A Brief Review of the Behavioral Economic Phenomenon of Digit Preference

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What is digit preference?

- Digit preference, quite literally, refers to the preference for certain digits as opposed to other digits.
- The phenomenon of digit preference has been studied in several different contexts across various fields, such as blood pressure measurements, used car prices, gas sales, batting averages, SAT scores, and even wedding dates.
- Many studies have attempted to provide an explanation for this phenomenon and many hypotheses have been generated,

Purpose

- The last few decades have witnessed the generation of quite a diverse and expansive literature surrounding this phenomenon.
- However, such a diverse literature, spread across a wide variety of fields, is prone to fragmentation. The purpose of the present study will be to revise these seemingly conflicting findings in order to provide an over-arching framework for digit preference that weaves together the various hypotheses and results of the literature.

The Round Number Heuristic

- A cognitive heuristic in which round numbers are used as "cognitive reference points" in numerical scales, and therefore act as reference points in the process of subjectively judging outcomes (Pope and Simonsohn 2011).
- Reference dependence refers to the idea that people make decisions based on expected utility with respect to a reference point (Kahneman and Tversky, 1979).

"Round"

- Before discussing the framework of this paper, it is important to provide an operational definition for the term "round", as much of the literature uses this term in order to describe different terms.
- Throughout the literature, "round" is a relative concept used to describe values on a scale that are more likely to be perceived as being complete or whole in comparison to the other values on the scale.

Threshold Effects

- Because of the round number heuristic, we hypothesize about the existence of various observable "threshold effects". Threshold effects are perceptual discontinuities at these round number reference points that are observable in behavioral data and are indicative of the round number heuristic.
- There are a variety of different types of observable threshold effects brought about by different contexts.

Systematic Biases

- The systematic biases observed in the digit preference literature are consequences of the threshold effects that are specific to certain contexts.
- The two most prominent systematic biases in the digit preference literature are the left-digit effect and end-digit preference.

The Left-Digit Effect

- The left-digit effect is the resulting effect that a change in the leftmost digit of a price (or other numerical value) has on the perception of the magnitude of that change (Bhattacharya, Holden, and Jacobsen 2012).
- Do consumers really perceive these nine-ending prices to be significantly lower than a price one cent higher? Thomas and Morwitz (2005) sought to answer this question by analyzing survey data regarding price comparisons of similar products. The data suggested that the answer to this question is yes, so much so that nine-ending prices have a significant effect on firms' revenues.

The Left-Digit Effect (cont.)

- In Pope and Simonsohn (2011), the researchers studied batting averages of major league baseball players and observed that players that are just below .300 adjust their behavior on the last play of the season to increase their chances of getting a hit.
- Pope and Simonsohn also observed a similar phenomenon with SAT scores, in which high school juniors were significantly more likely to have a final SAT score (the SAT score of the last SAT taken) that is just above a specific round number threshold (i.e. 1000, 1100, 1200, etc.).

End-Digit Preference

- End-digit preference is defined as an operator dependent phenomenon in which specific end-digits are recorded more often than would be expected by chance expected by chance (Alsanjari et al., 2012).
- Numerous studies that have conducted over the previous decades have observed this effect in blood pressure (BP) reporting, as the recording of BP with EDP can lead to fatal consequences regarding the monitoring of cardiovascular risk and effects of treatment (Alsanjari et al., 2012).
- Bakker and Damhuis (2018) observed end-digit preference and a similar effect in the reporting of tumor sizes. Specifically, they observed that in both breast and lung tumor size measurements, reports with pentameric values were significantly more common than would have been expected by chance.
- Buller et al. (2005) observed EDP in Goldmann applanation tonometry readings.
  - The researchers called this the hedgehog effect, as the end-digit frequency plot would move up and down like a hedgehog poking its head through the ground.

Implications

- An understanding of this framework in the private sector is crucial as much of the digit preference literature has demonstrated the importance that playing to these systematic biases in pricing can have on revenue.
- An understanding of this framework in medical care would have a tremendous impact on emphasizing the importance of proper and accurate reporting, which would help ensure that people receive proper diagnoses. This would allow for people to receive proper care and could ultimately save lives.