6th AWBR International Conference

9 – 10 June 2011

Bordeaux Management School – BEM – France

Consumer Evaluation and Decision Process when Engaging in a Sequential Sampling Scenario

Antonia Mantonakis
Brock University, Canada
amantonakis@brocku.ca

Matthew Philp
Queen's University, Canada
mphilp@business.queensu.ca

Isabelle Lesschaeve
Vineland Research and Innovation Center, Canada
Isabelle.Lesschaeve@vinelandresearch.com

Reid Hastie
University of Chicago Booth School of Business, USA
Reid.Hastie@chicagobooth.edu

Abstract

Purpose*: It is known that primary and recency effects occur in a sequential choice scenario (Mantonakis et al., 2009); however what is the evaluation process consumers engage in that leads to these effects?*

◦ ***Design****: Two studies were run using experimentation. In Study 1, participants tasted either 2, 3, 4, or 5 wine samples, provided a rating for each sample and then chose a favourite at the end of the sequence (step-by-step evaluation process). In Study 2, participants were asked to pick a favourite between two wine samples. Depending on the condition, this process was repeated with a new sample being presented after each choice was made, with participants being asked to compare their favourite from the previous pair of wines to the newly presented sample (single elimination pair-wise tournament). In both studies, unknown to participants each wine sample tasted was the same wine poured from the same bottle.*

◦ ***Findings****: High knowledge consumers do not experience any primacy or recency effects when engaging in a step-by-step evaluation process but low knowledge consumers do (Study 1). On the other hand, high knowledge consumers do experience primary and recency effects when using a single elimination pair-wise strategy whereas low knowledge consumers do not (Study 2).*

◦ ***Practical implications****: Winery owners should be aware of sequential sampling effects on consumer decision making. Being aware of the different evaluation processes of high and low knowledge wine consumers will allow wine owners to control for or take advantage of these sequential effects.*

Key words: Consumer behaviour, Sequential Decision-Making, Taste Evaluaiton, Primacy and Recency Effects

INTRODUCTION

Information is perceived sequentially whether a person is learning a new subject, meeting someone new, or sampling items in a taste test. There is no way to instantly and equitably receive all the information required to make an accurate and informed decision, therefore people experience order effects in judgments. There have been numerous analyses and explanations of the resulting trends of making choices and forming judgments from information presented sequentially. The most prevalent effects are that of primacy and recency, whereby items and information early and late in a sequence have strong effects on memory (Glanzer and Cunitz, 1966) and can influence judgments of liking (Becker, 1954; Coney, 1977; Dean, 1980; MacFie et al., 1989; Mantonakis et al., 2009; Miller and Krosnick, 1998). However, what is not known is whether these results hold in typical consumer settings, such as tasting panels (when consumers first perform an evaluation, before making an end-of-sequence choice) or in wineries (where perhaps consumers do not know how many samples they will taste, and just make single choices along the way). This research will use the literature on sequence effects to examine these two types of decision scenarios, namely when consumers perform a step-by-step evaluation before an end-of-sequence choice (Study 1), or when they do not know how many options will be sampled (Study 2). If one of these two sampling scenarios produce similar data to previous findings of primacy and recency effects, then, it can be concluded that the consumer engages in similar evaluation processes when freely sampling each item and making a final choice. Understanding the underlying process that causes primacy and recency effects will help sampling administrators (i.e. winery employees, consumer panel researchers, in store sample promoters) take advantage or control for these effects depending on the objective.

1. THEORETICAL ANALYSIS

To better understand sequence effects and the cognitive processes behind them, a comprehensive analysis is done on primacy and recency effects, processing fluency, and expertise in judgment.

1.1. Primacy and Recency Effects

Sequence effects have been commonly found in sensory assessments of samples and treatments (MacFie et al., 1989). For end-of-sequence judgments, such as when a consumer samples a set of wines at a winery, and decides, at the end, which one was their favourite (and hence which one to purchase), researchers have concluded that items early in the sequence have the overall advantage (e.g., Mantonakis et. al., 2009). This is called a “primacy” advantage. For example, in analyzing democratic election results there is a significant bias to choose the first name listed on the ballot. This effect is found to be even stronger for those individuals who are less knowledgeable about politics (Miller and Krosnick, 1998). Similar primacy effects were found in end-of-sequence consumer choice research, such as the choosing of a favourite radio programming from a list (Becker, 1954), a favourite beer from a taste sample sequence (Coney, 1977), and a favourite soda from two samples (Dean, 1980).

How are these primacy effects explained? Suppose a consumer samples a sequence of similar wine (e.g., types of Chardonnay). The person first evaluates each one, and then, at the end, chooses their favourite. It may be the case that decreased attention or boredom effects for

the latter wines sampled may mean that the first sampled had the highest level of cognitive resources devoted to it, and in turn will be more memorable and preferred in the end-of-sequence choice (Sulmont-Rosse et al., 2008). Other explanations supporting this could be the biased processing of later information caused by a thought process that confirms believes established from earlier information (a confirmation bias). All subsequent information presented after formulating an impression (establishing a favourite item, which is usually the first) will only support a previous decision and choice (Holyoak and Simon, 1999; Russo et al., 2006).

On the other hand, some researchers have observed and concluded that in an end-of-sequence choice scenario, the most recent items sampled (i.e., the last) are preferred. These effects have been called "recency" effects. Recency effects have been observed in with consumers in a shopping center whereby they were asked to choose which pair of ladies stockings were the best quality. Although what the participants did not know is that all four pairs of displayed stockings were identical (Wilson and Nisbett, 1978). It was found that the pair of stockings last in the sequence was chosen 40% of the time whereas the first pair of stockings in the sequence was chosen only 12% of the time. In a similar study using wine, recency effects were only shown in longer sequences and were significantly prominent with high knowledge wine consumers compared to low knowledge wine consumers (Mantonakis et al., 2009). These various effects have been observed but the underlying psychological process that occurs during the sampling sequence has not been determined.

1.2. Expertise and Decision Making

If one individual has more prior knowledge of the category of the item then they may sample and assess the item differently compared to individuals without that prior knowledge. An individual with a high interest in a particular area will be more likely to feel positive and pleasant feelings when engaging in activities within that area, which will be accompanied by high levels of concentration and absorption (Cardello et al., 1982; Hughson & Boakes, 2001; Lawless, 1984). In addition, when sampling longer sequences, individuals will be less likely to experience boredom over time and devote high levels of cognitive energy to each sample, resulting in a recency effect as participants start to forget items earlier in the sequence (Mantonakis et al., 2009). This can provide support to the explanation of why primacy effects are observed with low knowledge consumers – it may be due to boredom and less cognitive energy devoted to later samples (Sulmont-Rosse et al., 2008). However, if individuals are highly interested in the items being sampled, perhaps because they have higher knowledge, then the boredom effect may not be triggered.

It has also been observed that as complexity increases (e.g. unfamiliar item category, increase in choice options), people can no longer use extensive cognitive strategies and have to resort to an assessment strategy that eases cognitive strain (Hogarth & Einhorn, 1992). This implies that low knowledge consumers may devote a lot of cognitive resources to an assessment task early in a sequence and therefore earlier items make the strongest impact on their choice. As the sequence continues individuals reduce cognitive effort devoted to the task, resulting in a preference for earlier items. However, an individual who is very knowledgeable of the item being sampled is experienced in sampling and may not have to reduce cognitive energy devoted to assessment tasks resulting in recency effects.

2. CURRENT RESEARCH

The current research seeks to understand the unconscious sequential evaluation process of a sampling participant in two situations: when they have to first evaluate each item (e.g., each wine) before making an end-of-sequence choice (Study 1), or, when they do not know how many options (e.g., wines) they will be sampling and essentially make a single, pair-wise comparison between the current wine, and the subsequent wine (Study 2). It is understood that primacy and recency effects do occur when sampling items in a sequence and then being asked to make an end-of-sequence decision (Mantonakis et al., 2009). However, what is not known, that is the subject of this research, is the underlying evaluation process undertaken by the participant when sampling each item in the sequence that results in these primacy or recency effects. Can these effects be replicated or diminished by altering the sampling process? The following 2 Studies will test two different sampling processes, if the data match the findings of Mantonakis et al. (2009) then it may be the case that the forced sampling process is what the sampling participants are unconsciously engaging in instinctively. To achieve this end, we will test both a step-by-step sampling process (Study 1) and a single elimination pair-wise tournament sampling process (Study 2).

2.1. Study 1: Step-by-step sequence evaluation

2.1.1. Participants

One hundred and ninety-nine participants made up of members of the local community, including students, were recruited through advertisements to participate in a study of "attitudes and values towards wine" (79 men and 120 women, ranging from 19, the local drinking age, to 77 years old; average age of 23.89). Participants received either $5 or course credit for participation.

2.1.2. Design and Procedure

Participants were sat down in an isolated tasting booth and were told they would taste different locally produced wines of the same grape varietal (e.g., different types of Riesling). Participants were randomly assigned to taste two (n= 50), three (n= 48), four (n= 50), or five (n= 51) 20ml samples of wine. Participants were asked to rate each wine on a ten-point scale between samples, and to then make an end-of-sequence choice of their favourite wine. What the participants did not know was that each sample was the same wine poured from the same bottle. Finally, participants answered a wine knowledge questionnaire (Hughson and Boakes, 2001).

2.1.3. Results and Discussion

Two separate analyses were performed: one for the step-by-step ratings, and the other for the end-of-sequence choice. A one-way ANOVA determined that the mean ratings for each wine were not significantly different from one another (two wines: $F(1,49) = .252$, $p > .618$; three

wines: $F(1,47) = .0$, $p > 1.0$; four wines: $F(1,49) = .438$, $p > .511$; five wines: $F(1,50) = .037$, $p > .848$) (see Figure 1).

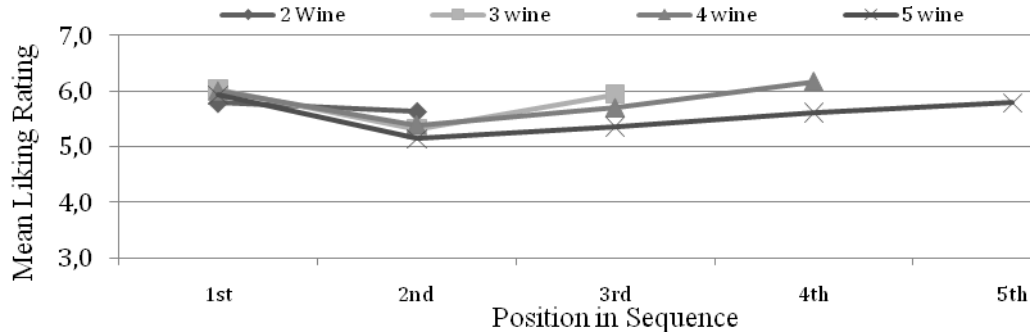

Figure 1. Experiment 1 results for all participants: mean liking rating for each sample as a function of serial position for set sizes of two, three, four, or five wines

Chi-square tests were used to verify that the observed end-of-sequence choice for each sequence length were reliably different from uniform preferences (see Figure 2). The first position showed a primacy advantage, and this was accompanied by a recency advantage with longer sequence lengths; the four and five wine conditions were found significantly different from uniform preferences: Two wines: $\chi^2(1,N = 50) = .32$, $p = .57$; three wines: $\chi^2(2,N = 48) = 3.50$, $p = .17$; four wines: $\chi^2(3,N = 50) = 8.08$, $p = .04$; five wines: $\chi^2(4,N = 51) = 20.86$, $p < .001$.

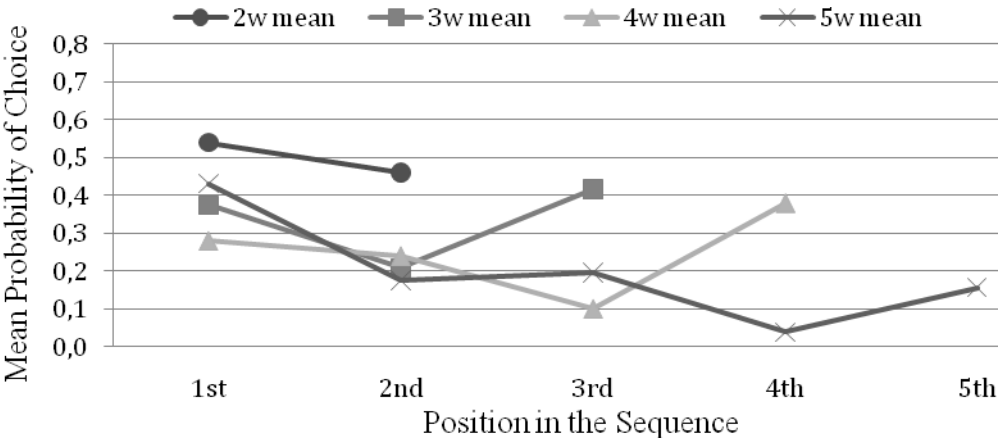

Figure 2. Experiment 1 results for all participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

Participants were also divided into low ($n = 117$) and high-knowledge ($n = 82$) groups on the basis of their wine knowledge questionnaire responses (Hughson and Boakes, 2001). Both primacy and recency effects are observed for the low-knowledge consumers, similar to previous primacy and recency findings (see Figure 3). However, the chi-square statistic was significant for only the five-wine condition (cf. Mantonakis et al., 2009): $\chi^2(4, N = 29) = 21.17$, p = .001. For high knowledge participants, the chi-square statistics were not significant for any of the sequence lengths with no visible primacy or recency effects (see Figure 4).

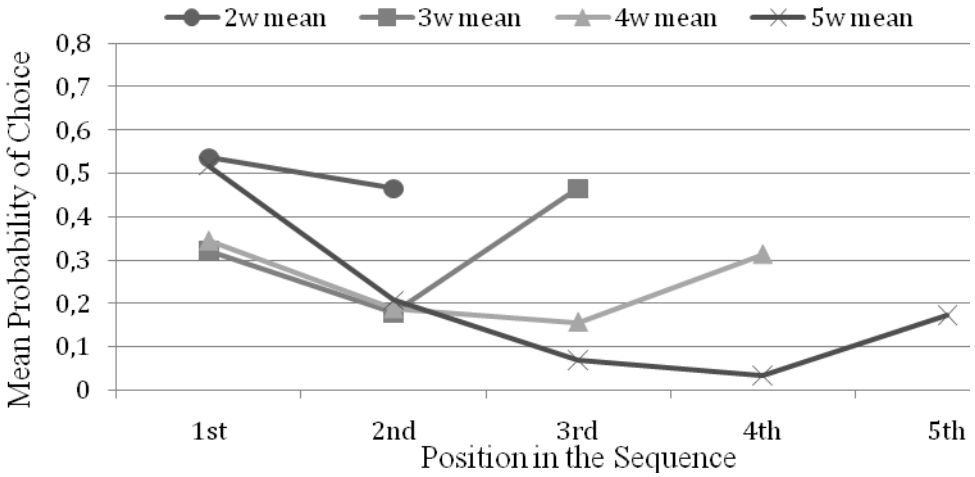

Figure 3. Experiment 1 results for low-knowledge participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

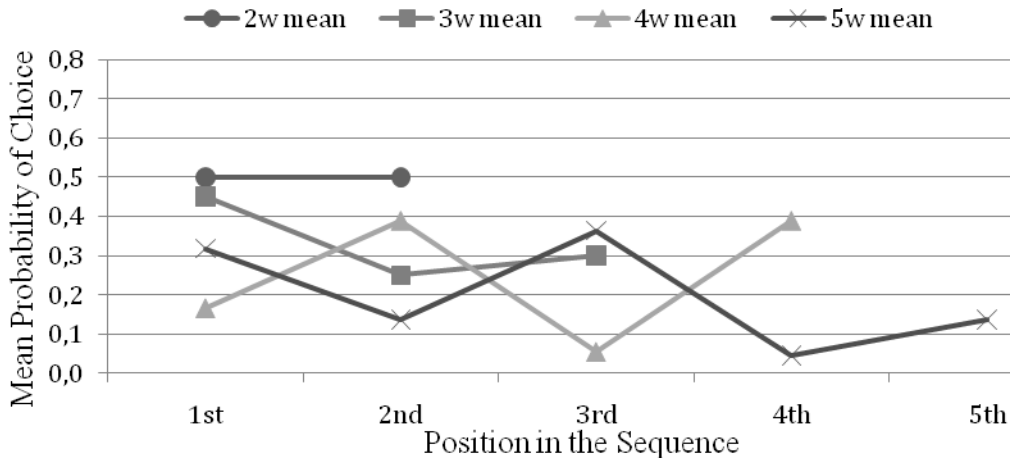

Figure 4. Experiment 1 results for high-knowledge participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

Thus, when forcing participants to engage in a step-by-step evaluation, the individual ratings for each sample do not show any evidence of primacy or recency effects, however the end-of-sequence choice results for low knowledge consumers show evidence for these effects. Also the high knowledge consumers show no clear primacy or recency pattern. This may be because forcing knowledgeable consumers to evaluate each sample in a step-by-step fashion attenuates their ability to carry out natural comparison processes. What is the natural comparison process?

2.2. Study 2: Single Elimination Pair-wise Tournament

It may be the case that consumers may spontaneously sample and compare each item to the next, choosing the current favorite in that pair, before moving on in the sequence (henceforth: "single elimination pair-wise tournament"), with the first item having a .70, and the second item a .30

probability for being chosen as the favourite (Mantonakis et al., 2009). The first item has special status: it has higher levels of attention paid to it; lower levels of proactive interference, and may be more susceptible to the common habit of satisficing, especially for less knowledgeable consumers (Simon, 1955) resulting in observed primacy effects. However, as the participant progresses through each pair (the current favorite vs. the newly-sampled option), recency effects may be observed for longer sequence lengths, especially for more knowledgeable consumers. A recency pattern may be more pronounced for knowledgeable consumers, who may try harder to discriminate between options (Cardello et al., 1982; Hughson and Boakes, 2001; Lawless, 1984). In this study, we created a situation that would allow such a single-elimination comparison process.

2.2.1. Participants

Two hundred and twenty-seven participants made up of members of the local community, including students, were recruited through advertisements to participate in a study of "attitudes and values towards wine" (70 men and 87 women, ranging from 19, the local drinking age, to 64 years old; average age of 22.77years). Participants received either $5 or course credit for participation.

2.2.2. Design and Procedure

We attempted to create a procedure that matched the procedure hypothesized by a "single-elimination pair-wise tournament" process. If the data produce primacy and recency effects, then it may be the case that the forced procedure is what evaluators are doing spontaneously whenever primacy and recency effects emerge.

The procedure closely matched that of Study 1 (isolated tasting booth, were told they would taste several different locally produced wine, participants unaware that each sample was the same wine), with the exception that there was no step-by-step evaluation. Instead, following the tasting of samples "1" and "2" the computer prompted the participant to select their favourite wine between the two. Depending on the participant's randomly assigned condition (two, three, four, or five wines) this pair-wise comparison process repeated with the experimenter presenting an additional sample, asking to choose a favourite between the previously chosen favourite and the newly-presented sample. The experimental focal point is the participant's final wine choice.

2.2.3. Results and Discussion

Chi-square tests were again used to verify that the observed end-of-sequence choice for each sequence length were reliably different from uniform preferences (see Figure 5). The serial position curve shows primacy for shorter sequence lengths, and recency for longer sequence lengths. However Chi-square results were found significant for only the two wine condition: Two wines: $\chi^2(1,N = 43) = 6.72$, p = .01; three wines: $\chi^2(2,N = 39) = 4.31$, $p = .12$; four wines: $\chi^2(3,N = 36) = 2.89$, $p = .41$; five wines: $\chi^2(4,N = 39) = 4.21$, $p = .38$.

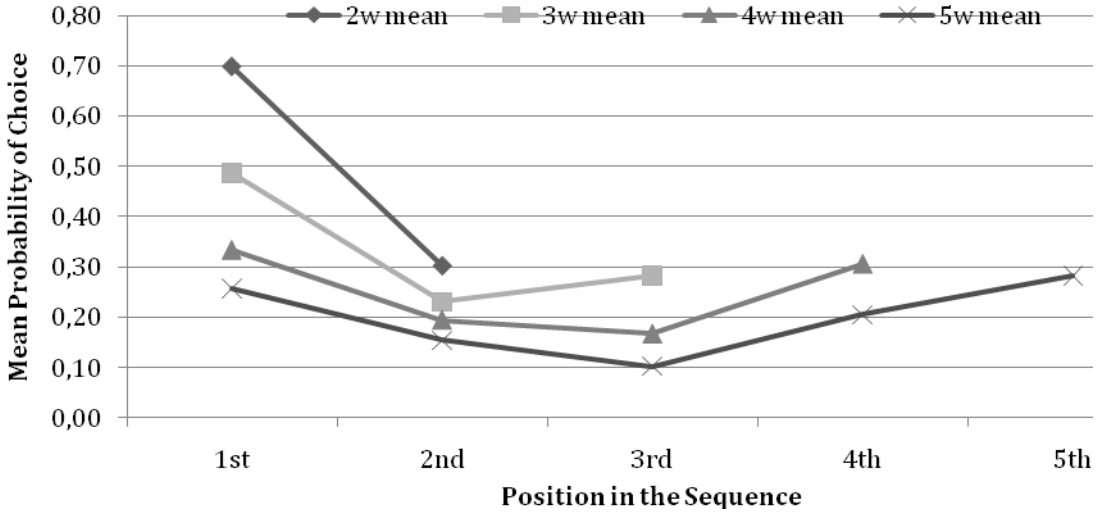

Figure 5. Experiment 2 results for all participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

Participants were again divided into low (n = 88) and high-knowledge (n = 64) groups on the basis of the wine knowledge questionnaire (Hughson and Boakes, 2001). The results from the low knowledge consumers reveal no visible primary or recency effects (see Figure 6). The results from the high knowledge consumers demonstrate primacy and recency effects, however, data for only the two wine condition reached significance ($\chi^2(1, N = 17) = 4.77$, $p = .03$) (see Figure 7).

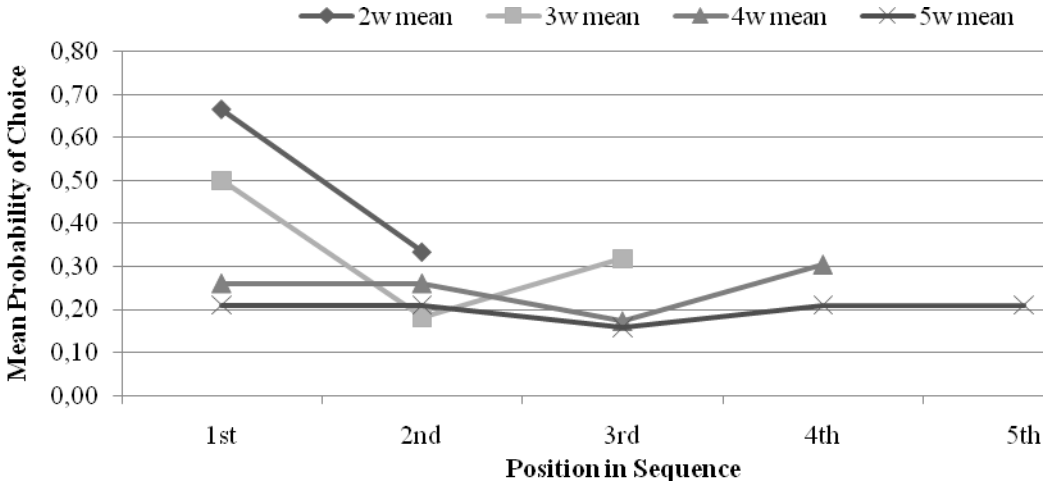

Figure 6. Experiment 2 results for low-knowledge participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

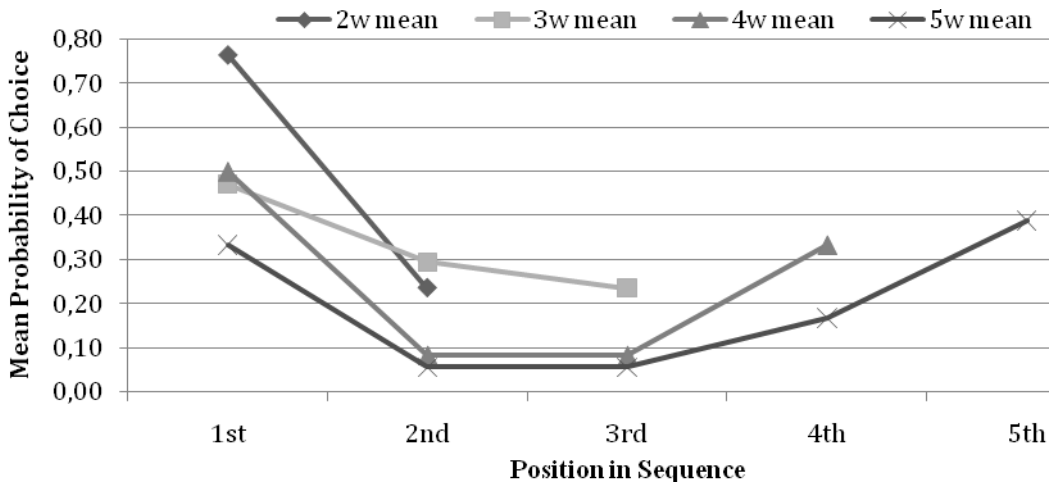

Figure 7. Results for high-knowledge participants: mean probability of choice for each sample as a function of serial position for set sizes of two, three, four, or five wines

In further analyses, it is observed that for longer sequence lengths (four or five wines) low knowledge consumers are likely to switch their favourite sample early in the sequence (probability of choosing wine one over wine two is on average 42.8%). Also, low knowledge consumers are likely to remain with their current favourite later in the sequence (probability of remaining with their current favourite for their last choice is 74.3%). This effect is reversed for high knowledge individuals who are found to have a high probability to remain with their current favourite early in the sequence (probability of choosing wine one over wine two is on average 72.2%). High knowledge consumers are then likely to switch to a new favourite later in the sequence (probability of remaining with their current favourite for their last choice is 63.9%).

3. GENERAL DISCUSSION

3.1. Summary

Taken together, these findings add understanding to the current explanations of how consumers process and choose items presented in a sequence. By forcing participants to process and evaluate each sample separately (Study 1) a recency effect is observed along with the elimination of previously observed primacy and recency effects for high knowledge consumers. However, by forcing participants into a direct comparison process with their current favourite sample (Study 2) we can better understand the cognitive process behind sequence effects in choice in that consumers unconsciously compare newly experienced items in the sequence with their current favourite.

In Study 1, we found that forcing participants into a step-by-step evaluation process reduces the severity of sequence effects, especially for shorter sequence lengths. The step-by-step evaluation process was observed to have a larger effect on eliminating sequence effects for high knowledge versus low knowledge consumers. Preference for the first item was found only for the five-item sequence length for low knowledge consumers. This implies that by forcing low-knowledge consumers to devote cognitive resources in evaluating each wine after it is sampled can result in a boredom effect for longer sequences, resulting in a default preference for

the first sampled wine. Whereas high knowledge consumers do not experience boredom due to their high levels of interest and instead of devoting the majority of cognitive resources to evaluating the first wine, they are experienced and can spread energy across the sequence resulting in no significant primacy and recency effects. This has shown to result in a scattered mean probability of choice across various sequence lengths, with no logical pattern.

The findings from Study 1 also add to the findings of de Bruin (2005, 2006), who observed increasing evaluations in judgment events as the sequence length increases. We have found that this finding does not carryover to consumer choice because we observed no differences in individual ratings. From these findings we can conclude that observed sequence effects are not attributable to sequence positions receiving a higher evaluation, as on average all sequence positions received the same evaluation.

In Study 2 participants were forced to compare their current favourite sample with the next sample over the course of the sequence length. The first item sampled is assumed to become the immediate favourite in comparison to preceding samples. Indeed, the current favourite has a probability of remaining the current favourite of .69. Therefore, when asked to choose the favourite between the previously chosen favourite and the newly experienced sample, there was a 69% chance that the previously chosen favourite (the current favourite) will remain the favourite, and be chosen again. This, however, is observed to be stronger for high-knowledge consumers (.72), compared to for low-knowledge consumers (0.67).

In analyzing both experiments it can be concluded that the sequence effects observed in previous studies (e.g., Mantonakis et al., 2009) can be partially replicated when forcing low knowledge consumers to engage in a step-by-step analytic sampling process (Study 1) and when forcing high knowledge consumers to engage in a pair-wise-competition process (Study 2). These results also demonstrate that sequence effects can be partially eliminated for high knowledge consumers by asking them to evaluate each sample individually between each sample (Study 1), and can also be partially eliminated for low knowledge consumers by asking them to continually pick their favourite sample after every newly tested sample (Study 2).

3.2. Managerial Implications

These findings have a number of implications for determining consumer preference and analyzing consumer choice. From the perspective of the consumer, it is valuable to know about sequence effects and how they may influence choice. Knowing that preferences unconsciously lean towards early (primacy effects) and later (recency effects) items in a sequence can allow for better and more rational decisions. When making a choice from a sequence of desirable options it will be beneficial to evaluate each item individually on a variety of attributes to pull one's mind away from a preference for the first or last item.

From the perspective of the manager, to better influence the decisions of the consumer, the desired item to be sold should be pushed first in the sequence. Allowing the customer to sample or learn more about the item until moving to the next choice will establish the first item as a favourite. Establishing an item as a current favourite gives it the advantage of .69 to remain the favourite and be chosen in the end. Therefore sample one stands to make the highest profit out of should be placed first in the sample set.

Also, managers and marketing researchers may want to eliminate these sequence effects to ensure the consumer choice results are not skewed to a particular position in the sequence. For example, in a wine taste-testing scenario a winery owner may seek the advice of a panel

consisting of several wine experts. To ensure there are no sequence effects in the taste-testing sequence and knowing that the members of the panels are experts then it is best to force each member to evaluate each wine after tasting as opposed to waiting until the end of the tasting sequence to receive their input. However, if it is known that the members of the panel consist of low knowledge consumers then it will be most beneficial to direct each participant to continually pick their favourite sample after each new sample is tasted. Knowing the knowledge levels of the consumer and the various sampling procedures (step-by-step and single elimination), one can control for sequence effects in choice.

This research does have several limitations, however, that should be considered by managers. First, we did present the same wine to participants, who believed that they were sampling different wines from the same varietal. This situation would not actually occur in natural tasting scenarios; nonetheless it was the best way for us to test our hypotheses. Second, the studies were carried out in a lab environment. While we were able to have internal validity, the somewhat contrived lab context must be acknowledged when evaluating our results. Future research can perhaps attempt to replicate these findings in more naturalistic contexts (e.g., with actual tasting panels, in an actual winery, etc.)

3.3. Conclusion

These research findings show that it is possible to control and manipulate sequence effects in consumer choice. Depending on what sequential sampling procedure is used and on the knowledge level of participants involved the preference outcomes of a sampling scenario can vary. Individually evaluating each choice will reduce expected sequence effects for high knowledge consumers, but not for low-knowledge consumers. The opposite is the case when directing participants to engage in a pair-wise evaluation process. When forcing consumers to compare their current favourite to a newly tasted sample, consumers are likely to stay with their current favourite 69% of the time. This is especially the case for high knowledge consumers on average. Sampling administrators (i.e. winery employees, consumer panel researchers, in store sample promoters) can take advantage of, or control for these effects, depending on the objective.

REFERENCES

Becker, S. (1954), "Why an order effect," *Public Opinion Quarterly,* 18 (3), 271.

Cardello, A.V., Maller, O., Kapsalis, J.G., Segars, R.A., Sawyer, F.M., and Murphy, C. (1982), "Perception of texture by trained and consumer panelists," *Journal of Food Science*, 47, 1186-1197.

Carney, D.R. and Banaji, M.R. (2008), *"First is best in rapid social judgment and consumer decision,"* Working Paper, Harvard University, Cambridge, MA.

Coney, K. (1977), "Order-bias: The special case of letter preference," *Public Opinion Quarterly,* 41 (3), 385.

de Bruin, W.B. (2005), "Save the last dance for me: Unwanted serial position effects in jury evaluations," *Acta Psychologica,* 118 (3), 245-60.

_____ (2006), "Save the last dance II: Unwanted serial position effects in figure skating judgments," *Acta Psychologica,* 123 (3), 299-311.

Dean, M. (1980), "Presentation order effects in product taste tests," *The Journal of Psychology,* 105 (1), 107.

Glanzer, M. and Cunitz, A.R. (1966), "Two storage mechanisms in free recall," *Journal of Verbal Learning and Verbal Behavior,* 5 (4), 351.

Hogarth, R.M., and Einhorn, H.J. (1992), "Order effects in belief updating: The belief-adjustment model," *Cognitive Psychology,* 24 (1), 1.

Holyoak, K.J., and Simon, D. (1999), "Bidirectional reasoning in decision making by constraint satisfaction," *Journal of Experimental Psychology.General,* 128 (1), 3.

Hughson, A. and Boakes, R.A. (2001), "Perceptual and cognitive aspects of wine experts," *Australian Journal of Psychology,* 53 (2), 103.

Lawless, H.T. (1984), "Flavor description of white wine by "expert" and nonexpert wine consumers," *Journal of Food Science,* 49 (1), 120.

Macfie, H.J., Bratchell, N., Greenhoff, K. and Vallis, L.V. (1989), "Designs to balance the affect of order of presentation and first-order carry-over effects in hall tests," *Journal of Sensory Studies,* 4 (2), 129.

Mantonakis, A., Rodero, P., Lesschaeve, I. and Hastie, R. (2009), "Order in choice: Effects of serial position on preferences," *Psychological Science,* 20 (11), 1309.

Miller, J.M. and Krosnick, J.A. (1998), "The impact of candidate name order on election outcomes," *Public Opinion Quarterly,* 62 (3), 291.

Russo, E.J., Carlson, K.A. and Meloy, M.G. (2006), "Choosing an inferior alternative," *Psychological Science,* 17 (10), 899.

Sulmont-Rosse, C., Chabanet, C., Issanchou, S. and Köster, E.P. (2008), "Impact of the arousal potential of uncommon drinks on the repeated exposure effect," *Food Quality and Preference,* 19 (4), 412.

Wilson, T. and Nisbett, R.E. (1978), "The accuracy of verbal reports about the effects of stimuli on evaluations and behavior," *Social Psychology,* 41 (2), 118.