Measuring Magnitude

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My entire family loves pickles — except me. At our family reunion there are several large jars of pickles on the table, and when the day is done, one of my uncles drinks the pickle juice from each jar. The only time I have eaten a pickle was for a contest that I was determined to win, and let's just say it didn't sit so well. I am not a pickle fan, a character flaw generously overlooked by my relatives, at least so far.

My family and I clearly differ immensely when it comes to taste. Who's to say that the saltiness or sweetness that I hate about pickles isn't the very reason that my cousins love them? When it comes down to it, it's virtually impossible to compare experiences like taste or pleasure across individuals, but we still try â€" as a human species we want to share each other's experiences.

In an effort to categorize our sensory experiences, we use various adjectives, like "strong," "sweet," or "hot." Take, for example, a woman who has just given birth. She describes her pain as "very strong." She may also describe a cup of tea as "very strong" later that day. We know that she does not mean to suggest that the flavor of the tea was the same intensity as her pain. What she is really saying is that among all of the pain that she has experienced, childbirth was very strong, and among all of the tea she has had, that particular cup was very strong.

This is relatively harmless in conversation, but what about when scientists or doctors use one scale that they believe fits all domains? APS President Linda Bartoshuk, University of Florida, tackled this question in presenting the APS David Myers Lecture on the Science and Craft of Teaching Psychology at the APS 21st Annual Convention.

Visual analog scales (VAS), as Bartoshuk pointed out, are widely used in psychology and medicine to measure a characteristic or attitude that is believed to range across a continuum of values. You're likely to be administered one of these scales in the hospital when the nurse asks you to rate your pain on a scale from "none" to "agonizing."

Bartoshuk first encountered problems with using this rigid scale when she began studying the differences between supertasters and normal tasters. Supertasters aren't *as* remarkable as they sound; they were just born with more fungiform papillae, the small structures on the tongue that house taste buds. This not only causes supertasters to taste more, but they also feel more intense sensations of other kinds. Give them a bowl of chili and they will feel more burn, a scoop of ice cream and they will experience more creaminess from the fat. Put another way, "Supertasters live in a neon taste world compared to the pastel taste world of others," Bartoshuk explained. If supertasters experience more from food, their taste scales are going to be expanded compared to normal tasters and, Bartoshuk argued, conventional scales, like the VAS, will not reflect this discrepancy.

Psychologists have a solution to this problem â€” magnitude matching. Here's how it works: In one experiment, Bartoshuk had supertasters and normal tasters rate the sweetness of a coke on a typical sweetness scale (from zero to max-sweetness). On this scale, everyone picked a point slightly more than medium sweet. If you were to stop there it looks like everyone is having the same sweet experience. However, she then had the groups match the sweetness of coke, to the loudness of a tone. Supertasters cranked the volume of the tone to 90 decibels to match the sweetness of the coke and normal tasters stopped it at 80 decibels. A difference of 10 decibels doubles the loudness of tone. So, supertasters are really experiencing double the sweetness as normal tasters even though the conventional scale doesn't catch it. But when you match sweetness to a standard independent of taste, you are then able to make comparisons across individuals.

Using this method to measure sensory and hedonic experiences between individuals will yield better results and contribute to better practices in real world settings. For example, pain assessment scales in hospitals should be adjusted so that patients receive adequate care for their reported pain. Women who have given birth have arguably experienced more pain than the most painful experience that a man has undergone. Their pain scale is expanded and if they rate themselves at a 4 on the hospital pain scale, they are probably in more pain than a man who rates himself at the same spot.

Bartoshuk believes that measuring a completely subjective experience is possible with magnitude matching. If we want to measure happiness of quality of living around the world, why not compare it to a standard like the loudness of a tone or the brightness of the sun? As Bartoshuk quoted Galileo, if we are going to have an accurate science, we must "Measure what is measurable, and make measurable what is not so."