BENTLEY UNIVERSITY

Metacognition and Decision Making

A Case Study on DirectLineCruises.com

Michael Andryauskas

11/28/2016

Metacognition can be best described as thinking about how people think (Flavell, 1979; Yeung & Summerfield, 2012). While initially thought of as a uniquely human trait, evidence has recently surfaced suggesting that other animals use metacognition to forage for food (Metcalfe & Jacobs, 2009) and to escape potentially harmful situations (Kornell, 2009). Our ability to make decisions is one of the many human tasks that require our metacognitive abilities (Yeung & Summerfield, 2012). Scientists once believed that the brain was an infallible logic-based organ capable of making perfect decisions every time (Lipshitz et. al, 2001). However, after decades of study on the brain's decision making methods, scientists realize that there are still blind spots that make the mind susceptible to making poor decisions (Lipshitz et. al, 2001; Kahneman & Klein, 2009). When a UX designer asks the user to make a decision, it is the designer's responsibility to minimize the possibility for the user to make a decision the user doesn't actually want to make. A service that should be more conscious of the user's decision making limitations when presenting choices to its users is Direct Line Cruises. How the designers perform a disservice to their users will be addressed in this paper as well as a review of the major factors of metacognition and some of the influential factors in decision making. Several suggestions on how Direct Line Cruises can improve their decision making process will be presented for consideration.

Planning to take a trip on a cruise liner is a popular method of visiting exotic locations in a unique fashion with family and friends. Cruises allow people to visit multiple locations while providing a relaxing and stress free method of traveling to each location. Regardless of how people wish to spend their free time, finding a trip that fits their requirements, from both a financial and organizational standpoint, can be a hassle. Using the Direct Line Cruises website (see Figure 1), potential vacationers can look at various itineraries for cruises and book the best trip on one of the ships. However, there are several ways the website burdens the user's decision making processes unnecessarily, especially from the perspective of a first-time user. This case study focuses on how the Direct Line Cruises website, from a metacognitive standpoint, makes it difficult to properly select a good trip.

Figure 1: Home page for Direct Line Cruises

Factors in Metacognition

One of the primary factors in the quality of a person's metacognitive skills is the self-appraisal, or the understanding of his own ability (Bandura, 1993). A person who has high metacognitive abilities is able to accurately understand his own capabilities and shortcomings, allowing him to take proper actions with the knowledge he possesses (Bandura, 1993). People typically gauge their capabilities by comparing themselves to their peers (Bandura, 1993; Kruger & Dunning, 1999; Haynes et. al, 2007) as well as by self-reflecting on their own progress (Wilson & Ross, 2001; Haynes et. al, 2007). In Western culture, it's common for individuals to overestimate their own abilities in comparison to others, which results in people attempting challenges when they are not properly prepared (Meyer, 1980; Kruger & Dunning, 1999; Haynes et. al, 2007). In fact, Kruger and Dunning (1999) demonstrated that people who overestimate their skills not only make poor choices in a given subject matter, but they also lack the metacognitive ability to understand their mistakes without outside guidance. However, people who perceive their self-appraisal capabilities to be strong set higher challenges for themselves to accomplish and are more likely to commit to them (Bandura, 1993).

Individuals with high metacognition have also demonstrated the ability to effectively set goals for themselves when trying to accomplish a task (Locke et. al, 1981). These goals are challenging enough for the person to push himself through, which will result in a greater self-efficacy boost when the task is completed (Huber & Neale, 1986; Schunk, 1990; Bandura, 1993). If the task set is deemed too challenging, there would be less motivation to get the task done (Locke & Latham, 2006). However, someone can learn to adjust his goals to make them more achievable yet still challenging (Huber & Neale, 1986; Lock & Latham, 2006). Good goals also tend to be specific rather than vague, allowing the person to not only accurately gauge his

progress (Schunk, 1990), but it also allows the person to establish a better strategy for accomplishing his task (Locke et. al, 1981).

Those who are able to demonstrate the ability to monitor their own thoughts and actions are also displaying high metacognition (Flavell, 1979). The self-monitoring methodology of a highly tuned metacognitive system allows a person to evaluate the instinctive cognitive thoughts and verify whether the action is appropriate for the given situation (Snyder, 1974; Kahneman & Klein, 2009) as well as to check for any errors in previous lines of thinking (Yeung & Summerfield, 2012). When working on a task that requires multiple steps, a person can also employ self-monitoring to determine the progress being made (Halpern, 1999). Alternatively, if a task is deemed too difficult given a person's capabilities, self-monitoring would recognize that the goal at hand needs to be adjusted, making the revised end goal more likely to be accomplished (Flavell, 1979).

Factors in Decision Making

One of the key reasons the brain utilizes decision making shortcuts is to lessen the amount of work the brain has to perform (Kahneman & Klein, 2009). The amount of cognitive resources the brain has at a given time is shared between operations the brain performs and the monitoring of these operations (Wegner, 1994). As such, as more cognitive resources are devoted to the operations themselves, the monitoring of these operations becomes lax (Wegner, 1994). When the cognitive load on the brain becomes too high, people are more likely to make errors in judgement (Locke et. al, 1981). One of the mental operations the brain performs that is taxing on the cognitive load is filtering out distractions (Wegner, 1994), and distractions are abundant in the Direct Line Cruises website design.

How the Direct Line Cruises website displays its pricing information for potential lodging arrangements for each itinerary all at once puts an unnecessary burden on the user's cognitive load. There are four different lodging options for each trip and the prices for each option are constantly displayed (See Figure 2). While this allows for more perceived transparency for the options available to the user, presenting this information to the user all at once distracts the user from the other factors, such as ports of call or on board amenities, which are important reasons for taking the cruise in the first place. These users aren't even able to effectively filter out cruises by price, as there are cheaper and expensive options constantly on display for each trip. In addition, the website groups itinerary by the vessel and the duration of the trip, and highlights the cheapest options for each grouped itinerary. However, when several options could be considered the cheapest, the highlighting becomes ineffective, and actually becomes a distraction more than it becomes helpful in selecting deals.

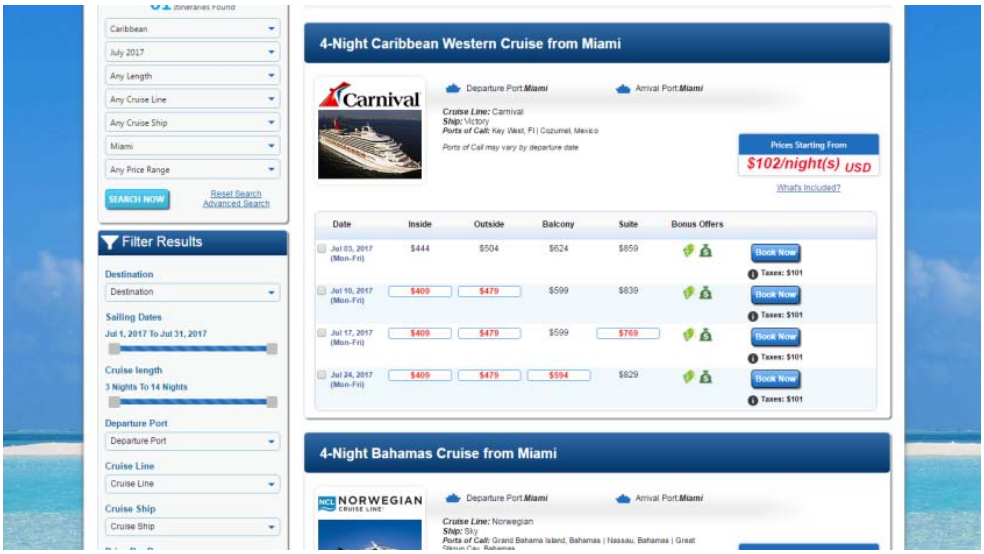

Figure 2: Search results entry with an overabundance of highlighting

Heuristics serve as mental shortcuts that are utilized when a person needs to make a decision (Tversky & Kahneman, 1974; Cioffi, 1997, Albar & Jetter, 2009). Heuristics are mental patterns that a person can apply to a choice that makes the choice more familiar to the decision maker (Tversky & Kahneman, 1974; Cioffi, 1997). When an expert relies on his intuition, he is actually referring to his well-established heuristics to make his decision (Cioffi, 1997; Albar & Jetter, 2009). However, improperly formed heuristics, whether due to lack of experience or misleading construction, can lead to poor decisions and are susceptible to biases (Tversky & Kahneman, 1974).

Biases can influence the decision a person makes by altering the true significance of a factor in a given decision (Tversky & Kahneman, 1974). Overreliance on past experiences, misinterpretation of relationships, and recency of events are just a few of the factors that can distort the importance of an element of a decision (Tversky & Kahneman, 1974). Even those who are high self-monitoring individuals are susceptible to self-protective bias, leading them to disregard how their behavior contrasts with the consensus information to protect their self-esteem (Krosnick & Sedikides, 1990). Because many of these biases are common enough and well documented, UX designers should consider these biases when trying to frame their decisions.

Another factor involved in decision making is how the decision is framed. People may receive the same information, but would have different reactions depending on how the presenter of the decision frames the choices (Tversky & Kahneman, 1981). People are more sensitive to the negative feeling of losing something rather than the positive feeling of gaining something (Kahneman & Tversky, 1985). When appraising past iterations of himself, a person generally utilizes temporal framing to alter the past self and to show the present self in a better light

(Haynes et. al, 2007). If a person needs to lighten the cognitive load of a decision, he also reframes the situation to be simpler to understand, even if the reframed situation is actually inaccurate and doesn't serve the decision maker's best interest (Tversky & Kahneman, 1981). Goals that are achievable by an individual may be perceived as too difficult if improperly framed, and the goal could be deemed as threatening to the person (Locke et. al, 2006).

The prices displayed while looking at cruise plans on the Direct Line Cruises website only takes into consideration the amount of money the tickets themselves cost the customer (See Figure 3). While a customer can most certainly get by on the cruise without paying for additional services, such a mindset severely limits not only the activities available to him, but finer food and all types of alcohol that the person can feast upon while on the ship. There is no method available on the site to review the extra costs associated with excursions available at ports of call or a fine dining facility on the ship. As such, someone who booked one cruise trip over another due to subtle differences in price might end up either paying more than he would have on another cruise or not enjoying himself as much. A person might reflect on what he missed out on, and feel that he made a bad decision based on factors out of his control.

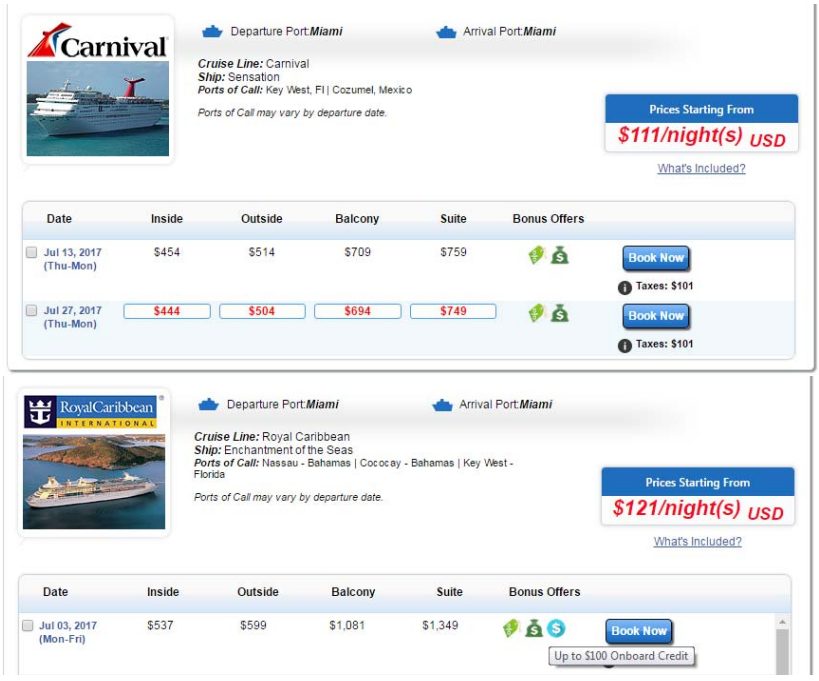

Figure 3: The Carnival trip appears cheaper due to the starting prices per evening, but it doesn't offer any onboard credit to offset the possible expenses while living on the ship. No prices for excursions are mentioned on this page.

Uncertainty forces decision makers to pause prior to finalizing a choice and to consider whether any potentially missing or misinterpreted information is an important enough factor to

review or revisit (Lipshitz & Strauss, 1997; Albar & Jetter, 2009). When faced with uncertainty during the decision making process, a typical person may refer to personal heuristics and bias to fill in the missing information (Tversky & Kahneman, 1974; Lipshitz & Strauss, 1997). While experts would be able to rely on a minimal amount of information to make their decisions (Cioffi, 1997), the heuristics and bias that other people have are more likely to lead to incorrect decisions (Tversky & Kahneman, 1974). When an option is statistically likely but fails to meet expectations, a person, upon reflection, is more likely to regret the decision and to be more averse to making similar choices in the future despite any statistical advantages (Bell, 1982).

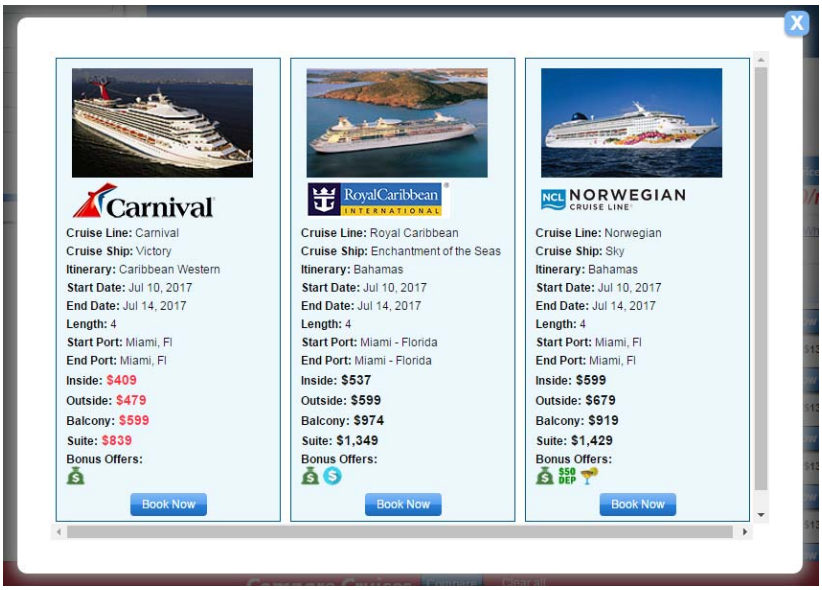

Figure 4: Comparing multiple trips at the same time

Probably the biggest decision making issue that the Direct Line Cruises website presents pertains to uncertainty, which will increase the burden on the user's cognitive load. Firstly, users are only able to compare prices and dates when comparing multiple plans at once (See Figure 4). Every cruise trip has a unique set of features that might be important to the user, and factors such as ports of call, possible entertainment options, and childcare services are not available for comparison. To gather this information, the user will need to visit each trip's page individually, forcing the user to rely on his fallible memory to discern the differences among cruise trips. In addition, information pertaining to the ship itself is hidden deep in the itinerary page (See Figure 5). Hiding this information from the user leaves more uncertainty towards the potential quality of the ship.

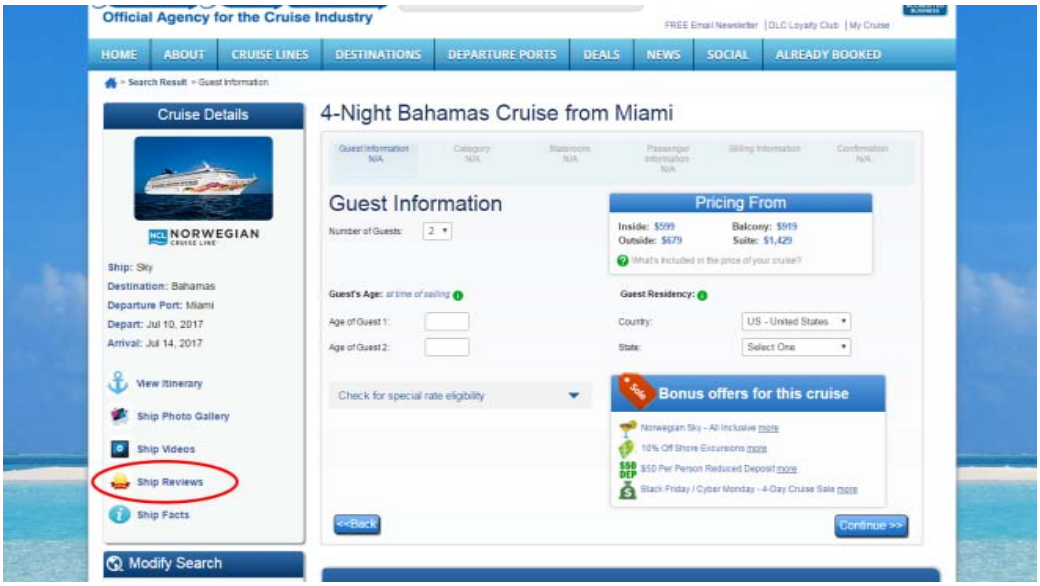

Figure 5: The dedicated trip details page hides user rating of the ship in the bottom right corner

Closing Thoughts

There are several recommendations to the UX team for the Direct Line Cruises website to improve the metacognitive aspects of the website. Prior to viewing search results, the user should be required to choose the lodging method they would prefer, along with information pertaining to the general benefits of picking one over another. The search results would then display the price of the ticket for the desired lodging. Any other numbers would be superfluous, and the cognitive strain of viewing numbers that are irrelevant to the user would be relieved. This change would allow the user to process the pertinent information faster and without distraction. If the user wishes to change his desired lodging arrangements, a search filter should be provided to alter the lodging price being displayed. The space created by the removal of distracting data leaves room for more pertinent trip information, such as overall user ratings for the ship and an expense rating for the ship's amenities. These additions would reduce the uncertainty concerning the quality of a ship when looking at possible vacation plans.

The information changes mentioned for the search results page should also be applied to the itinerary comparison page. This will allow the user to compare possible trips while simultaneously reducing his cognitive load. Displaying the locations that a cruise itinerary would visit during each trip is also recommended, preferably as a visual map if possible. If wishing to display more differences among the ships for the itineraries being compared, the website should not display information that is consistent for all options multiple times. If the designers wish to display the features the itinerary options have in common, displaying it once in its own area would be acceptable. The reworked comparison page should also refrain from displaying

information that has no significance on the user's potential enjoyment on the trip, such as ship dimensions or tonnage.

As it stands, various presentation mistakes from a decision making standpoint on the Direct Line Cruises website are causing users to be mentally stressed when trying to decide how to relax in the future. Reducing the number of metacognitive roadblocks when deciding on the right cruise would make users more certain they made a great choice.

Bibliography

Albar, F. M., & Jetter, A. J. (2009, August). Heuristics in decision making. In PICMET'09-2009 Portland International Conference on Management of Engineering & Technology (pp. 578-584). IEEE.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. Educational psychologist, 28(2), 117-148.

Bell, D. E. (1982). Regret in decision making under uncertainty. Operations research, 30(5), 961-981.

Cioffi, J. (1997). Heuristics, servants to intuition, in clinical decision-making. Journal of Advanced Nursing, 26(1), 203-208.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. American psychologist, 34(10), 906.

Haynes, G. A., Sorrentino, R. M., Olson, J. M., & Szeto, A. C. (2007). The effects of temporal framing on counterfactual thinking and self-appraisal: An individual differences perspective. Social Cognition, 25(3), 339.

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. New directions for teaching and learning, 1999(80), 69-74.

Huber, V. L., & Neale, M. A. (1986). Effects of cognitive heuristics and goals on negotiator performance and subsequent goal setting. Organizational Behavior and Human Decision Processes, 38(3), 342-365.

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: a failure to disagree. American Psychologist, 64(6), 515.

Kornell, N. (2009). Metacognition in humans and animals. Current Directions in Psychological Science, 18(1), 11-15.

Krosnick, J. A., & Sedikides, C. (1990). Self-monitoring and self-protective biases in use of consensus information to predict one's own behavior. Journal of Personality and Social Psychology, 58(4), 718.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. Journal of personality and social psychology, 77(6), 1121.

Lipshitz, R., & Strauss, O. (1997). Coping with uncertainty: A naturalistic decision-making analysis. Organizational behavior and human decision processes, 69(2), 149-163.

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. Journal of behavioral decision making, 14(5), 331-352.

Locke, E. A., Shaw, K. N., Saari, L. M., & Latham, G. P. (1981). Goal setting and task performance: 1969–1980. Psychological bulletin, 90(1), 125.

Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. Current directions in psychological science, 15(5), 265-268.

Metcalfe, J., & Jacobs, W. J. (2010). People's study time allocation and its relation to animal foraging. Behavioural processes, 83(2), 213-221.

Meyer, H. H. (1980). Self-appraisal of job performance. Personnel Psychology, 33(2), 291-295.

Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. Educational psychologist, 25(1), 71-86.

Snyder, M. (1974). Self-monitoring of expressive behavior. Journal of personality and social psychology, 30(4), 526.

Tversky, A., & Kahneman, D. (1975). Judgment under uncertainty: Heuristics and biases. In Utility, probability, and human decision making (pp. 141-162). Springer Netherlands.

Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. Science, 211(4481), 453-458.

Tversky, A., & Kahneman, D. (1985). The framing of decisions and the psychology of choice. In Environmental Impact Assessment, Technology Assessment, and Risk Analysis (pp. 107-129). Springer Berlin Heidelberg.

Wegner, D. M. (1994). Ironic processes of mental control. Psychological review, 101(1), 34.

Wilson, A. E., & Ross, M. (2001). From chump to champ: people's appraisals of their earlier and present selves. Journal of personality and social psychology, 80(4), 572.

Yeung, N., & Summerfield, C. (2012). Metacognition in human decision-making: confidence and error monitoring. Phil. Trans. R. Soc. B, 367(1594), 1310-1321.