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# AN EYE TRACKING STUDY OF OPTIONAL DECISION CONSTRUCTS IN B2C TRANSACTIONAL PROCESSES

Mairéad Hogan

*National University of Ireland Galway,  
Galway, Ireland*

Chris Barry

*National University of Ireland Galway,  
Galway, Ireland*

Ann M. Torres

*National University of Ireland Galway,  
Galway, Ireland*

## ABSTRACT

Previous research indicated the design of certain decision constructs could be unclear to users in the business to consumer (B2C) transactional process. This pilot study, using eye tracking and cued retrospective think-aloud (RTA) sessions, examines potentially problematic decision constructs. It explores the impact of decision constructs on users' decision making and their cognitive processes during interactions. The key contributions of the study are the identification of improvements the researchers can make to their research design; robust experiment administration; and the refinement of research instruments. Ultimately, the pilot study will contribute to a more extensive study that combines quantitative eye tracking and qualitative cued RTA data to assess some questionable website design choices made by firms.

## KEYWORDS

Web design, usability, ethical design, eye tracking, opt-out.

## 1. DECISION CONSTRUCTS

### 1.1 Background

Decision constructs used in B2C transactional processes are essential or optional (Hogan et al., 2014). An essential decision is one where the user must choose from a number of variants before continuing with the transaction (e.g., selecting a payment method). An optional decision involves accepting or rejecting an option (e.g., an extended warranty). Hogan et al. (2014) identified the following seven distinct decision constructs: un-selected and pre-selected opt-ins; un-selected and pre-selected opt-outs; must-opts; and un-selected and pre-selected essential decisions. A must-opt has no default value and requires the user to explicitly choose one of the variants (which always includes a variant declining the option) offered. Barry et al. (2014a) assessed decision constructs across 25 websites for clarity. While most constructs do not present problems, the opt-out was frequently presented in a way where the user could inadvertently make an unwanted choice. Variants of the opt-out decision construct are the subject of this pilot study.

### 1.2 Decision Construct Elements

#### 1.2.1 Default Value

Website designers may choose to present a decision construct in an un-selected or pre-selected manner. In the last section, we identified: opt-in, opt-out and essential decisions that can be presented in either way.

Presenting the construct as un-selected or pre-selected is a conscious choice by the firm. The construct may be framed variously and may or may not be accompanied with a degree of persuasion.

### 1.2.2 Framing

Decision framing is important; it may be acceptance, neutral or rejection (e.g., acceptance - 'I want an Extended Warranty'; neutral - 'Extended Warranty - tick Yes or No'; rejection - 'I do *not* want Collision Damage Waiver'.) There is often a 'natural' frame for a type of decision construct. For example, opt-out decisions normally appear as a pre-selected tick in a checkbox with associated acceptance framing (e.g., 'I want Express Delivery') and opt-in decisions are normally presented as an un-selected checkbox with acceptance framing (Barry et al., 2014b). However, firms and systems designers sometimes design constructs in a counterintuitive manner. For example, an opt-out construct can be designed as un-selected with rejection framing, appearing like a 'normal' opt-in decision, and possibly misleading or confusing users.

### 1.2.3 Persuaders

Firms may encourage consumers to select an option by adding additional persuasion to the decision construct, which may vary from a brief statement of benefits to more emphatic persuaders. This study examines different variants of opt-outs, which can be either un-selected or pre-selected. The latter can use acceptance, neutral or rejection framing, while un-selected opt-outs can only be presented using rejection framing (Barry et al., 2015). Each of these variants may or may not include additional persuasion.

## 1.3 Eye Tracking Research

Eye tracking technology works on the principle of focusing a light and a video camera on a person's eye to determine where the individual is looking on screen (Nielsen and Pernice, 2009). When an individual wants to pay attention to something, they fix their gaze on it and it comes into sharp focus. A person typically moves their eye across items of interest. These movements are jerky and happen so quickly we are not aware of them. When the eye is focused on an area of interest, it is referred to as a fixation, while the movements between items of interest are called saccades (Nielsen and Pernice, 2009). The saccades are rapid, lasting between one-hundredth and one-tenth of a second, while fixations last between one-tenth and a half second.

Eye tracking has been employed extensively in web usability studies (Djamasbi et al., 2011; Di Stasi et al., 2011; Huang and Kuo, 2011; Sivaji, et al., 2011; Djamasbi et al., 2010). Goh et al. (2013) compared a number of usability testing techniques for an e-commerce website and found the use of cued retrospective think-aloud (RTA), identified significantly more usability problems than un-cued RTA, observation or feedback capture after task (FCAT). By studying what users do and do not look at, it is possible to determine where they are concentrating their attention (Pernice and Nielsen, 2009). Through the examination of eye movement patterns, conclusions may then be drawn regarding the decision-making strategies users adopt (Glockner and Herbold, 2011; Huang and Kuo, 2011; Day et al., 2006).

## 2. RESEARCH APPROACH

This pilot study seeks to validate the research design for an extensive eye tracking and RTA study to comprehensively analyse all the constructs within the taxonomy described above. Its purpose is twofold: to learn from the process of constructing an eye tracking experiment and to fine-tune the research instruments (Barry et al., 2014a). The more extensive study seeks to confirm the key dimensions influencing user's decision-making in B2C transactional processes. Hence, the following research question emerges:

*RQ: How are users impacted by differently designed opt-out decision constructs?*

Pernice and Nielsen (2009) recommend six users for qualitative eye tracking (i.e., watching gaze replays). As this pilot tested the approach before conducting a larger scale study, six users carried out the tasks while their gaze was tracked using eye tracking equipment. A cued RTA was then conducted where the participant was shown a replay of their interaction with the gaze pattern superimposed on the screen (Ball et al., 2006). While watching the replay, participants described why they made their decisions and what they were thinking while interacting with the decision constructs. The tasks presented to the users involved making certain selections using a variety of opt-out decision constructs.

The webpages presented to participants were based on real interactions encountered on B2C websites. However, as most of these decision constructs were on pages that included multiple decision constructs, it was decided to create webpages, using anonyms, similar to the original but containing only a single decision construct. While this approach reduced the realism of the user interaction, it minimised the effects of extraneous variables on the validity of the experiment.

The participants were brought into the laboratory and the experiment explained. The equipment was calibrated for each participant before the experiment began. The first screen presented to the participant was a test screen (see Figure 1 for the decision construct on the test page). The purpose of this page was to explain to the participant what was required of them in the experiment. They were shown the area in which the decision construct was located and told they would be instructed what decision they were required to make (i.e., to either accept or decline the option). For the test page, participants were told the required decision was to agree to participate in the experiment. The correct course of action was, in this case, to press the ‘Leave Checkbox’ button.

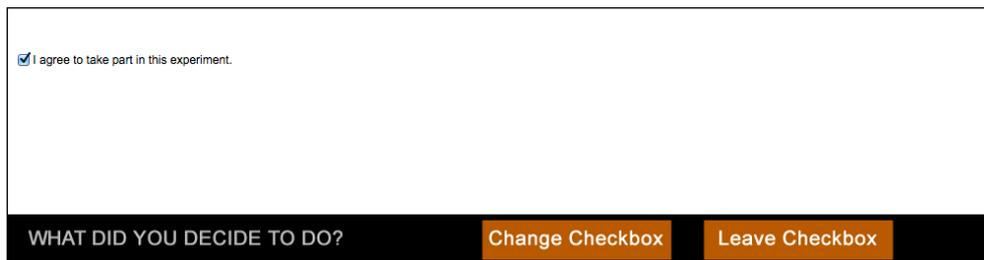


Figure 1. Test page with decision construct and checkboxes

The participants were then presented with each of the opt-out website variants. The presentation order was randomised to minimise bias in the results. For each screen, the participant was told what decision to make and they should press the appropriate button corresponding to the correct action. Once the eight screens were completed, the cued RTA was conducted while playing an animation of the interaction. The test screen was initially shown in order to familiarise them with the way in which the eye movement was superimposed on the screen. The process of cued RTA was also explained, and participants asked to articulate the thought process they followed during the interaction with each webpage. Prompts were used in order to facilitate the verbalisation. Once the RTAs were complete, a de-briefing was conducted to gather feedback on the conduct of the experiment and the RTA. This de-briefing was employed to improve the experiment design.

### 3. FINDINGS

#### 3.1 Data Analysis

Table 1 below lays out the details of eight webpages used in the experiment. The eye tracking data were analysed in a number of ways. Reports were produced based on the total interaction and on the interactions with the interest areas. Data such as dwell time (i.e., summation of fixation times), fixation count for individual interest areas and interaction duration were analysed.

The first step in the analysis was to define interest areas (IAs) on the webpages. These are the areas of the screen where the number of fixations is tracked. For each webpage, the decision construct was located within the same rectangular area on each screen, declared the decision construct interest area. Two additional interest areas were defined for the buttons: ‘Change Checkbox’ and ‘Leave Checkbox’.

The trial analysis is shown in Table 2, outlining: the duration of the interaction; the total dwell time (the sum of all fixation times); the number of fixations during the interaction; and the mean duration of each fixation. All times are in milliseconds. AnzAir had the longest mean duration and dwell time of all the decision constructs, followed by Aer Seamróg, TheatreTix, Blue Daisy Hotel, BestInsure, Balkan Blue Air, RS Sports and Auto Assist. The decision construct on AnzAir was a pre-selected opt-out with neutral framing and additional persuasion. This particular example, taken from a real website, was longer than the other

constructs due to having considerably more persuasion. This may explain the longer dwell time and the higher number of fixations associated with the construct.

Table 1. Decision construct types

Website	Task	Framing	Persuasion	Word Count
Aer Seamróg	Un-selected opt-out	Rejection	Yes	29
AnzAir	Pre-selected opt-out	Neutral	Yes	79
Auto Assist	Pre-selected opt-out	Neutral	None	5
Balkan Blue Air	Pre-selected opt-out	Acceptance	None	13
BestInsure	Un-selected opt-out	Rejection	None	17
Blue Daisy Hotel	Pre-selected opt-out	Acceptance	Yes	44
RS Sports	Pre-selected opt-out	Rejection	None	13
TheatreTix	Pre-selected opt-out	Rejection	Yes	26

Aside from AnzAir, the longest dwell times were associated with constructs using rejection framing. Rejection framing involves the use of negative language, such as “Please untick this box if you do not want to receive our newsletter that gives you the week’s top news, features and hot tickets” (TheatreTix). These constructs tell the user what action they need to take if they do not want something. The dwell time and number of fixations required to understand the wording suggest more cognitive effort was required on the part of the participant to make a decision on the action necessary to achieve their goal. The level of cognitive effort required is reinforced by comments made by participants during the RTA.

Table 2. Total fixations by decision construct

Website	Duration (ms)	Total Dwell Time (ms)	Fixation Count	Mean Fixation Duration (ms)
Aer Seamróg	14031.67	11594.50	59.83	197.26
AnzAir	17657.17	15271.00	72.33	211.01
Auto Assist	9419.67	7852.50	39.50	205.81
Balkan Blue Air	10421.50	8692.17	42.67	214.46
BestInsure	12550.33	10612.67	49.83	216.37
Blue Daisy Hotel	9977.67	8472.83	42.67	208.96
RS Sports	12067.50	10386.50	48.33	220.54
TheatreTix	13930.67	11781.17	55.83	217.57

The number of words in each of the constructs using rejection framing ranged from 13 to 29 words. The construct with 26 words had the highest number of fixations and the longest dwell time, which suggests the word count may not be the deciding factor in the interaction duration. This finding is further reinforced by the fact that one of the constructs using acceptance framing (Blue Daisy Hotel) had a considerably higher word count (44 words), but had the second shortest dwell time. The decision constructs, except for AnzAir’s wordy construct, using either acceptance or neutral framing had shorter dwell times and fewer fixations, suggesting less cognitive effort. This finding is again supported by comments during the RTA.

The analysis continued by examining the fixation count and dwell time for each of the interest areas. As can be seen from Table 3, the dwell time and fixation count were, unsurprisingly, considerably higher on the decision construct interest area than on the change or leave checkbox interest areas, as participants spent much more time considering the text of the decision construct than the buttons. Participants did also spend time fixating on the buttons deciding which one to press. In all cases, they spent more dwell time on the correct button, rather than the incorrect button. However, for three of the decision constructs using rejection framing (i.e., Aer Seamróg, TheatreTix and RS Sports), participants divided their dwell time more evenly than for constructs that used neutral or acceptance framing. This finding suggests the correct course of action was less obvious in these cases, requiring participants to spend time considering both options before making a final decision. In the case of BestInsure, the final construct using rejection framing, the language used, while phrased negatively, was relatively straightforward (i.e., “Quote valid for 30 days. If you do not wish to receive email reminders, please tick here”) in comparison to the other constructs using rejection framing. In this case, while less time was spent fixating on the ‘wrong’ button relative to other constructs using rejection

framing, the overall dwell time for the areas of interest was still higher than for the constructs using neutral or rejection framing, suggesting this decision required more cognitive effort.

Table 3. Fixations and dwell time by interest area

Website	Interest Area (IA)	Fixation Count	Dwell Tim (ms)	Total Dwell Time for IAs (ms)
Aer Seamróg	Change	2.67	508.83	6788.16
	Decision Construct	29.00	5594.50	
	Leave	2.67	684.83	
AnzAir	Change	3.50	999.17	10897.17
	Decision Construct	48.50	9765.67	
	Leave	0.50	132.33	
Auto Assist	Change	2.33	313.67	3975.5
	Decision Construct	14.83	2794.00	
	Leave	2.33	867.83	
Balkan Blue Air	Change	1.67	287.00	4852.67
	Decision Construct	18.33	3477.17	
	Leave	2.83	1088.50	
BestInsure	Change	3.00	677.50	5982.17
	Decision Construct	25.17	5272.67	
	Leave	0.17	32.00	
Blue Daisy Hotel	Change	2.67	794.17	5430.84
	Decision Construct	23.50	4395.00	
	Leave	1.00	241.67	
RS Sports	Change	3.17	734.67	6117
	Decision Construct	22.83	4848.00	
	Leave	1.33	534.33	
TheatreTix	Change	2.00	357.83	6807.83
	Decision Construct	28.00	5763.33	
	Leave	1.67	686.67	

## 3.2 Cued RTA Analysis

### 3.2.1 Neutral Framing

Of the eight decision constructs, those using neutral framing (i.e., AutoAssist and AnzAir) were perceived as being the most credible. Participants believed firms using neutral framing were more honest and trustworthy, as they were *“not deliberately making [i.e., nudging] consumers behave in a particular way.”* Further, participants were less likely to misinterpret the neutral decision constructs, which would lead them to making an incorrect decision. Availing of pre-selected opt-outs within the decision construct was typically not a concern among participants. For AutoAssist, all participants found the presentation to be clear and unambiguous, and no participant misinterpreted the decision construct. Indeed, they liked the straightforward, uncomplicated phrasing, which allowed them to decide quickly whether to accept or reject the item. With respect to AnzAir, although participants found this decision construct to be verbose, they appreciated the neutral framing, which one participant commented was *“in stark contrast to the other airline.”* One participant misinterpreted AnzAir’s construct, which they attributed to skimming over the passage or skipping it altogether, as they are *“used to skipping to the checkbox.”* Hence, AnzAir might benefit by presenting information more concisely, as consumers are likely to scan or skip longer passages.

### 3.2.2 Acceptance Framing

Acceptance framing (i.e., Balkan Blue Air and Blue Daisy Hotel) was also found to be quite satisfactory, as it is consistent with participants’ preference: clear, straightforward and unambiguous. Indeed, participants made correct decisions in all cases. Participants believed pre-selection correlated with agreement and if they

unchecked the box, it meant they did not agree or did not want a particular action. However, participants typically perceived a pre-selected checkbox, as firms “*forcing a choice on consumers.*” For example, one participant suggested Balkan Blue Air’s phrasing was deliberate, as the firm was “*trying to get you to read quickly without changing the decision they have made for you.*” Hence, without articulating differences between opt-in and opt-out, participants effectively preferred opt-in to opt-out constructs. In Balkan Blue Air’s favour, participants liked the direct and concise decision construct presentation. Regardless of framing, participants generally preferred concise decision constructs, as they found it “*easy to make a decision quickly.*” With Blue Daisy Hotel, although a bit long-winded, the participants appreciated the courteous manner (i.e., “*Please sign-up ...*”) in which the firm invited consumers to sign-up for an email newsletter. Indeed, one participant commented they were “*probably more likely to sign-up because the firm was polite*” and another participant believed the firm was “*very helpful and clear about how often they would email*” (i.e., monthly), which indicated the hotel “*cared about customer service.*” Provided they were interested, participants appreciated knowing they would only receive one email per month, as many participants commented they did not like receiving unnecessary and frequent emails from firms.

### 3.2.3 Rejection Framing

The decision constructs using rejection framing (i.e., Aer Seamróg, TheatreTix, RS Sports and BestInsure) were more problematic for participants, primarily because of their lack of clarity. Consequently, participants were more likely to misinterpret decision constructs employing pre-selected rejection framing, leading them to formulate an incorrect decision. Participants generally believed firms using rejection framing were less honest and less trustworthy, as the firms were “*deliberately trying to make you do something*” (e.g., sign-up for a newsletter or purchase an ancillary product feature). The use of negative framing within decision constructs was confusing and unclear to participants, as it seemed counterintuitive to them (i.e., “*check the box if you do not want to receive newsletters...* ”).

Those firms employing rejection framing in conjunction with an un-selected opt-out (i.e., BestInsure and Aer Seamróg) were perceived slightly more favourably, particularly if the construct was concise. For example, most participants found BestInsure’s construct to be straightforward and brief. Some participants read this construct several times because the first sentence indicated the quote was valid for 30 days and the second sentence invited consumers to sign-up for email reminders regarding the quote. Hence, it appears this firm could increase consumer comprehension by enhancing construct clarity. Mitigating BestInsure’s decision construct was its brevity as it was “*easy to make a decision quickly.*”

To many participants, it is the norm to “*check a box to receive something*”, whereas in the case of Aer Seamróg’s decision construct (i.e., un-selected opt-out, rejection framing) it was asking participants to do the opposite (i.e., check the box to *not* receive a newsletter). Hence, many participants read Aer Seamróg’s decision construct several times to ensure they understood it correctly. Indeed, one of the participants did make the wrong decision. Some believed Aer Seamróg deliberately used this phrasing, hoping consumers might skim quickly, inadvertently leaving the box unchecked and thus receiving the newsletters and offers. Others suggested the checkbox placed at the end of the Aer Seamróg’s decision construct (i.e., rather than at the beginning) was atypical and deliberate, where “*it might go unnoticed by consumers.*”

Those firms employing rejection framing in conjunction with a pre-selected opt-out (i.e., TheatreTix and RS Sports) were highly problematic decision constructs. Participants found the wording of TheatreTix’s construct verbose, unclear and confusing. They read the construct a number of times to ensure they took the correct action. Consumers were asked to uncheck a box so as not to receive a newsletter. Participants found this double negative (i.e., “*uncheck not to get it*”) confusing. Some felt it may “*make sense for the company*” because consumers would inadvertently “*receive emails if they did not read carefully and uncheck the box*”, Nonetheless, participants found the presentation to be contrived and unnecessarily confusing. Indeed, their preference was for clear, short and unambiguous phrasing (e.g., check the box to receive a newsletter).

RS Sports presented the most problematic decision construct. In this case, brevity did not confer an advantage to the firm. Indeed, half of the participants (i.e., 3 of 6 participants) misinterpreted the decision construct, thereby making the incorrect decision. Participants were asked to uncheck a box so as not to receive a newsletter; one participant found the “*double negative confusing*” and read the passage a few times to ensure they made the correct decision. Participants generally found this kind of phrasing potentially misleading, as it would be easy for consumers to misinterpret what they were being asked to do. Most

participants preferred to check a box to receive something. Hence, it is counterintuitive for them “*to do something*” [i.e., uncheck the box] *so as not to get something; it would be easy to choose the wrong option.*”

### 3.3 Discussion of Findings

The data analysis suggests the deciding factor in the duration and dwell time for the interaction with an opt-out decision construct is the framing of the construct. Those employing rejection framing generally had longer interaction times, longer dwell times and more fixations than those presented using either neutral or acceptance framing. The RTA reinforced this as rejection framing proved more problematic, primarily because of the lack of clarity. Participants found the use of double negatives confusing and typically read the passages several times to ensure they made the correct decision. Participants were also more likely to misinterpret decision constructs using rejection framing. Participants generally believed firms using rejection framing were less honest and less trustworthy, as they were “*deliberately trying to make you do something.*”

Neutral framing was deemed to be more credible during the RTA; participants believed firms using neutral framing were more honest and trustworthy, as the firms were not nudging “*consumers to behave in a particular way.*” Acceptance framing was also considered to be clear, straightforward and unambiguous. None of the participants misinterpreted the acceptance decision constructs while one misinterpreted a neutral framing construct, which is in contrast to four errors on constructs using rejection framing. Regardless of framing, participants preferred brevity in decision constructs because it is “*easy to make a decision quickly.*”

The default value (i.e., whether pre-selected or un-selected) did not seem to impact on interaction times, dwell times and the number of fixations. The two un-selected opt-outs, which by their nature must use rejection framing, had the third and fourth longest interaction and dwell times whereas the two longest were pre-selected opt-outs. However, the default value did influence participants’ attitude who typically perceived a pre-selected checkbox as firms “*forcing a choice on consumers.*” Participants also believed pre-selection correlated with agreement and if they unchecked the box, it meant they did not agree or did not want a particular action. Conversely, in some cases, they appeared to misunderstand the un-selected opt-out, as they seemed to believe a checked box indicated they would be getting something while an unchecked box indicated they would not be getting something. While the terms opt-in or opt-out were not articulated in the experiment, some participants said they preferred the un-selected version, as they believed they needed to take action in order to receive the option. These constructs were typically the ones where the participants made the wrong decision, presumably believing, since it was un-selected, it was an opt-in.

With persuasion, there would appear to be less of a pattern in interaction times. The two constructs using rejection framing and persuasion had longer interaction times than the two that did not use persuasion while the construct using neutral framing and persuasion had a longer interaction time than the construct using neutral framing and no persuasion. However, the construct using acceptance framing and persuasion had shorter interaction times than the construct using acceptance framing and no persuasion. Thus, it would appear that all other things being equal, persuasion might impact the interaction times. Naturally, confirming this finding requires many more participants than used in this pilot. Persuasion did, in some cases, appear to influence the likelihood of the participant wishing to avail of the proffered option. Several participants commented on the politeness and courtesy of the Blue Daisy Hotel construct and stated they were “*more likely to sign-up because the firm was polite.*” This finding was the only case where participants appeared to be persuaded by the phrasing of the construct, suggesting only certain types of persuasion may be effective.

## 4. CONCLUSIONS AND FURTHER RESEARCH

The pilot study was conducted to learn from the process and improve the research instruments for a more extensive study. The key lessons ascertained were to ensure participants: are fully briefed before they commence the test; perform the interaction as instructed working with neither haste nor laboring the tasks; and are de-briefed after the test to ascertain insights into their behaviour. The authors are confident the pilot was sufficient preparation to ensure the main study will be both robust and reliable. It is planned to employ a post-trial questionnaire to measure construct features such as clarity and ease of use. The authors also expect to compare and contrast different types of constructs, such as: pre-selected versus un-selected; negative versus positive framing; and additional persuaders versus no persuaders.

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