

Rasch Invents "Ounces"

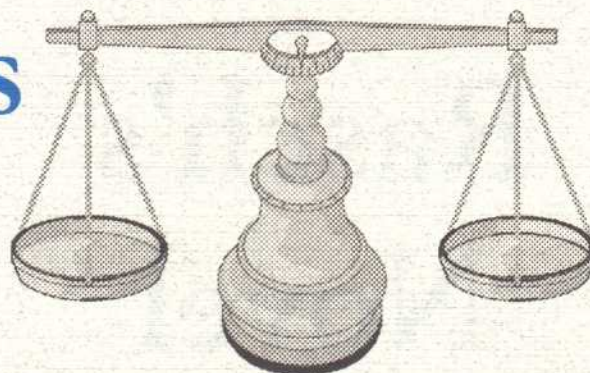
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One might wonder how civilization ever arrived at the efficient and reliable abstraction we call "weight" — measured out, for instance, in ounces? We could not get along without this lovely abstraction. Not only physics and engineering, but commerce also would collapse. But where did the measurement of weight come from? How did it develop?

We cannot trace its entire history, because most is unrecorded. But we can reenact, right now, an experiment which shows how it must have come about. We can demonstrate the irresistible and nearly perfect connection between the simplest possible hand-to-hand perceptual comparison and professionally measured weight. All we have to do is

to compare pairs of objects for their apparent relative heft by passing them back and forth from hand to hand and record which one seems heavier. Nothing more exact or demanding is needed. An entirely psychometric, that is mathematical, construction built from a collection of these simplest of all observations produces a linear equivalent to "objective" weight.

Ellie Choi poured different amounts of rice into 10 unmarked paper cups, sealed the cups, and labeled them "A" through "J" at random. Then she asked each of 13 students she happened to encounter to pick up pairs of these cups, one in each hand, pass them back and forth and then tell her which



cup seemed heavier. The 10 cups produced 45 pairings per student. Her experiment produced 580 separate paired comparisons with the heavier-feeling cup scored "1" and the lighter-feeling cup scored "0" each time. After Ellie had collected these data, she weighed each cup on a postal meter to determine its "official" weight in ounces.

When Ellie analyzed these simple dichotomous paired comparisons with the Rasch measurement program *Facets*, she found that the Rasch calibrations of the 10 cups in logits formed a statistically linear relationship with their weight in ounces. Here is her picture of this relationship.

The implications of Ellie's experiment for the history of measurement is

that the linear abstraction of "weight" has been resident in our simplest perceptual judgements since our beginning, whenever that was. All we did over all those centuries was to discover, step-by-step, how to make the implications of what we felt in our hands into objective, reproducible measures.

Ellie's experiment was replicated by Natalie Colabianchi last autumn with the same result.

Choi, Sungeon "Ellie" (1995) Using Paired Comparisons to Determine Weight Perception. Unpublished paper. University of Chicago.

