A Trio of Inference Problems That Could Win You a Nobel Prize in Statistics (if you help fund it)

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Statistical inference is a field full of problems whose solutions require the same intellectual force needed to win a Nobel Prize in other scientific fields. Multi-resolution inference is the oldest of the trio. But emerging applications such as individualized medicine have challenged us to the limit: infer estimands with resolution levels that far exceed those of any feasible estimator. Multi-phase inference is another reality because (big) data are almost never collected, processed, and analyzed in a single phase. The newest of the trio is multi-source inference, which aims to extract information in data coming from very different sources, some of which were never intended for inference purposes. All these challenges call for an expanded paradigm with greater emphases on qualitative consistency and relative optimality than do our current inference paradigms.