However, as Ariely showed, when the middle alternative was present, the majority of subscribers opted for the expensive option ('Printed and online version for $125'), while when it was removed, the majority opted for the cheap one ('Online version for $59').

In the above example, the decoy nudge operates primarily at the Environment level through the presence of the middle alternative, but it also operates, at least to some extent, at the Message level because the three subscription offers are described using words. Yet, we can easily figure out a decoy nudge that operates without the intervention of words. Think of a wine shop with the following three options displayed in its window: a bottle of Barbera for €5, a bottle of Chianti for €10 and a bottle of Chianti with a bottle opener included for €10.

### *Defaults*

A 'default' is the option that applies to the decision-maker in case she does not actively decide otherwise. Examples of default nudges targeting the Environment can be found when, in installing a software, some options are already ticked or feature a value already inserted by the developers (e.g., maximum number of connections allowed or a specific IP address or proxy). Alternatively, a default may be established at the Message level. For instance, in the case of software or an internet page, the message establishing the default could take the form 'By installing this software, you agree with the terms of use' or 'By using our website, you agree to the use of cookies' or 'These are the recommended settings based on your PC specifics'.

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### *Anchors*

The 'anchoring and adjustment' effect (Tversky & Kahneman, 1974) is the decision-maker's tendency to take a certain situation as a reference point (the anchor) and then make her choice by adjusting from that situation. Nudges exploiting the anchoring effect may also target either Environment or Message. Environmental anchors typically operate on menus. For instance, the Behavioural Insights Team (2013) showed that individuals presented with the set of potential donations {£2, £4, £6, £8, £10} donate on average more than individuals presented with the set {£1, £2, £3, £5, £10}. Apparently, by featuring higher figures, the first set establishes a higher anchor for donations.

Anchors may also be induced by messages, especially with respect to purchasing behaviour (Wansink *et al.*, 1998). Examples are messages that, in posing limits to the quantity that can be purchased (e.g., 'Limit of 10 per person'), implicitly set the upper bound as an anchor; messages that identify a habit as an anchor ('How many units do you usually buy?'); or messages that suggest an expanded anchor ('Think of all the different ways you could consume this product over the next two weeks').

### *Framing*

The 'framing effect' (Tversky & Kahneman, 1981) is a cognitive bias that refers to the different responses decision-makers exhibit when confronted with logically equivalent descriptions of the choice scenario. For instance, a physician warning about the risk posed by a certain surgery may obtain a different acceptance rate according to whether she frames the risk as '90% of patients survive the surgery' or '10% of patients do not survive the surgery'. In our framework, nudges exploiting framing effects pertain exclusively to the Message dimension. In fact, they do not modify what the decision-maker can encounter in her physical or virtual surroundings, perceive through her senses or interact with; that is, they do not modify her Environment.

## Message and Environment in Amazon's website

We now use the Message–Environment framework to review some features of the website of Amazon, the well-known online retailer. When accessing the website for the first time, the customer is prompted to register to the service through a small pop-up with the wording 'Sign in' on an orange button. Besides the wording that counts as the Message (for it gives an instruction through words), the pop-up alters the Environment by making access to the platform more accessible and salient.

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When the customer selects a particular product and moves to the product webpage, she is bombarded with further messages. Some of these messages, such as 'In stock', 'FREE UK Delivery' or 'Want it delivered by today, 6pm–10pm?', count as accessibility nudges. Others, such as 'Frequently bought together' or 'Customers who bought this item also bought', target the possible herd behaviour of customers. A further feature of the product webpage counts as an anchoring message: Amazon indicates a list price of the product cancelled by a strikethrough and replaced by a discounted value. The list price serves as an anchor, in the sense that the convenience of the purchase is also judged in virtue of the saving offered by the discounted price with respect to the original price.

Amazon also exploits the decoy effect. By clicking 'Compare: Offers for this product', the customer accesses another window where Amazon's price and delivery conditions for the product are compared with the price and delivery conditions for the same product as sold by other retailers. Amazon's price and delivery conditions are typically superior (lower price, quicker delivery) to those offered by its competitors. Evidently, Amazon advertises the price–delivery conditions of competitors as Environment decoys that can make Amazon's product more attractive.

When the customer makes a choice and clicks the orange 'Add to Basket' button, he or she has the possibility of activating the '1-Click ordering' option. After registering all relevant data for the first purchase (e.g., credit card, home address and so on), the customer can buy further items just by clicking 'Buy now with 1-Click'. The 1-Click option is primarily an Environment nudge that alters the accessibility of the product. This Environment nudge is reinforced by the very message 'Buy now with 1-Click', which reminds the customer of the easiness of the purchasing process.

A further option for the customer in the final phase of the purchasing process is to activate 'Amazon Prime', a modality of fast home delivery with a monthly fee. This option is highlighted through a prominent blue button positioned on the bottom right of the webpage. This button again alters environmental accessibility and exploits both the prominent colour to increase salience and the tendency of users to associate what is on the right part of the webpage with what allows them to advance in an online procedure. When activated, the Amazon Prime option is automatically renewed, unless the customer opts out before the monthly deadline. The automatic renewal, which is common to many online subscriptions, is an environmental feature that aims at securing the payment of the monthly fee even from occasional customers by exploiting their inertia or forgetfulness.

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## Message and Environment for designing nudges

In this section, we use an example to illustrate how the distinction between Message and Environment could help a choice architect to design new nudges. In our example, a choice architect attempts to increase individuals' retirement savings, which are notoriously suboptimal (Rhee & Boivie, 2015), by designing a web portal where individuals choose how much to allocate to a given saving fund.

At the Environment level, the choice architect could employ a default nudge. That is, the individuals using the portal will automatically save a given percentage of their monthly salary, say 3% as in the 'Save More Tomorrow' program by Thaler and Benartzi (2004), unless they decide otherwise. Alternatively, the choice architect could use environmental anchors and present the portal users with a menu of potential saving rates per month, expressed either in absolute monetary values (e.g., $100, $250, $500, etc.) or in percentages of their monthly salary (e.g., 1.5%, 3%, 5%, etc.). The latter menu should induce more saving than the former because it automatically increases savings as salary increases. The choice architect could also use a different form of environmental anchoring based on a scroll bar. In this design, the website users would have to decide how much to save by choosing a percentage between two boundary values, say 1% and 25%, by scrolling a bar. Insofar as individuals tend to choose an intermediate saving rate between the two anchoring values of 1% and 25%, their savings may be significantly above the 1% minimum. If the choice architect believes that individuals do not save enough because they neglect the future, he or she can adopt a different approach and design the choice environment so as to make the future more accessible and salient. For instance, the user's screen could feature an aged avatar generated by modifying the user's ID photo. As argued by Hershfield *et al.* (2011), if individuals choose how much to save when facing an age-progressed rendering of themselves, their saving rates increase.

The Environment so designed risks being ineffective if users do not understand what they should do with it and why. Here is where the Message dimension enters the scene. In the first place, potential users could be convinced to register to the saving portal by explaining to them the importance of saving for retirement. To this end, the portal's home page could feature messages such as 'You might not be saving enough to maintain your standard of living after retirement'. This framing of the message emphasises the negative consequences of inadequate saving. In order to prompt potential users to register, messages targeting herd behaviour also could be used; for example, messages such as 'X million people are already using [name of portal] to manage their retirement fund. What are you waiting for? Join them and start saving

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for your retirement'. Messages targeting herd behaviour could also be employed after registration. For instance, the user webpage could feature windows heralding the behaviour of other users (e.g., the maximum saving rate recorded in the platform, which may nudge an individual towards an increased level of saving). The windows communicating this type of message are also part of the Environment, and their mere presence may increase the user's perception that she is part of a larger group of peers who share a common goal.

## Summary and conclusions

In this paper, we have argued that the diverse components of a choice architecture can be classified into two main dimensions – Message and Environment – and that the distinction between them is useful for better understanding how nudges work. In the first part of the paper, we explained in detail what Message and Environment are, argued that the distinction between them is conceptually robust and showed that it is also orthogonal to other distinctions advanced in the nudge literature. We also addressed some general issues concerning the definition of nudge, the identification of rationality failures and the relationship between nudging and libertarian paternalism.

In the second part of the paper, we reviewed some common types of nudges and showed that they target either the Message dimension or the Environment dimension or both dimensions of the choice architecture. We then applied the Message–Environment framework to discuss some features of Amazon's website, and finally, we indicated how the distinction between Message and Environment could help a choice architect to design a new choice architecture.

We pointed out that nudges may simultaneously operate at the Message level and the Environment level and that both types of effects may concur in affecting the decision-maker's behaviour. We also stressed that messages, besides the proper Message component associated with their meaning, always have an Environment component associated with the physical form through which the meaning is conveyed. Nonetheless, we contended, for both choice architects and economists, keeping the Message and Environment dimensions conceptually separate is useful for better comprehending how and why certain nudges work and others do not.

In effect, the Message–Environment distinction suggests a possible strategy for assessing the effectiveness of alternative nudge interventions. That is, one may investigate whether or under what conditions modifying the Environment alone could be more effective than intervening at the Message level or, alternatively, whether a well-designed Message would be sufficient to obtain the intended behavioural change. For instance, in our saving portal

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example, one might ask whether it is sufficient to remind citizens about the crucial importance of saving for retirement through messages framed in a certain way or whether designing a specific online procedure (i.e., intervening in their Environment) would be more effective. This type of question can be addressed only through case-by-case empirical studies. However, we believe that the Message–Environment distinction offers a useful general framework for this sort of investigation.

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