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Research Statement

I am a microeconomic theorist studying problems of economic design. I primarily use tools from game theory to analyze how institutions shape individual behavior and social outcomes. I also draw on experimental methods to examine behavioral responses to institutional variation. My research aims to propose implementable solutions to practical design problems and contributes to three broad areas:

Contest theory. Contests model environments where agents compete for valuable prizes by making costly investments. Examples include electoral campaigns, R&D races, sports tournaments, and crowdsourcing competitions. My research investigates how contest structure shapes investment behavior.

In many contests, such as sports tournaments, agents are awarded monetary prizes based on their relative performance. [1] analyzes prize structures in such rank-order contests and establishes the winner-takes-all format as robustly optimal across a broad class of settings and objectives. In some contests, however, the designer can only observe coarse measures of performance. For instance, in crowdsourcing for innovation contests or programming competitions, the designer cannot directly observe agents' effort but can verify whether their submissions meet a target criterion. [8] introduces weighted contracts, which allocate a fixed budget among successful agents in proportion to their weights, and demonstrates their desirability in such environments. Prizes can also take non-monetary forms—such as grades in classrooms, or evaluations and status in organizations—which are valuable for the information they convey about the recipients. [4] examines grading schemes when grades serve as signals of ability and shows how making them more informative may encourage or discourage effort depending on the underlying ability distribution. Other work keeps the prize structure fixed but explores the design of instruments that govern the rules of competition: [5] studies how tie-breaking rules affect investments in Tullock contests with ties, while [11] analyzes how feedback policies shape behavior in dynamic all-pay auctions.

Broadly, these papers point to a rich theory of how uncertainty in the distribution of abilities, the shape of the effort cost function, and noise in observed output jointly determine the effect that contest structures have on investment. I plan to investigate this theory in greater depth in future work.

Allocation problems. Fair and efficient allocation of resources is a fundamental problem in economics and computer science. However, rules that satisfy classical versions of these requirements typically fail to exist. My research seeks to overcome these impossibility results by examining restricted preference domains and relaxing key axioms.

For the object reallocation problem, the Top Trading Cycles (TTC) mechanism is well known to be fundamental and has found important applications in kidney exchange. [9] introduces the top-two condition as a richness criterion for identifying domain restrictions where TTC remains uniquely desirable or where alternative desirable mechanisms exist. Notably, the paper identifies instances where TTC outcomes may be undesirable and proposes a modification that yields improved outcomes in such cases. In richer settings with multiple indivisible objects, stable allocations that are immune to coalitional blocks may fail to exist. [2] identifies conditions under which core allocations exist and proposes a generalized TTC algorithm that finds an allocation in a version of the stable set. For allocating objects over multiple periods, such as dorm rooms to students each year, [3] proposes a TTC+Serial Dictatorship algorithm that produces fair and efficient allocations. In separate work, [10] establishes an ordering of k-price auctions based on their worst-case allocative efficiency.

These papers contribute to a broader agenda of pushing the boundaries of impossibility results and uncovering new possibilities along the way. In future work, I plan to explore the potential of using contests to address allocation problems. An ongoing project studies multi-period allocation through Tullock contests, where agents are endowed with hypothetical budgets that they can invest across periods.

Mechanism design without money. In mechanism design, the well-known Vickrey–Clarke–Groves (VCG) mechanism implements efficient outcomes by using monetary transfers to align incentives. However, in many environments, such as public decision-making or matching, monetary transfers are impractical, and simply implementing the efficient outcome may not be incentive compatible. My research examines the design and performance of optimal mechanisms among those that remain incentive compatible without transfers.

For a facility location problem on a plane, [6] identifies the coordinate-wise median mechanism as optimal for a broad class of social cost functions and quantifies the resulting welfare loss. In the context of a principal–agent project selection problem, [7] shows how partial verifiability can mitigate losses arising from the absence of transfers. For instance, if the agent cannot oversell any project to the principal, perhaps because it must provide evidence in support of its claims, a simple mechanism that selects the agent's most preferred project among those meeting a profit threshold is shown to be optimal for the principal.

In future work, I plan to investigate further how incorporating practical elements into the design problem can restore compatibility between efficiency and incentive compatibility. An ongoing project introduces Probably Approximately Strategyproof (PAS)—a notion of approximate incentive compatibility inspired by the Probably Approximately Correct (PAC) learning framework in machine learning—and investigates whether implementing the efficient outcome is compatible with this weaker notion across a range of problems.

References

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