# Sizing Up Magnitude

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From fitness trackers that monitor our heart rates and daily steps to the number of “likes” on our latest social media update, the world is becoming an increasingly quantified place. Though we may not be aware of it, our own estimations of magnitude and scale bias our senses and decisions in a number of surprising ways, profoundly influencing everything from our social lives to our business decisions.

In an interdisciplinary symposium, “The Origins and Consequences of Magnitude Estimation,” at the 2016 APS Annual Convention in Chicago, four speakers discussed a diverse sampling of new research on the basic mechanisms and biases that underlie our appraisals and approximations.

Seemingly simple estimation tasks — like choosing the mug that’s just the right size for your morning coffee — can give insights into how we make basic cognitive judgments, and how those judgments can be led astray. In a recent series of experiments, Clayton Critcher and Hannah Perfecto, both of University of California, Berkeley, showed participants drinking glasses and asked them to estimate how much liquid they could hold.

This simple question helped reveal new insights about how people estimate size as well as what biases such judgments. One way people estimate the volume of a container is by simulating how much a person could pour into it. But when the same glass is turned upside-down, people have a harder time performing this simulation. As a result, the glass was estimated to be smaller.

“Much as an apartment may look smaller if you have trouble imagining how you would fit your furniture into it, our perceptions of volume are led astray by irrelevant features that affect such simulations,” Critcher explained.

Sam Maglio (University of Toronto Scarborough, Canada) presented a recent study demonstrating that a change to just one vowel sound can have an outsized effect on our sense of spatial distance. Specifically, people intuitively associate front-of-the-mouth vowel sounds — such as the “ee” in feet — with concepts of nearness, while vowel sounds produced with the tongue far back in the mouth, such as the “oo” in food, are associated with distance.

In a series of experiments, Maglio demonstrated that “changing one vowel sound in a name can influence magnitude estimations for geographical space, impacting judgment, perception, and action.”

In one experiment, participants in New York City were asked to guess their distance from one of two fictional towns: Fleen, New York (which contains a front vowel sound) or Floon, New York (which uses a back vowel sound). On average, people estimated that Fleen was much closer — approximately 150 miles away — while Floon was estimated to be approximately 200 miles away. Additional experiments showed that referring to a novel object as a “doab” or “deeb” also influenced people’s perceptions of distance. On average, people threw a beanbag farther when they were trying to hit a “doab” compared

with trying to hit a “deeb.”

We often experience magnitude in more than one form simultaneously: time, distance, scale, and likelihoods. To investigate the effects of multiple forms of magnitude simultaneously, speaker Evan Polman (University of Wisconsin-Madison) turned to a novel set of data: online restaurant reviews. Polman and colleagues used a sample of 166,215 restaurant reviews from the website TripAdvisor to analyze how physical distance and temporal distance combined influence restaurant appraisals.

Their analysis revealed a new insight called the “distance boosting effect”: Experiencing both a long journey and a long temporal delay amplified the positivity of a restaurant’s review.

“As you can imagine, events feel more remote when events take place a long time ago or far away — however, we found that events feel even more remote when those events take place a long time ago *and* far away,” Polman explained. “Specifically, events are usually remembered more fondly [more positively] after time has passed; and we find that events are remembered even more fondly when both time and physical distance has passed.”

Distance also influences our social relationships, Rachel Ruttan (Northwestern University) explained.

Evidence suggests that sharing a similar hardship with someone else actually can inhibit our compassion toward that person rather than bolstering it. Over time, we forget how much difficulty we had with the experience, leading us to attribute others’ struggles to their personal failings.

In a series of experiments looking at former smokers, business school alumni, and people who had completed a strenuous exam, Ruttan and her colleague, Katherine DeCelles, demonstrated that people’s construals of their success — whether they felt they had overcome obstacles on their own or with help, advice, and support from others — determined the extent of their compassion for others in the same boat. Reminding people of support they received may be one way to reduce emotional distance and increase compassion, Ruttan suggested.