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**Choosing among options presented sequentially versus simultaneously**

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## Sequential vs. Simultaneous Choice

### **Abstract**

When choosing among multiple options, people can view the options either one at a time or all together. This article reviews an emerging stream of research that examines the ways in which viewing options sequentially vs. simultaneously influences people's decisions. Multiple studies support the idea that viewing options simultaneously encourages people to compare the options and to focus on the ways in which the options differ from each other. In contrast, viewing options sequentially encourages people to process each option holistically by comparing the option against previously encountered options or a subjective reference point. Integrating research from judgment and decision making, consumer behavior, experimental economics, and eyewitness identification, we identify ways in which the different processing styles elicited by sequential and simultaneous presentation formats influence people's judgment and decision making. This issue is particularly important because presenting option either sequentially or simultaneously is a key element of choice architecture.

Keywords: choice; sequential; simultaneous; choice architecture; decision making

### **Choosing among options presented sequentially versus simultaneously**

When choosing among multiple options, people can either examine the options one at a time (sequentially), or they can review all options together (simultaneously). For example, a person choosing a health insurance can either go to each insurance provider's website to view plans or go to healthcare.gov to view all plans she is eligible for. Similarly, a recruiter can evaluate the resume of each applicant individually, or lay them all out and compare them along specific attributes, such as education and prior experience. In this article, we review findings from an emerging stream of research examining how viewing options sequentially vs. simultaneously influences people's decisions. Specifically, viewing options simultaneously encourages people to engage in more comparative processing whereas viewing options one at a time encourages more holistic processing. These processing styles can influence people's decisions and their post-choice judgments. This issue is particularly important because presenting option either sequentially or simultaneously is a key element of choice architecture (Johnson et al., 2012), so understanding the psychological consequences of these option presentation strategies can have substantial policy implications.

Research on sequential vs. simultaneous option presentation is distinct from research on separate vs. joint evaluation (Hsee & Leclerc, 1998). In a typical separate vs. joint evaluation study, participants either view two options together (*joint evaluation*) or view only one of the two options (*separate evaluation*), similar to a within- versus between-subjects experimental design. However, in the research reviewed here, all participants view all available options (akin to *joint evaluation*), but either together or one at a time.

### **COMPARATIVE VS. HOLISTIC PROCESSING**

When people consider all options simultaneously vs. sequentially, they engage in different types of choice processes. Viewing options together nudges people to compare and contrast various attributes and features of the options, and to focus on ways in which the options differ from one another. The presentation format facilitates detailed comparative processing because all attributes of all options are simultaneously laid out in front of the decision maker. For example, people who viewed both common and unique symptoms of two diseases together were more likely to use the diagnostic unique symptoms in a subsequent diagnosis task; in contrast, participants who viewed the symptoms of each disease sequentially paid less attention to the more relevant unique information (Klayman & Brown, 1996).

Viewing options sequentially, on the other hand, makes it difficult for people to engage in detailed comparative processing because only one option is in front of them at any given moment—the other options in the choice set are not immediately visible. Therefore, people need to evaluate each option on its own based on all the information provided about that option, and based on any relevant information that they recruit from memory. They would then compare their overall evaluation of the option with either an internal reference point, or with their memory representations of previously encountered options. For instance, people who viewed hedonic consumer options (e.g. chocolate, wine) sequentially were less satisfied with their chosen option compared to those who viewed the same options simultaneously (Mogilner, Shiv, & Iyengar, 2013). In the sequential format, people considered each option against an imagined better option

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(i.e., an internal reference point) and hoped to encounter such a better option subsequently, which reduced their satisfaction with their chosen option.

The comparative vs. holistic processing engendered by simultaneous and sequential presentation, respectively, can influence people's decision in multiple ways, as we review below.

### **CONSEQUENCES OF DISTINCT PROCESSING STYLES**

When people view options together, they are more likely to identify the objectively best option in a choice set because they engage in more in-depth cognitive processing than those who view options one at a time (Basu & Savani, 2017). In this research, participants chose options from choice sets containing four inferior options and one dominating option (e.g. a supplier providing the best rate for goods, a consumer product with the highest value on all attributes). Participants who viewed options together were more successful in identifying these dominating options vis-à-vis those who viewed the options one at a time. Moreover, identifying the crucial role of cognitive processing, this effect was attenuated when participants' processing abilities were experimentally limited by a secondary task.

A related stream of research on eyewitness identification provides converging findings (Gronlund, Wixted, & Mickes, 2014; Wixted & Mickes, 2014). The police can test eyewitness' ability to recognize a suspect using either a simultaneous lineup (e.g., six people, including the suspect, presented side-by-side) or a sequential lineup (e.g., the six people are presented one at a time). Eyewitnesses are better able to distinguish among the candidates' faces in a simultaneous lineup (Mundy, Honey, & Dwyer, 2007). Eyewitnesses make more accurate judgments in the simultaneous lineups because it

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allows them to focus on distinctive, and hence, diagnostic, attributes of the candidates, and also highlights that non-unique attributes are less helpful in making an accurate judgment (Wixted & Mickes, 2014).

Viewing options together may also lead people to make choices that are consistent with their preferences. In a study, people were asked to choose one lottery from a pair of lotteries, with 10 such pairs presented either simultaneously or sequentially (Levy-Garboua, Maafi, Masclet, & Terracol, 2012). Importantly, participants who viewed all pairs of lotteries together were more likely to exhibit consistent risk preferences (i.e., choosing all safe options above a certain risk threshold, and all risky options below the threshold) than those who viewed each pair sequentially, and were thus better able to express their risk preferences when making risky choices.

The greater comparative processing in the simultaneous format may lead people to focus on the differences between the options while disregarding common information, even if the common information is necessary for interpreting the differing information. In particular, numerical information consists of both a number and the unit or scale that is necessary for interpreting the number. When faced with options varying on a numerical scale, people often attend to the numbers while disregarding the scale, although the scale is essential for interpreting the numbers. For example, people judge the difference between 700 and 900 on a 1000-point scale as larger than that between 7 and 9 on a 10-point scale (Pandelaere, Briers, & Lembregts, 2011). Recent research suggests that people are more likely to exhibit this bias when they view options simultaneously rather than sequentially (Schley, Lembregts, & Peters, 2017; see also Tao, Wyer, & Zheng,

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2017), again indicating that simultaneous presentation shifts people's attention away from common information (e.g., the unit or scale in this case).

The greater comparative processing elicited by the simultaneous format highlights tradeoffs, and thereby accentuates processes arising from tradeoff salience. Participants in a study were presented three options varying on two attributes (e.g. three hotels with ratings on *accessibility* and *amenities*) that were negatively correlated. When faced with difficult tradeoffs, people tend to choose the compromise option (i.e. the hotel with the middle rating on *accessibility* and *amenities*; Simonson, 1989). This compromise effect was heightened when people viewed options simultaneously rather than sequentially (Jang & Yoon, 2015), probably because both the tradeoff and the compromise nature of one of the options was more salient in simultaneous choice. Another manner in which people resolve difficult tradeoffs is by deferring the choice, and indeed, people who viewed equally attractive options simultaneously were more likely to defer the choice than those who viewed the same options sequentially (Dhar 1996).

When viewing options sequentially, comparing each newly encountered option with previous options can highlight the unique aspects of the newly encountered option, thus leading to order effects in evaluation. Participants in a study were shown three options of college dorm rooms, one at a time, such that each option had unique positive features but shared negative features. When evaluating these options, participants focused only on the unique positive aspects of each newly encountered option but paid little attention to the common negative aspects (Bruine de Bruin & Keren, 2003). Similarly, analyses of the Eurovision Song Contest and the World Figure Skating

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Contest results found that judges' evaluation of contestants increased linearly with the contestants' order of appearance (Bruine de Bruin, 2005). In another study, when people were presented with equally appealing options, such as four chocolate cakes, they rated the options appearing later more positively (Bullard, Manchanda, & Sizykh, 2017). The order effects persisted both when participants rated each option as soon as they viewed them and when participants rated options after viewing all available options (Bruine de Bruin & Keren, 2003). When the options were presented together, such order effects greatly reduced (Bruine de Bruin & Keren, 2003) or were completely eliminated (Bullard et. al., 2017). Further, the order effects attenuated for participants who had a lower need for a reference point in the initial stage of the sequence (Bullard et. al., 2017), providing further evidence for the underlying mechanism.

### **FUTURE DIRECTIONS**

Future research can examine other downstream effects of these two option presentation formats. For instance, when viewing options together, people might have a lot of information to process if there are many options varying on many attributes. To manage choice overload, people may use simplifying rules to help them reach a decision, such as counting the number of attributes on which one option is best and selecting the option with the majority of winning attributes (*majority rule*; Russo & Doshier, 1983), or breaking down a choice with a large number of simultaneously presented options (e.g. choosing one of 24 different sandwiches) into a sequence of simpler choices (e.g. choosing the bread, the filling, the sauce) that are more tractable, thereby converting one large, unmanageable simultaneous choice into a sequence of smaller simultaneous choices (Dorn, Messner, & Wänke, 2016). On the other hand,

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when viewing options one at a time, as people have difficulty comparing across options, they might focus more on comparing options against an internal reference point.

Therefore, they may evaluate each attribute of each option against an internal reference cut-off point, and select the option that has the maximum number of attributes fulfilling the decision maker's reference point (Alba & Marmorstein, 1987). Further, the decision strategies and option presentation format may sometimes interact. For instance, when people encounter options that have a large number of attributes, comparing options on attribute information may be tedious, even when options are viewed together. In such cases, even in simultaneous format, people may resort to a holistic, alternative-based processing strategy.

The general difference between more comparative vs. more holistic processing in simultaneous vs. sequential presentation formats, respectively, can take a number of different specific forms, especially when people are making multi-attribute choices. For example, people might be more likely to use by-attribute comparisons when viewing options simultaneously and by-alternative comparisons when viewing options sequentially (Bettman, Luce, & Payne, 1999). When viewing options simultaneously, people might be more likely to use the elimination by aspects strategy (i.e., eliminating options failing to meet the cutoff value for important attribute; Tversky 1972). When viewing options sequentially, people might be more likely to use a weighted additive strategy (Payne, Bettman, & Johnson, 1988), whereby they multiply each value of each attribute with its subjective importance in the decision, and compare the resulting value across options. Future research can test whether sequential vs. simultaneous option

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presentation alters the specific decision strategies that people use when making multiattribute choices.

In nearly all the above cited research, people had to choose among options belonging to the same category (e.g., five different lotteries; five different laptops). However, often times, people might be choosing among options belonging to different categories (e.g., whether to go on a vacation or to renovate one's house), which cannot be compared along a parallel set of attributes (Cho, Khan, & Dhar, 2013). Given that simultaneous presentation encourages people to compare attributes across options, encountering non-comparable attributes may reduce their ability to make a decision and their satisfaction with the decision that they ultimately make. In contrast, if people evaluate each option on its own and compare their holistic evaluation of the different options, they might be quicker to make a decision and be more satisfied with their decision. Even when the options belong to the same category, sometimes attribute values of one or more options may be missing (e.g., no information on Consumer Reports<sup>®</sup> about a new refrigerator), which can lead people to defer making a choice (Gunasti & Ross, 2008). When people view options one at a time, the absence of full attribute information may become less salient, thus reducing uncertainty and helping people make a choice. Future research can test these possibilities.

Future research can also examine whether specific procedural design choices used in past experiments might systematically influence people's decisions. For example, in the sequential format, in some studies, people could go back and forth among all the options (e.g., Basu & Savani, 2017), whereas in others they could not (e.g., Bruine de Bruin, 2005). It is possible that some of the biases arising in the

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sequential presentation might be attenuated if people can go back to previous options, and thereby do more detailed comparative processing than would be otherwise possible. Nevertheless, differences between the simultaneous and sequential formats were observed even when people could go back and forth among the options in the sequential format (Basu & Savani, 2017).

Finally, we have been assuming that when presented with multiple options simultaneously, people would tend to compare specific attributes of the options against each other. However, this need not always be the case. For example, a recruiter faced with a large number of applicants' CVs might still process each CV one at a time, even with all the CVs laid out in front of them. Future research can examine the conditions under which people spontaneously adopt holistic processing even when all options are simultaneously available.

Viewing options one at a time or together is one of the most fundamental decision people make before embarking on a choice task. It is also a choice architecture tool for managers and policy makers. Our article sheds light on this nascent but important area of research and deepen our understanding of the way option presentation affects decisions.

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### **Notes**

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### References

- Alba, J. W., & Marmorstein, H. (1987). The effects of frequency knowledge on consumer decision making. *Journal of Consumer Research*, *14*, 14-25.
- Basu, S., & Savani, K. (2017). Choosing one at a time? Presenting options simultaneously helps people make more optimal decisions than presenting options sequentially. *Organizational Behavior and Human Decision Processes*, *139*, 76-91.
- Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research*, *25*, 187-217.
- Bruine de Bruin, W. (2005). Save the last dance for me: Unwanted serial position effects in jury evaluations. *Acta Psychologica*, *118*, 245-260.
- Bruine de Bruin, W., & Keren, G. (2003). Order effects in sequentially judged options due to the direction of comparison. *Organizational Behavior and Human Decision Processes*, *92*, 91-101.
- Bullard, O., Manchanda, R. V., & Sizykh, A. (2017). The “Holding-Out” effect: How regulatory focus influences preference formation for sequentially presented choice alternatives. *Social Psychological and Personality Science*, *8*, 284-291.
- Cho, E. K., Khan, U., & Dhar, R. (2013). Comparing apples to apples or apples to oranges: the role of mental representation in choice difficulty. *Journal of Marketing Research*, *50*, 505-516.
- Dhar, R. (1996). The effect of decision strategy on deciding to defer choice. *Journal of Behavioral Decision Making*, *9*, 265-281.

## Sequential vs. Simultaneous Choice

Dorn, M., Messner, C., & Wänke, M. (2016). Partitioning the choice task makes Starbucks coffee taste better. *Journal of Marketing Behavior*, *1*, 363-384.

Gronlund, S. D., Wixted, J. T., & Mickes, L. (2014). Evaluating eyewitness identification procedures using receiver operating characteristic analysis. *Current Directions in Psychological Science*, *23*, 3-10.

Gunasti, K., & Ross, W. T. (2008). How inferences about missing attributes decrease the tendency to defer choice and increase purchase probability. *Journal of Consumer Research*, *35*, 823-837.

Hsee, C. K., & Leclerc, F. (1998). Will products look more attractive when presented separately or together?. *Journal of Consumer Research*, *25*, 175-186.

Jang, J. M., & Yoon, S. O. (2016). The effect of attribute-based and alternative-based processing on consumer choice in context. *Marketing Letters*, *27*, 511-524.

Johnson, E. J., Shu, S. B., Dellaert, B. G. C., Fox, C., Goldstein, D. G., Häubl, G., . . . Weber, E. U. (2012). Beyond nudges: Tools of a choice architecture. *Marketing Letters*, *23*, 487-504.

Klayman, J., & Brown, K. (1993). Debias the environment instead of the judge: An alternative approach to reducing error in diagnostic (and other) judgment. *Cognition*, *49*, 97-122.

Lévy-Garboua, L., Maafi, H., Masclet, D., & Terracol, A. (2012). Risk aversion and framing effects. *Experimental Economics*, *15*, 128-144.

Mogilner, C., Shiv, B., & Iyengar, S. S. (2013). Eternal quest for the best: Sequential (vs. simultaneous) option presentation undermines choice commitment. *Journal of Consumer Research*, *39*, 1300-1312.

## Sequential vs. Simultaneous Choice

- Mundy, M. E., Honey, R. C., & Dwyer, D. M. (2007). Simultaneous presentation of similar stimuli produces perceptual learning in human picture processing. *Journal of Experimental Psychology: Animal Behavior Processes*, *33*, 124-138.
- Pandelaere, M., Briers, B., & Lembregts, C. (2011). How to make a 29% increase look bigger: The unit effect in option comparisons. *Journal of Consumer Research*, *38*, 308-322.
- Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *14*, 534-552.
- Russo, J. E., & Doshier, B. A. (1983). Strategies for multiattribute binary choice. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *9*, 676-696.
- Schley, D. R., Lembregts, C., & Peters, E. (2017). The role of evaluation mode on the unit effect. *Journal of Consumer Psychology*, *27*, 278-286.
- Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research*, *16*, 158-174.
- Tao, T., Wyer Jr, R. S., & Zheng, Y. (2017). The role of categorization and scale endpoint comparisons in numerical information processing: A two-process model. *Journal of Experimental Psychology: General*, *146*, 409-427.
- Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review*, *79*, 281-299.
- Wixted, J. T., & Mickes, L. (2014). A signal-detection-based diagnostic-feature-detection model of eyewitness identification. *Psychological Review*, *121*, 262-276.

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### **Recommended Reading**

Basu & Savani (2017). (See references). A series of studies examining the underlying reason for the positive effect of viewing options together on decision quality.

Bruine de Bruin, W., & Keren, G. (2003). (See references). A series of studies examining the mechanism underlying order effects.

Mogilner, Shiv, & Iyengar (2013). (See references). A series of studies examining the role of emotions on the positive effect of viewing hedonic options together.

Wixted & Mickes (2014). (See references). A review of the impact of sequential and simultaneous line ups in eyewitness identification research.