Empirical Articles

Dynamic Mental Representations of Habitual Behaviours: Food Choice on a Web-Based Environment

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Abstract

Aim: Rather than being rigid, habitual behaviours may be determined by dynamic mental representations that can adapt to context changes. This adaptive potential may result from particular conditions dependent on the interaction between two sources of mental constructs activation: perceived context applicability and cognitive accessibility.

Method: Two web-shopping simulations offering the choice between habitually chosen and non-habitually chosen food products were presented to participants. This considered two choice contexts differing in the habitual behaviour perceived applicability (low vs. high) and a measure of habitual behaviour chronicity.

Results: Study 1 demonstrated a perceived applicability effect, with more habitual (non-organic) than non-habitual (organic) food products chosen in a high perceived applicability (familiar) than in a low perceived applicability (new) context. The adaptive potential of habitual behaviour was evident in the habitual products choice consistency across three successive choices, despite the decrease in perceived applicability. Study 2 evidenced the adaptive potential in strong habitual behaviour participants – high chronic accessibility – who chose a habitual product (milk) more than a non-habitual product (orange juice), even when perceived applicability was reduced (new context).

Conclusion: Results portray consumers as adaptive decision makers that can flexibly cope with changes in their (inner and outer) choice contexts.

Keywords: habitual behaviour, behavioural goals, cognitive accessibility, perceived applicability, food choice, web-based environments

Introduction

Mental Representation of Habitual Behaviours

Lay views consider habitual behaviour to be one that frequently occurred in the past and that is, for that reason, more likely to occur in the present. This is partly acknowledged by literature showing that habitual behaviour results from frequent stimulus-response pairing in specific contexts (for a discussion on limitations of a "frequency" view, see e.g., Aarts & Custers, 2009; Aarts & Dijksterhuis, 2000; Gardner, 2012; Verplanken, 2006). Despite this "context-dependent repetition" being an important pre-condition for habitual behaviour to develop, research from the last two decades has shown that an additional and central component of habitual behaviour is its cue-dependent automaticity (Gardner, 2012). The latter emerges from a learned process that eventually leads to the generation

of automatic responses in presence of contextual cues – habit (Gardner, Sheals, Wardle, & McGowan, 2014). Given this, "habit is therefore better conceptualised as a form of automaticity which, once formed, need not be defined by frequent performance" (Gardner, 2012, p. 35).

In accordance, habitual behaviour can be defined as "any action, or sequence of actions, that is controlled by habit" (Gardner, 2015, p. 282), being mentally represented as knowledge structures that can be triggered by environmental cues (Aarts & Dijksterhuis, 2000; Aarts, Verplanken, & van Knippenberg, 1998; Verplanken, Aarts, & van Knippenberg, 1997). These "knowledge structures" include, not only the mental representation of the behaviour, but also of the conditions for it to take place and its' activating cues. These cues can include, for example, aspects related to the physical setting, preceding actions or a person that is typically present (Neal, Wood, & Quinn, 2006; Wood & Neal, 2007). This mental representation activation can occur outside people's awareness, even when behaviour is not actually performed (Aarts et al., 1998). Moreover, Aarts and Dijksterhuis (2000) claim that habits are comparable to other knowledge structures that are also frequently used and automatically activated, such as stereotypes and attitudes. Due to this, shared cognitive and motivational properties can be expected, one being their dynamism or adaptive potential (found for example in stereotypes; see Garcia-Marques, Santos, & Mackie, 2006). For example, when the habitually bought product is not available in the supermarket, we can decide not to buy anything or to buy it elsewhere. However, we can also choose an alternative product with perceived similar characteristics. The latter demonstrates this dynamism and adaptive potential, since as long as other means to achieve the goal of buying the habitual product are present, the habitual choice can still occur (Gaspar, Palma-Oliveira, & Corral-Verdugo, 2010; Gaspar, Palma-Oliveira, Wyer, & Corral-Verdugo, 2011). This is supported by the Goal Systems Theory (Kruglanski et al., 2002) and studies that present habitual behaviours as goal-dependent automatic behaviours (Aarts & Dijksterhuis, 2000). Here we define dynamism as the mental representation capacity to flexibly adapt to changes (internal and external to the individual) in order to maintain *stability* in the necessary conditions for the habitual behaviour to be performed. It is this dynamism that we aimed to explore in the studies presented here.

Mental Constructs Applicability and Accessibility

Given that habitual behaviours can be mentally represented, their activation and implementation into behaviours should follow similar rules as for other types of mental representations. One concerns applicability (Higgins & Brendl, 1995): the greater the overlap between the features of a knowledge structure and the features of a stimulus or context, the greater that construct's applicability to that stimulus or context. When this overlap is detected, the construct is applicable, therefore, becoming accessible with an increased probability of influencing cognitions, decision making and behaviours. Despite involving mostly unconscious components, conscious components may also be evidenced in the form of perceived applicability or judged usability (Higgins, 1989, 1996). The latter refer to the perceived relevance and appropriateness of the stored knowledge for use in a given context, independently of being objectively applicable or not. For example, a piece of evidence can be relevant for determining someone's guilt but the jury or judge decide that is inapplicable or inappropriate (Higgins, 1989) given some subjective criteria. Perceived applicability may thus determine if an activated mental construct will actually be used (Higgins, 1996). This has also been shown for habitual behaviours (Wood, Tam, & Witt, 2005), namely that the "performance of everyday action is tied to the circumstances in which the actions typically occur" (Wood et al., 2005, p. 920).

Perceived applicability is not the only source of mental representations activation and even when the former is low, the latter may still occur. This is due to another determinant of mental constructs activation – accessibility – defined as high construct readiness to be used at the output (i.e., behaviour; Higgins & Brendl, 1995). This may

occur in two forms: 1) chronic accessibility – resulting from "natural" processes, given the frequent activation of the construct in the past (Higgins, 1989; Higgins & Brendl, 1995); or 2) contextual priming – resulting from temporary accessibility, for example due to experimental priming.

Considering the interaction between applicability and accessibility, the first rule of Higgins and Brendl's (1995) Mental Constructs Activation Rules states that: *Strong accessibility can compensate for weak applicability*. As both are independent activation sources, a highly accessible construct can still have an effect even if context applicability is low. Based on this rule, we aimed to show the dynamism of habitual behaviour mental representation, which to our knowledge has not yet been studied in food choice research. Specifically, we aimed to answer the question: "Are habitual behaviours only rightfully considered as such if we regularly encounter the circumstances that facilitate their expression?" (Barrett, 2014, p. 2). Our answer is no, when high accessibility can compensate for low perceived applicability.

Study 1 – The Perceived Applicability Effect

In Study 1 we aimed to assess if, in the presence of two categories of products – organic and non-organic products – people would significantly choose more the latter, given the existence of a habitual behaviour of choosing non-organic. This behaviour was expected to occur more often in a high applicability context with familiar products (national brands), than in a low applicability context with unfamiliar products (foreign brands), even when the habitually chosen product is not present. As long as the context is perceived as applicable, habitual preference can be replaced by a familiar alternative perceived as similar, in line with the habitual choice pattern. Thus, in a high applicability context there is a high probability of one or more products having been bought in the past (being part of the choice set), or at least having been included in the decision (being part of the consideration set; Shocker, Ben-Akiva, Boccara, & Nedungadi, 1991), thus, being mentally represented. Hence, there is a high probability of a partial or complete overlap between the products present in the choice context and the products within the habitual behaviour mental representation.

The selected product for the study – milk – was one for which non-organic buying habitual behaviour was less available at the time of the study, due to a generally low percentage of organic purchase (see e.g., Hughner, McDonagh, Prothero, Shultz, & Stanton, 2007). Thus, we expected a higher choice of products in line with the habitual behaviour (non-organic option) in a high applicability context than in a low applicability context. In addition, we sought to demonstrate this by requesting people to make two additional consecutive choices, after the first. In this scenario, even if the habitually chosen product (or a similar one) was selected, it could not be selected again and thus, an alternative had to be found. Despite an overall reduction in perceived applicability (given the reduction in available choices), a certain level of it might still be enough to allow choices in line with the habitually chosen product. Hence, we expected consistency in the choice of non-organic products across choices. The magnitude of this effect was expected to be higher in a high applicability context, given the higher activation potential of perceived applicability, and thus, higher consistency was also expected in this case.

To test these predictions, participants completed a web-based study, in which they were asked to choose three different products in three times, from a list of four organic and eight non-organic milk products (pre-tested and selected to reflect an uneven proportion of these two categories as in "real" shopping settings), being randomly assigned to two between-participant conditions or choice contexts: 1) high perceived applicability for the non-or-

ganic milk buying habitual behaviour (with national products); 2) low perceived applicability for the non-organic milk buying habitual behaviour (with foreign products).

Method

Participants and Design

A total of 80 participants (24 male; 56 female), students from the University of Évora who received credits for their participation, and people who volunteered to participate recruited by them, were included and offered the possibility of entering a draw to receive 50 Euros in CDs and DVDs. All fulfilled the criteria of buying food products for domestic consumption at least once every two weeks. The sample mean age was 28.16 years old (SD = 10.52; Min = 19; Max = 54), with the majority having a completed high school degree (60%) or university degree (27.50%). A questionnaire (see description below) portrayed them as frequent shoppers, shopping for food twice-a-week on average (M = 2.10, SD = 1.28), with a low percentage of reported organic food buying (M = 12.33%, SD = 19.85), and with 95% of the participants including organic products in 50% or less of the total products bought. Moreover, they had a medium intention to buy organic food in the future (M = 3.44, SD = 1.78). All this portrayed them as habitual non-organic food buyers.

Procedure

Participants were asked to take part in two web-based studies, one on "Health and Consumption" and one on "Real and Virtual Shopping Environments", by two different research groups. These were the same study but were presented as such in order to reduce the perceived connection between tasks. Upon providing their informed consent, they received a link to complete a web-based questionnaire regarding organic and dietetic/light products (introduced to make the study goal less salient). This included socio-demographic and purchase behaviour items and the future intention (from Ajzen, n.d.) to buy organic and diet products scale, with four items in a 7-point Likert-type scale (from 1 – *Completely disagree* to 7 – *Completely agree*), e.g., "I intend to buy organic products during the next month". Validity measures regarding our sample showed a very good level of reliability (α = .97). The questionnaire presented the concept "organic" before the main study, so that it could be equally familiar and accessible to all, in addition to measure participants' baseline intentions.

Two days after this task, participants received an email requesting them to participate in a second study. They were provided with a link for a web-based environment for an online shopping simulation, developed with the Comersus Cart (2004) Software and forms developed with *SurveyWiz* (Birnbaum, 2001). First, participants were given the option to be directed to one out of four different categories of products and told to press one of four buttons for that to happen. This attribution was perceived as random, although all led to the same product category: milk. After choosing, the decision making task instructions appeared. Participants were requested to choose the product they would most probably buy from a list and informed that the product would be provided to them, upon the study completion. In addition, they were asked to choose the product they would most probably buy as "second" and "third", in case the first option was not available in stock. At the study end they were given the option of receiving the product or entering an additional draw to win 50 Euros. All participants chose the latter.

Following the instructions, the list of eight (pre-tested) non-organic and four organic options appeared, showing the price, brand and a picture of the product (for more information on the pre-tests and images of the web shopping environment, please see the Appendix). Specifically concerning the price, this was approximated to the real market price, with both high and low price options available for each of the two categories organic and non-organic, to maintain this constant across products. Both high and low applicability contexts had the same type of products

in the same matching positions with similar same prices and description. Products pictures and brand names were different – national brands in the high applicability context and foreign brands in the low applicability context. The participants were randomly attributed to the applicability tasks (between participants).

After choosing three products from the same list in three consecutive choices, participants responded to the manipulation checks and socio-demographic variables. The first manipulation check asked the level of influence (in a 5 point Likert-type scale from "*no influence at all*" to "*strong influence*") of a list of factors over the participants' decision in the decision making tasks, including: perceived influence of their habitual behaviour in the choices made, how frequently they bought the three products chosen (1 to 5 scale, from "*never*" to "*four times or more*") and future intention to buy organic products (to retest the intention measure administered two days before). Upon study completion, participants were duly thanked for their participation and provided a contact if they wanted additional information and/or receive the study results.

Results and Discussion

The *t*-test for independent samples results showed no significant differences between the high applicability context and the low applicability context conditions, in terms of the sample characteristics and control questions asked at the end of the study. Participants in the high applicability context task reported an average frequency of buying the first choice product of twice or three times a month ($M = 3.70$, $SD = 1.49$), and the second and third on an average of once per month (second product: $M = 2.28$, $SD = 1.13$; third product: $M = 1.70$, $SD = .94$). Finally, there were no significant differences between the intention measure in the first and the second moment of the study (two days interval).

Concerning the influence of the products' price over the decisions made in the decision task, we have recoded the data into two categories of milk products: low price (below .70 Euros, the average price of all products together) and high price (above .70 Euros). Regarding the choice made in the high applicability context or the choice made in the low applicability context, results with the Binomial test showed no significant differences between the choice frequencies in the two price categories (high vs. low), in each of the three decisions made.

Decision Making Task

Binomial test results for the first choice in the high applicability context showed a significantly higher proportion of non-organic milk chosen (.95) than an expected proportion that would have been obtained by chance (.66) ($p < .001$; Binomial), with this representing the actual proportion existent in the choice list for the first decision. For the low applicability context, these differences were non-significant. To what concerns differences, in the non-organic milk choice, between the high applicability and low applicability context, Fisher's Exact test results showed that there was a higher proportion of non-organic products choices in the high applicability context (.95) compared to the low applicability context (.68) ($p = .002$; Fisher's exact test). This result shows that people did not decide by chance but, instead, were influenced by habitual behaviour in a context in which it was applicable. This is explained by a stronger overlap between non-organic products in the list and the one(s) associated with the habitual behaviour, given a higher frequency of their pairing in the past. Differently, in a low applicability context, this overlap was not expected.

Considering the three consecutive choices, Chi-square test results for the high applicability context showed that the decisions were significantly different from the results that would have been obtained by chance for the dependent events, either associated with the choice in the first decision and then the choice in the second, $\chi^2(3) = 23.01$, $p <$

.001; associated with the choice in the second decision and then with the choice in the third, $\chi^2(3) = 14.73$, $p <$ .005; and associated with the choice in the first decision and then with the choice in the third, $\chi^2(3) = 31.00$, $p <$ .001.

The Chi-square test was based on the probabilities calculation of choosing by chance in two consecutive choices from four possible combinations (e.g., organic in the first choice and non-organic in the second), in order to determine the expected frequencies and subsequent calculation of the partial Chi-squares for each combination (see Table 1). These were, in turn, aggregated in a composite Chi-square and the level of significance was determined from that. This composite Chi-square was calculated based on the sum of the partial Chi-squares associated with each of the four pairs of possible choices. The degrees of freedom were calculated from the number of cells (4) minus 1: $df = (N\text{-}1)$.

Table 1

Expected and Observed Values for the Combinations of Consecutive Product Choices – Familiar Context

Decision moment	Product choice consistency/ revision between decisions	Choice frequency		Composite Chi-square ($df = 3$)	p
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	31	23.01	<.000
	O-O	3.6	2		
	NO-O	9.6	7		
	O-NO	9.6	0		
2nd decision vs. 3rd decision	NO-NO	18.4	29	14.73	<.005
	O-O	4.0	2		
	NO-O	10.4	2		
	O-NO	10.4	7		
1st decision vs. 3rd decision	NO-NO	18.4	35	31.00	<.000
	O-O	4.0	1		
	NO-O	10.4	3		
	O-NO	10.4	1		

Note. O = Organic; NO= Non-organic.

With respect to the low applicability context, Chi-square test results showed that the decisions were significantly different from the results that would have been obtained by chance. This was, for the dependent events, associated with the choice in the first decision task and then the choice in the second decision task, $\chi^2(3) = 31.11$, $p <$ .001; associated with the choice in the second decision task and then with the choice in the third decision task, $\chi^2(3) = 23.01$, $p <$ .001; and associated with the choice in the first decision task and then the choice in the third decision task, $\chi^2(3) = 7.61$, $p \approx$ .050 (see Table 2).

McNemar's test results regarding the differences between decisions in the high applicability context showed a highly significant non-organic choice consistency (75%, $p <$ .001, i.e., choice of non-organic milk between two decisions) across the three decisions, with the highest consistency obtained between the first and third decisions (87.50%; $p =$ .000) and the lowest between the first and second (72.50%; $p <$ .001). Moreover, there was a significantly higher percentage of participants who revised their choice between the first and second decisions – choosing organic in the second decision after choosing non-organic in the first decision (17.5%) – than the opposite

Table 2

Expected and Observed Values for the Combinations of Consecutive Product Choices – New Context

Decision moment	Product choice consistency/ revision between decisions	Choice frequency		Composite Chi-square (*df* = 3)	*p*
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	22	31.11	<.001
	O-O	3.6	12		
	NO-O	9.6	5		
	O-NO	9.6	1		
2nd decision vs. 3rd decision	NO-NO	18.4	22	22.31	<.001
	O-O	4.0	11		
	NO-O	10.4	1		
	O-NO	10.4	6		
1st decision vs. 3rd decision	NO-NO	18.4	22	7.61	≈.05
	O-O	4.0	7		
	NO-O	10.4	5		
	O-NO	10.4	6		

Note. O = Organic; NO= Non-organic.

revision (0%) (*p* = .023; McNemar test). For other combinations of choices, this difference was non-significant. These results support the expectation that consistency will maintain itself overtime, following an adaptable habitual behaviour. This is because as long as other products are perceived as sufficiently applicable, the subsequent choices will be consistent with the first choice. Regarding the low applicability context, differences were significant only between the first and third choices (*p* = .009; McNemar test). Overall, there was a medium consistency in non-organic milk choice between the three decisions (55%). There were no significant differences in the choice revision.

Lastly, it should be noted that using frequency as an indicator of habitual behaviour, is a limitation of this study. This measure only provides an indication of habits presence from a "context-dependent" perspective but not from a "cue-dependent" perspective, with the effect of habitual behaviour in association with the latter having being inferred from the study results. Hence, Study 2 included a Self-Report Habit Index measure (SRHI; Verplanken & Orbell, 2003) that overcomes this limitation and that acknowledges habitual behaviour as having automatic features that go beyond frequency. In addition, organic products may be seen not as being a different alternative to non-organic, but rather as a more "expensive and less available" version of the same product. Therefore, it can be criticised that it is not a non-habitual alternative to non-organic and thus, it cannot be compared directly in terms of habitual vs. non-habitual. To overcome this, rather than comparing different options of the same product, Study 2 contrasted two different and mutually exclusive beverage products, varying in terms of degree of consumption: habitual vs. non-habitually chosen.

Study 2 – The Perceived Applicability and Chronic Accessibility Effect

In this study we aimed to explore the interaction between perceived applicability and habitual behaviour chronic accessibility (Higgins, 1989). Accessibility referred to the chronicity of the habitual behaviour mental representation, operationalised as habit strength: strong habit = high chronicity. Our main prediction focused on the low applicability context, in order to demonstrated that "strong accessibility can compensate for weak applicability" (Higgins & Brendl, 1995). Hence, we expect strong habit participants – high accessibility in the habitual behaviour mental representation – to evidence choice consistency between the low and high applicability context. The same was not expected for weak habit participants, more prone to context framing effects, thus choosing according to context and choice revision between contexts: more choice of the habitual product (or similar) in the high applicability context than in the low applicability. To assess this, participants were randomly assigned through an experimental design to four within participant's conditions: 2 (high vs. low perceived applicability for milk buying habitual behaviour) X 2 (strong vs. weak habit participants). Differently from Study 1, both contexts were presented, with a randomised order of presentation.

Method

One habitual product – milk – and one non-habitual product – orange juice – were chosen from the *Consumer Purchase Habits Questionnaire* of Study 1. The orange juice category was chosen because it appeared on the top five products in an infrequent way (2% in the first choice and 3% in the second) and with a small overall proportion (17%). The same *Familiar* and *Unfamiliar Brands Questionnaires* from study one were used to choose the orange juice products (see pre-tests description in the Appendix).

Participants and Design

A sample of 160 participants (28 male; 132 female), students from the University of Évora who received credits for their participation, and people who volunteered to participate recruited by them, were included and offered the possibility of entering a draw to receive 50 Euros in CDs and DVDs. All fulfilled the criteria of buying food products for domestic consumption at least once every two weeks. The sample mean age was 25.53 years old (*SD* = 7.56; *Min* = 18; *Max* = 60), with the majority having a completed high school (56.90%) or university degree (33.10%).

Procedure

The same procedure as in Study 1 was used. The main differences were that participants performed both applicability tasks (within-participants) in two randomised orders with different products, and had a habit strength measure. Upon providing their informed consent, participants were requested to perform the two tasks/contexts. In the high perceived applicability task the instructions stated: "Imagine that you are home and have to prepare breakfast or lunch." In the low perceived applicability task, they stated: "Imagine that you are at a friend's house in another country and have to prepare breakfast or lunch." The products list consisted of six options of UHT milk options and six options of orange juice.

After choosing the products, participants responded to: 1) Socio-demographic items; 2) and a Self-Report Habit Index measure (SRHI; Verplanken & Orbell, 2003) adapted for milk and orange juice buying habitual behaviour (using a 7-point Likert-type measure from *Completely Disagree* to *Completely Agree*; e.g. "Buying milk is something that I do automatically"; "Buying milk is something that I do without thinking"); and 3) future intentions to buy milk

and orange juice (Ajzen, n.d.). Results regarding psychometric properties of the SHRI measure showed both a very good level of reliability concerning milk ($α$ = .93) and orange juice ($α$ = .95). The same was the case for the future intentions to buy milk ($α$ = .91) and to buy orange juice ($α$ = .96) scales.

The SRHI measure allowed the formation of two groups of participants based on the highest (Q = 5.42) – strong habits – and lowest (Q = 3.37) – weak habits – quartiles (for a similar procedure see Verplanken & Holland, 2002). Accordingly, participants with high values, performed behaviour frequently, with high efficiency, reduced control and awareness, and as part of their identity or personal style (Verplanken & Orbell, 2003). Hence, we considered that strong habitual behaviour participants would also be chronic to what concerns this mental construct, given that chronic accessibility results from the frequent activation of the construct in the past (Higgins, 1989; Higgins & Brendl, 1995). Moreover, SRHI validity studies showed that this measure strongly correlates with response frequency measures of habitual behaviour (Verplanken & Orbell, 2003; Study 2). Upon study completion, participants were duly thanked for their participation and provided a contact if they wanted additional information and/or receive the study results.

Results and Discussion

Regarding the baseline characteristics of the sample, there was an overall moderate strength of the habitual behaviour mental representation concerning milk buying (M = 4.27, SD = 1.42), which the Paired-Samples t-test showed as significantly higher than the strength of the habitual behaviour mental representation concerning orange juice (M = 2.41, SD = 1.37), t(159) = 12.00; p < .001. Regarding future intention to buy the products, there was a very high intention to buy milk in the future (M = 6.24, SD = 1.33), which the Paired-Samples t-test showed as significantly higher than the intention to buy orange juice in the future (M = 4.05, SD = 2.03), t(159) = 10.81, p < .001.

The independent-samples t-test results showed no significant differences between the "weak vs. strong habit" participants in the SRHI for orange juice, in the intentions to buy it in the future, and in the level of influence of habitual behaviour and price over that decision. A significant difference was found for the intentions to buy milk in the future between strong (M = 6.80, SD = .44) and weak habitual behaviour participants (M = 4.86, SD = 1.94), t(77) = 6.10, p < .001, d = 1.40.

Decision Making Task

Regarding order effects, results from the Fisher's exact showed no differences for the High-Low and Low-High applicability orders.

Chi-square test results for the consecutive choices made in the high applicability and low applicability context showed that the decisions made were significantly different from the results that would have been obtained by chance for the independent events, either for the strong, $χ^2$(3) = 26.54, p < .001; or for the weak habitual behaviour participants, $χ^2$(3) = 16.80, p < .001.

McNemar's test results regarding differences between decisions in the high applicability vs. low applicability context for the strong habitual behaviour participants showed a higher choice consistency for the habitual (58.97%) than for the non-habitual products chosen (12.82%) between contexts (p = .000; McNemar test). Regarding revision between contexts, there were no significant differences. This is in accordance with Higgins and Brendl's (1995) activation rule: "*Strong accessibility can compensate for weak applicability*". In the absence of the preferred

products, the presence of familiar products can still be enough for the choice of the habitually chosen product to remain consistent between contexts, for people with a strong habitual behaviour. Differently, there was a significantly higher percentage of weak habitual behaviour participants who have revised their choice, by choosing the non-habitual product in the low applicability context and the habitual in the high applicability context (45%) when compared to the opposite revision (0%) (p = .002; McNemar test). There were no significant differences in consistency between contexts. Thus, these participants seem to have been more influenced by context and chose more often the habitual product in the high applicability context and the non-habitual product in the low applicability context.

General Discussion

Habitual behaviours are mentally represented as automatic behaviours that can be triggered by environmental cues (Aarts et al., 1998; Aarts & Dijksterhuis, 2000; Gardner, 2012; Verplanken et al., 1997; Wood & Neal, 2007), sharing some characteristics with other types of mental constructs (Aarts & Dijksterhuis, 2000), one being their dynamism. Given this, we consider the idea that if context changes and becomes new, unfamiliar and/or unstable, habitual behaviour should be disrupted – as supported by the *habit discontinuity hypothesis* (see Verplanken et al., 2008) – may not always apply. Even when context changes through a reduction in perceived applicability, habitual behaviour can still occur, as long as its mental representation activation is maintained. Hence, in a food choice context such as the one in our study, the habitual behaviour can still be implemented, even if it is not possible to choose the habitually bought product. This occurred both when: 1) the initial choice context implied a high perceived applicability that was reduced in subsequent consecutive choices, as long as familiar choices that could work as alternatives or substitutions to the habitual choice were still present – Study 1; and 2) the perceived applicability was low but the chronic accessibility of the habitual behaviour mental representation was high (strong habitual behaviour), thus compensating for the former – Study 2.

These findings suggest that people adapted to changes within (consecutive choices) and between (familiar vs. new) contexts, compensate the preferred product absence with other products that may have co-occurred with it or even been chosen in the past as alternative means to achieve the behavioural goals. This implies that, although habits are considered to be automatic behaviours, their operation is not necessarily unconscious. In fact, considering the decisions made under three consecutive choices (Study 1), results indicate that deliberative and conscious processes could have also come into play. This is in line with the view of behaviour as being determined by two parallel processing systems (see Gardner, 2015, p. 278): 1) "an impulsive pathway, such that perception of cues activates low-level context-behaviour associations, which prompt behaviour rapidly and efficiently, with minimal forethought"; and 2) "a reflective pathway, whereby a cue initiates rule-based deliberation, which directs behaviour slowly and effortfully". This is also in line with Goal Systems Theory (Kruglanski et al., 2002): to achieve their habitually pursued goal, people can substitute their habitual mean by another mean that also allows achieving it. Moreover, while people with strong habitual behaviour may adapt to certain context changes, Study 2 results showed that this is not the case for weak habitual behaviour participants. These were more influenced by contextual changes and thus, more susceptible to habit disruption. For these people, the prediction that decision processes change when context changes, thus disrupting habitual behaviour (Neal et al., 2006; Ouellette & Wood, 1998; Verplanken et al., 2008; Verplanken & Wood, 2006; Wood & Neal, 2007; Wood et al., 2005), seemed to hold.

Under this view, habitual behaviour mental representation dynamism can result from their association with behavioural goals, either by being part of the habitual behaviours mental representation (Aarts & Dijksterhuis, 2000) or by interacting with it (Wood & Neal, 2007). Based on this, future research may further explore the conditions under which such activation of habitual pursued goals occurs. Our studies were limited in this regard and did not directly tested this but rather inferred it through evidence that this took place in the studies performed. Also, it might be interesting for future studies to assess if it is (or not) the behavioural goals that confer the dynamic properties to the habitual behaviours mental representations, thus making them less context-dependent and more cue-dependent. This is because "in order to be effective, goal pursuit must be adaptive" (Hassin, Aarts, Eitam, Custers, & Kleiman, 2009, p. 550), which in turns depends on cognitive and behavioural flexibility. This can happen, for example, through the adoption of new means to achieve the goal (Kruglanski et al., 2002), if the context changes and the old means do not apply anymore (Hassin, Bargh, & Zimerman, 2009). In fact, habitual behavioural goals pursuit should allow for quick "online" adaptation to novel circumstances (Hassin, Bargh, et al., 2009), for example when someone goes to the supermarket and the habitual bought product is not available. In this case, we can decide not to buy it or buy elsewhere, but we can also find an alternative product, thus becoming an adaptive decision maker.

Despite a deeper understanding of the processes involved is needed, the idea of dynamism is not so surprising given that this mirrors "real life". In everyday decisions, people frequently encounter changes in the decisional contexts, such as, for example: 1) being confronted with the absence of their habitually chosen product in the supermarket or local store shelf; 2) having to relocate to a different geographical and cultural context in which the habitually chosen options are not present or are, at least, different (e.g., moving to another country or city); 3) increase in social pressure to choose alternative products (e.g., the organic alternative). Accordingly, consumers are adaptive decision makers (Palma-Oliveira, 1995; Payne, Bettman, & Johnson, 1993) with adaptable habitual behaviours that make them able to overcome these contextual changes under certain conditions (Gaspar et al., 2010). This implies that habitual behaviours may, for example, be strong barriers to ecological behaviour change. such as organic products purchase, potentially inhibiting ecological behavioural goals (Gaspar, 2013).

The dynamic nature of habitual behaviours mental representations, as preliminarily evidenced from the results presented, should not make us pessimistic regarding their change. In fact, in order to be successful, interventions aimed at disrupting habitual behaviour should take this into account and develop self-regulatory competency (Fraijo-Sing, Corral-Verdugo, Tapia-Fonllem, & González-Lomelí, 2010) for the effective implementation of intentions (Holland, Aarts, & Langendam, 2006). This should allow developing "good" habitual behaviours associated with dynamic mental representations that strive for "system stability" (Barrett, 2014) in face of inner and outer changing environments.

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Competing Interests

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Appendix: Pre-Tests and Images of the Web Shopping Environment

Pre-Tests

Consumer's Purchase - Habits Questionnaire

A questionnaire was designed in order to assess food products with stronger associated habits and answered by 100 frequent shoppers (14 male and 86 female) who provided informed consent to participate. These were recruited through a snowball procedure by students from University of Évora, who were given credits for this. It allowed the identification of the five products bought more often and the corresponding habit strength for the two most frequently bought products. The latter measure comprised an adaptation of the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003) to the Portuguese language. This questionnaire comprises 12 items (in a seven point Likert-type scale, from one – the lowest activation strength to seven – the highest activation strength) which tap into the automaticity features of habit. Measures regarding our sample showed a very good level of reliability (α = .87) and moderate Item-total correlations (the lowest being .42, p <.001).

From the answers, we chose the milk category (UHT Semi-skimmed) for our main study, since 53% of the participants reported it in the top five and 31% in the Top two products most frequently bought; there was a Moderate-to-High level habit activation strength on the SRHI (between M = 4.91, SD = .96 for the participants who chose it as first product and M = 4.61, SD = 1.18 for those who have chosen it in second place).

Familiar Brands Questionnaire

60 frequent shoppers (21 male and 39 female) volunteered to participate and provided their informed consent to participate in a Web-Based questionnaire. This was designed to assess their most frequently purchased and familiar, organic and Non-organic milk brands. Open-ended questions - brands recall - allowed choosing the 12 brands, to be used in the high perceived

applicability task: eight Non-organic products and four organic products. We chose a proportion of .66 for Non-organic products (8/12) and a proportion of .33 for organic products (4/12), based on a market study performed by searching all national super-markets online shopping webpages available, which showed an average proportion of .17 organic products (2/12). To reduce the possible influence of salience effects from this small proportion (see Higgins, 1996) but at the same time to maintain a realistic proportion, we increased it to .33 (4/12) in the main study.

Unfamiliar Brands Questionnaire

A questionnaire answered by 21 participants (five male and 16 female) who volunteered to participate and provided their informed consent was designed to Pre-test a list of 18 foreign (United Kingdom) products. These were the most frequently available in online shopping pages and participants were asked to manifest their preference for each brand. 12 Semi-skimmed UHT milk products (eight Non-organic and four organic) equivalent to the familiar brands chosen in the above Pre-test, were chosen to be used in the low perceived applicability task.

Web Shopping Environment

Study 1 - Familiar Context Condition – Web Shopping Environment

Study 1 - Unfamiliar Context Condition – Web Shopping Environment

Study 2 - Familiar Context Condition – Web Shopping Environment

Study 2 - Unfamiliar Context Condition – Web Shopping Environment

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