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## *Presentation Title*

### **Eliciting information for decision making** (with Vincent Conitzer)

## *Abstract*

We consider a setting in which a principal faces a decision and asks an external expert for a recommendation as well as a probabilistic prediction about what outcomes might occur if the recommendation were implemented. The principal then follows the recommendation and observes an outcome. Finally, the principal pays the expert based on the prediction and the outcome, according to some decision scoring rule. In this paper, we ask the question: What does the class of proper decision scoring rules look like, i.e., what scoring rules incentivize the expert to honestly reveal both the action he believes to be best for the principal and the prediction for that action? We first show that in addition to an honest recommendation, proper decision scoring rules can only incentivize the expert to reveal the expected utility of taking the recommended action. The principal cannot strictly incentivize honest reports on other aspects of the conditional distribution over outcomes without setting poor incentives on the recommendation itself. We then characterize proper decision scoring rules as ones which give or sell the expert shares in the principal's project. Each share pays, e.g., \$1 per unit of utility obtained by the principal. Owning these shares makes the expert want to maximize the principal's utility by giving the best-possible recommendation. Furthermore, if shares are offered at a continuum of prices, this makes the expert reveal the value of a share and therefore the expected utility of the principal conditional on following the recommendation. We extend our analysis to eliciting recommendations and predictions from multiple experts. With a few modifications, the above characterization for the single-expert case carries over. Among other implications, this characterization implies that no expert should be able to "short-sell" shares in the principal's project and thereby profit if the project goes poorly.

## *Keywords*

Prediction markets; decision markets; principal-agent problems; principal-expert problems; proper scoring rules

## *Affiliation*