Coarse and Precise Information in Food Labeling

Link to the full paper

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Coarse labels — i.e., labels that indicate that a product's attribute falls within a range of values — are widespread. Public authorities and companies often adopt these simple categorical labels to convey information and promote the purchase of healthy products. In recent years many countries have introduced standardized food labels, often in the form of coarse labels. But information models predict that detailed labels, that provide more precise information, should allow consumers to make better decisions. Is it true? Or are detailed labels confusing and difficult to interpret?

Figure 1: Coarse nutrient labels across the world.

Experimental Design. I design an experiment to study the effect of coarse and precise information on food choices. I manipulate front-of-package labels about foods' calorie content. Precise labels are defined as a partition of the coarser ones. I conduct the study online on a representative US sample, and I collect additional data on food literacy, calorie preferences, purchasing habits, and demographics.

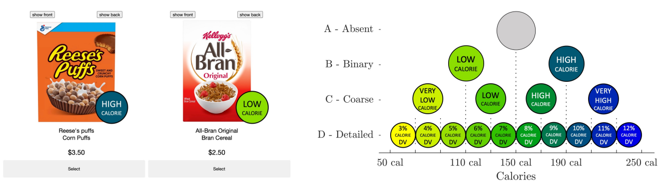

Figure 2: Food choice task and label treatments.

Results. I find that increasing the number of categories in the label has a U-shaped effect on calories. Coarse-categorical labels reduce the number of calories by up to 3% relative to having no labels, but detailed-numerical labels have a weaker effect, only 1% less. I also find that, when detailed labels are used, choices are less responsive to the product's calorie content. The probability of choosing a low-calorie product in the detailed-numerical treatment (D, blue in Fig 3.b) lies between the control treatment without labels (A, black) and the one with coarse-categorical labels (C, magenta). I also ask the participants to rank various types of labels based on what they would prefer to see in stores. Coarse labels are the most popular first choice and the Condorcet winner in the pairwise comparisons.

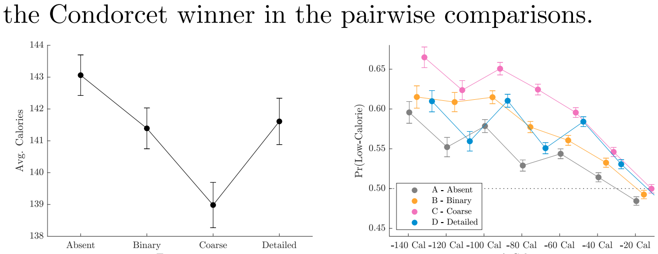

Figure 3: Label effect on calories and choices.

Testing the Bayesian Inference Model. In the context of a structural demand model, I estimate weights representing the informativeness of the labels. The central prediction of the Bayesian inference model is that coarse labels are associated with less extreme weights compared with detailed labels. However, I find that the estimates from the experimental dataset show the opposite pattern, with coarse labels having systematically more extreme weights, at odds with the model's predictions. The results suggest that, despite more information contained in the detailed labels, consumers might extract less information from them.

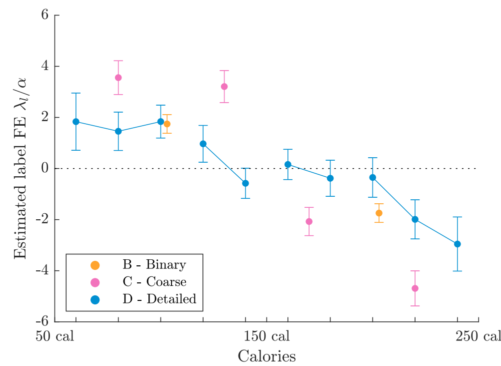

Figure 4: ML estimates, label informativeness weights.

Precision Overload. I suggest a psychologically plausible mechanism to capture the main results. Consumers could find the detailed information so confusing that they make worse use of it compared with the case in which they receive a coarser message. Differently from information and choice overload effects, *precision overload* refers to the degree of granularity of information, not to the number of attributes or options available in a choice set.

Limited Attention Model. I consider a storing/retrieval model in which consumers have limited cognitive resources available to process label information. The novel feature of the model is that agents incur a recognition cost that depends on the complexity of the messages, e.g., the granularity of the labeling regime. The remaining resources are used to reduce the noise of the message. Numerical simulations show that this model can capture the main results observed in the experiment, with higher attention costs leading to a more severe precision overload effect and a lower optimal number of labels. Some information helps, but too much detail can be confusing, and lead to less healthy food choices.

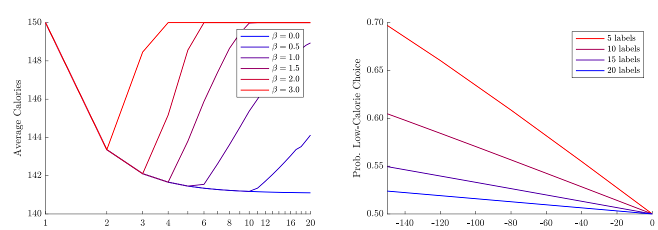

Figure 5: Limited attention model, numerical exercise.