LETTER

Characterizing perceptions of energy consumption

The adoption of energy-saving technologies is presumably deterred by underestimates of energy use and by corresponding underestimates of the difference between more- and less-efficient appliances. Thus, it is easy to grasp the potential policy significance of a recent study (1) concluding that Americans underestimate energy use by a factor of 2.8.

However, the apparent precision of that statistic belies its arbitrary origins. By manipulating just two experimental details (the provided numeric referent and the units in which judgments were rendered), we show that one can readily reach qualitatively different conclusions.

For the study in question (1), respondents were first told that a 100-W incandescent electric light bulb uses 100 units of energy in 1 h and were then asked to estimate the energy use of various household appliances. The experimental decision to provide a 100-W light bulb as the referent was justified by respondents' familiarity with light bulbs and by the authors' corresponding conjecture that a light bulb might serve as a natural reference point for such judgments, even if not explicitly provided as part of the experimental materials.

Using an online panel of survey participants, we first tested whether a light bulb would serve as a natural reference point for judgments about energy use. Of 100 participants asked to name something that uses energy to operate, a total of 12 mentioned light, lights, or a light bulb. Other responses included computer (30), car (13), television (11), air conditioner (4), coffee pot (2), toaster (2), vacuum (2), and chain saw (2).

We then tested for the influence of the provided numeric referent. A separate set of respondents estimated the energy consumption of the eight electrical appliances used in the study by Attari et al. (1). We manipulated whether the provided referent was a 3-W light-emitting diode (LED) flashlight bulb (n = 36), a 100-W incandescent light bulb (n = 31), or a 9,000-W electric furnace (n = 37).

As shown in Table 1, the chosen numeric referent markedly influenced estimates: if it was a 3-W LED flashlight bulb, respondents underestimated energy consumption by a factor of 18.3; if it was a 100-W incandescent light bulb, they underestimated consumption by a factor of 2.5 (strikingly close to the value reported by Attari et al.); and if it was a 9,000-W electric furnace, they *overestimated* consumption by a factor of 1.6. In two other conditions (n = 38 and n = 39), we provided no referent but manipulated the units in which judgments were rendered. When responding in watts, respondents underestimated energy use by a factor of 6, but when responding in kilowatts, they *overestimated* energy use by a factor of 51. In our view, such results call into question the validity of the summary statistics proposed in the target article (1).

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Table 1. Median judgments (watts)

Provided referent	Laptop computer (48)	Stereo (128)	Desktop (140)	Heater (925)	Room AC (1,000)	Dishwasher (1,800)	Dryer (3,400)	Central AC (3,500)	Average (1,368)
3-W LED flashlight bulb	25	23	33	73	78	73	100	150	75
100-W light bulb	200	125	340	500	500	300	500	800	544
9,000-W electric furnace	350	300	500	1,000	2,000	1,200	1,000	6,000	2,188

Actual energy consumption, as reported by Attari et al. (1), in parentheses. AC, air conditioner.