

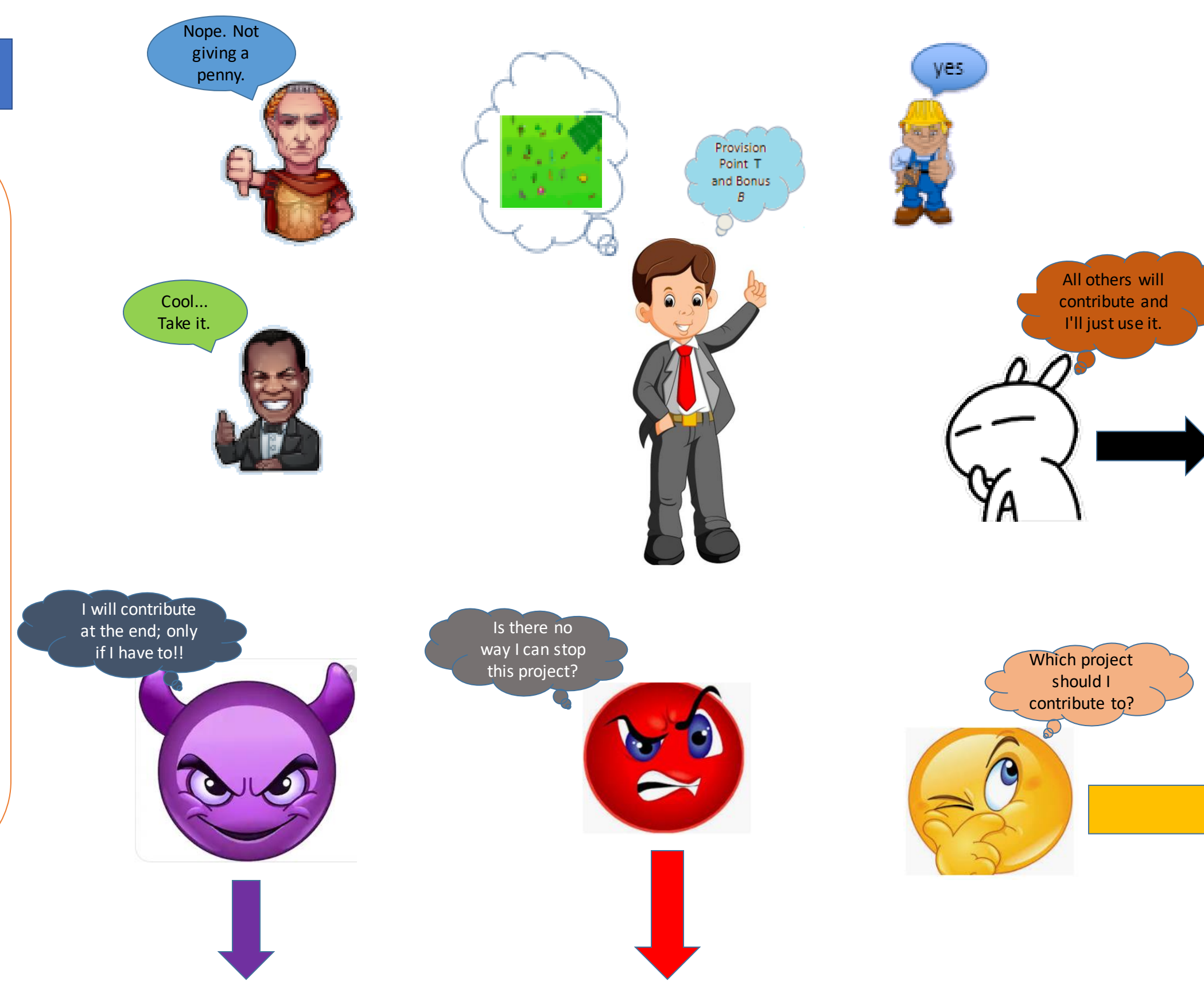


Civic Crowdfunding

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- **Civic crowdfunding** -- online websites for arranging large amounts of small donations from lots of people - to produce shared goods that have value to communities.
- **Project Manager (PM)** announces a project with specific goals - Target value (T) that has to be contributed by all agents within a Deadline (D)
- All agents interested contribute depending on their valuations of the project
- If T is collected by the deadline, the project is funded and implemented, else the amount collected will be returned (project shelved)
- Provision Point Mechanism (PPM): **voluntary contribution mechanism**, faces challenge of free riding

Crowdfunding Platforms



Mechanism to avoid Free Riding

- In public projects, since players cannot be excluded from enjoying the benefits of the project, strategic players may not contribute – they "**Freeride.**"
- In Provision Point Mechanism With Refund (PPR), the PM announces a **reward** proportional to the agent's contribution in case the project is unfunded
- This ensures the funding of the project at NE.
- In PPM and PPR agents don't have any idea about contributions already made to the project
- Rational agents will wait till the last moment to contribute to the project – a "**Race condition.**"

Publications

- Sankarshan Damle, Moin Hussain Moti, Sujit Gujar, and Praphul Chandra. "Civic Crowdfunding for Agents with Negative Valuations and Agents with Asymmetric Beliefs" **IJCAI, 2019**
- Sankarshan Damle, Moin Hussain Moti, Sujit Gujar, and Praphul Chandra. "Designing Refund Bonus Schemes for Provision Point Mechanism in Civic Crowdfunding" **AAMAS, 2019**
- Praphul Chandra, Sujit Gujar, and Y. Narahari. "Referral-Embedded Provision Point Mechanisms for Crowdfunding of Public Projects." **AAMAS, 2017**
- Chandra, Praphul, Sujit Gujar, and Y. Narahari. "Crowdfunding public projects with provision point: A prediction market approach." *Proceedings of the Twenty second ECAI, IOS Press, 2016*

Mechanisms for sequential games And avoiding race conditions.

- Agents can observe previous contributions
- Freeriding and race conditions are solved by incentivizing agents to contribute based on their true preference for the project and to contribute as soon as they arrive
- Provision Point Mechanism with Securities (PPS) uses a complex **prediction market** reward scheme
- With the rise of **Blockchain-based platforms** (like Ethereum) - which don't require trust- need to develop **computationally easy** solutions arose. **PPRG** (PPR with refunds in Geometric Progression) does exactly that
- Both the above mechanisms fund the project at Subgame Perfect Equilibrium.

Mechanisms for Agents with Beliefs - Asymmetric and Negative preferences

- For agents with a high belief of provision, the PM needs to incentivize more.
- **Belief Based Reward** scheme (BBR) and PPR for Agents with Asymmetric Beliefs (PPRx and PPSx) incentivize people to contribute proportionally to their beliefs.
- Some agents would not want the project to get provisioned (**Negative valuation** of the project)
- In PPR with Negative Preference (PPRN), the PM sets up two separate markets, one for and one against provisioning
- A strategic agent may choose to contribute in a market against its preference, based on its utility. The reward function is constructed, ingeniously, to avoid these and incentivize agents to contribute to true preference.

Mechanisms for Multiple Projects and RNN-based simulators

- In some cases, PM deploys **multiple projects** simultaneously for provisioning. In such a case, it is rational to assume that agents are **budget-constrained**
- We are developing constraints the refund mechanism has to satisfy for provisioning of projects (some or all)
- We show that existing refund mechanisms will not work in a multi-project environment with budgeted agents
- We are also developing **RNN based simulators** that **mimic rational agents** to find the most efficient mechanism among all the classes in budgeted multi-project scenarios.