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## THE HEBREW UNIVERSITY OF JERUSALEM


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# WHY DIDN'T I SEE IT EARLIER?

**By**


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## מרכז פדרמן לחקר הרציונליות

## THE FEDERMANN CENTER FOR THE STUDY OF RATIONALITY


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# My Biggest Research Mistake

## Adventures and Misadventures in Psychological Research

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# 27 WHY DIDN'T I SEE IT EARLIER?

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We live our life one day after another, and hence our research, too, unfolds in time. My tale is about how the arbitrary order in which I encountered some of the effects I will discuss led me, for many years, down a garden path. Stickiness in belief revision, which is a form of confirmation bias, plus striving for parsimony, which is a form of theoretical elegance, hampered for years my ability to understand position effects in simultaneous choice (namely, choice from a set of options that are all presented at the same time, like a salad bar).

My graduate student, Yigal Attali, worked at Israel's National Institute for Testing and Evaluation (which is like America's ETS, the firm that produces the SATs and the GREs). Vaguely based on a mix of intuition and experience, he had a hunch that test-takers with no idea what the correct answer to a multiple choice (MC) question is gravitate to the middle of the offered answers more often than to the first or the last of the possibilities. Psychometric theory, in contrast, predicts that guessing respondents choose an answer at random.

A series of clever experiments and sophisticated analyses of data from real tests proved that Yigal's hunch was correct. But far more interesting was his serendipitous discovery that the people who invent the MC questions have a tendency to place the correct answer in the midst of the distractors they make up. These people, usually with advanced degrees, should have known better. According to game theory, in hide-and-seek situations, such as MC tests, the correct answer should be placed in a randomly chosen position. That is the only strategy that cannot be exploited: No matter how the test-taker guesses, every guess has the same probability of being correct. The test-takers' bias might be a response to the test-makers' bias. But where does the latter come from?

We could think of no good answer, but when searching the literature, we found many other studies of simultaneous choice from identical options (picking a can of soup from a supermarket display of identical cans; picking which roll of toilet paper to use in a bathroom stall; picking a chair to sit on when waiting for an experiment to begin; picking a questionnaire from three stacks of questionnaires; picking a number to bet on in a lottery; etc., etc., etc.). These seemed to resemble our test-makers' decision where to place the correct answer, which was also a choice from options that differed only in their position. In all these studies, the authors reported a *middle bias*—middle options were chosen disproportionately compared to those on the edges.

Besides a shared effect, these studies shared a lack of theory. At the end of our search, we still had no single explanation for the middle bias, but we sure had a lot of company! Middle bias was also reported when the simultaneously presented items were not identical (e.g., in store layouts). There it was called the *center-stage effect*.

We published our findings without explanation but with a generalization: For some reason, simultaneous choice was consistently subject to a middle bias.

Some years later, another student, Eran Dayan, studied choice from restaurant menus. We didn't expect novel results; we just thought it would be cool to show middle bias in an inherently interesting everyday context. Since menu items are not identical, the bias would have to be shown by comparing the popularity of any given menu item when it is placed in the middle of the menu options, versus when it is placed at the beginning or end of the list. There was indeed a position effect in menu choice—but to our surprise, it was the reverse of the expected middle bias. Being first or last on the menu conferred an advantage—not large but persistent—over being placed in the middle!

Eran's results could not be dismissed as a fluke. He had dozens of observations in a lab experiment, as well as in a real restaurant where real patrons were making real orders. He had data about choosing drinks, deserts, or entrees. For each setting and each category, and not just on average, the middle was *dis*advantaged. We had to take it seriously. But why was menu choice an exception?

I then had an epiphany: Menu choice was not really simultaneous choice. Although menus are presented simultaneously to one's eyes, they are presented sequentially to one's mind. They must be read and processed, rendering the presentation serial. In the sequential world, "position" is not in space but in time. And position in time is famously governed by the ubiquitous serial-position effect—which gives an advantage to being first or last, at the expense of the fuzzy middle. The psychology of the serial-position effect is well understood. It is menu choice, I realized, that conforms to a well understood rule, and MC questions, which must also be read and processed in a serial fashion, are the exception.

Exception? The literature was replete with middle bias; MC tests exhibited a middle bias; and yet were MC tests the exception? What was going on?

To cut a long story short, the data forced upon me the very belated realization that not in all simultaneous choices was a middle bias due to the same psychology, and not all serially processed choice sets were governed by the same psychology.

Simultaneous choice was subject to at least two major dichotomous considerations, which jointly could predict what effect position would have. First, it matters whether serial processing is required or not. Evidently identical cereal boxes on a supermarket shelf require no serial processing. They differ only in the position that they occupy. Other options, such as answers to a MC question, or a list of foods to order from, or a pull-down menu in an Internet site, clearly *do* require serial processing. When "middle" is in physical space and choice is implemented by reaching for it, the

middle has the advantage of getting more visual attention, and reaching for it is easier, because it is often closer to where one is standing vis-à-vis the display, and it is less sensitive to careless reaching than the edges. This account cannot possibly explain middle bias in MC tests.

For that, a second consideration is required. If the choice involves strategic considerations, if it is a move in a two-sided game, then strategic considerations trump the advantages that accrue to the so-called *choice architecture*. In competitive hide-and-seek contexts, formally known as *zero-sum games*, choice is biased *against* salient options or salient positions; salient positions are not good hiding places. In contrast, in cooperative contexts, also known as *win-win*, salience is advantageous.

Nobelist Tom Schelling provided a famous example. Yale students were asked to imagine they had made an appointment to meet another Yalie in Manhattan the next Sunday but forgot to state a precise time and place and there was no way for them to communicate (this is a 1950s example). It was critical for them to meet—but HOW?? This is simultaneous choice: All spots in Manhattan, and all hours, are simultaneous candidates. Almost all respondents chose noon, and most chose the Grand Central information booth—arguably the most salient of Manhattan landmarks at the most salient time of day.

It took me over 10 years and several false starts (corresponding to several papers), to figure this out, simply because mere chronology misdefined "rule" and "exception."

## REFERENCE

This chapter is based on the following paper:

Bar-Hillel, M. (2015). Position effects in choice from simultaneous displays. *Perspectives on Psychological Science, 10*(4), 419 – 433.

## CRITICAL THINKING QUESTIONS

1. If you were being interviewed for a job, where would you like to be in the sequence of interviewees: First, last, or somewhere in the middle? How does this follow from the paper, if indeed it does at all?
2. In a simultaneous presentation of just two options, there is no "middle." Can you speculate whether there is an advantage or disadvantage to being first versus second?
3. There are famous position effects on the IQ of children born into a family. First-borns tend to be smarter than their siblings, followed by second-borns, then third-borns, and so on. Do you see any relationship between these position effects and the ones reported in my little essay? If so, what is it? If not, why not?

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