ProSocial: A Decentralized Market for Public Goods

ProSocial

Boston College

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Micro Theory Brown Bag, Boston College

Why aren't we nicer to each other?

What do you mean nice?

- Not this: I give you 5 dollars, you make me lunch.
- This: You do something expecting nothing in return.
- *Non-Excludable Public Goods/Deeds*
  - Writing a honest product review.
  - Cleaning up a park.
  - Moderating on-line forums.
  - Volunteer work.

Ever benefit from such public goods?

- Yes...

Ever paid for this kind of work?

- Not so much...

Where's the market?

What do you pay?

- What's the right price? Depends on "for what" and "to whom".
- Must you pay? Most don't pay anyway... so why pay?

Payment issues

- Where do you put the money?
- How do you send the money? To whom?
- Transaction costs and collection is a technological challenge.

Status Quo: "Suboptimal" production of public goods/deeds

- We produce fewer public goods that we would like to see produced.
- Only those who get the warm glow (meaning, they have a full stomach) from these goods produce them.

What are existing solutions?

Charity

- Who donates? What are their motives?
- The wealthy decide which values are rewarded.

Taxes

- We vote for a government who levies taxes.
- Fundamentally good so long government remains "good" and "'elected'.
- Government cannot and should not provide many goods mentioned – Honest product reviews, free financial advise, instructions on how to fix a car, or handle bankruptcy.

Praise

- "We will miss a good man..."
- Upvote, like, retweet, thumbsup, share, forward.
- We cannot survive on these societal affirmations.

Can we incentivize public goods without imposing values?

This Presentation: Public goods in ONLINE communities

Protocol

- From the real world to virtual communities
- A reward system with single dimension preferences
- Extending to more general preferences and scenarios

Implementation

- Sketch the final product
- Briefly outline challenges in implementation
  - Proof-Of-Humanity to secure and extend the Blockchain
  - Financing/Funding with Smart-Contracts

Issues

- Outline different ways of gaming the system
- Unintended consequences
- Why does each feature exist?

Protocol: Public goods are non-excludable

Figure: Who pays? Did everyone pay?

Protocol: Even if they are excludable... What is the price?

Figure: How do you pay?

Protocol: One treasure, another's trash

Figure: Is it even a good? Who decides?

Protocol: From real world to virtual (sub)communities

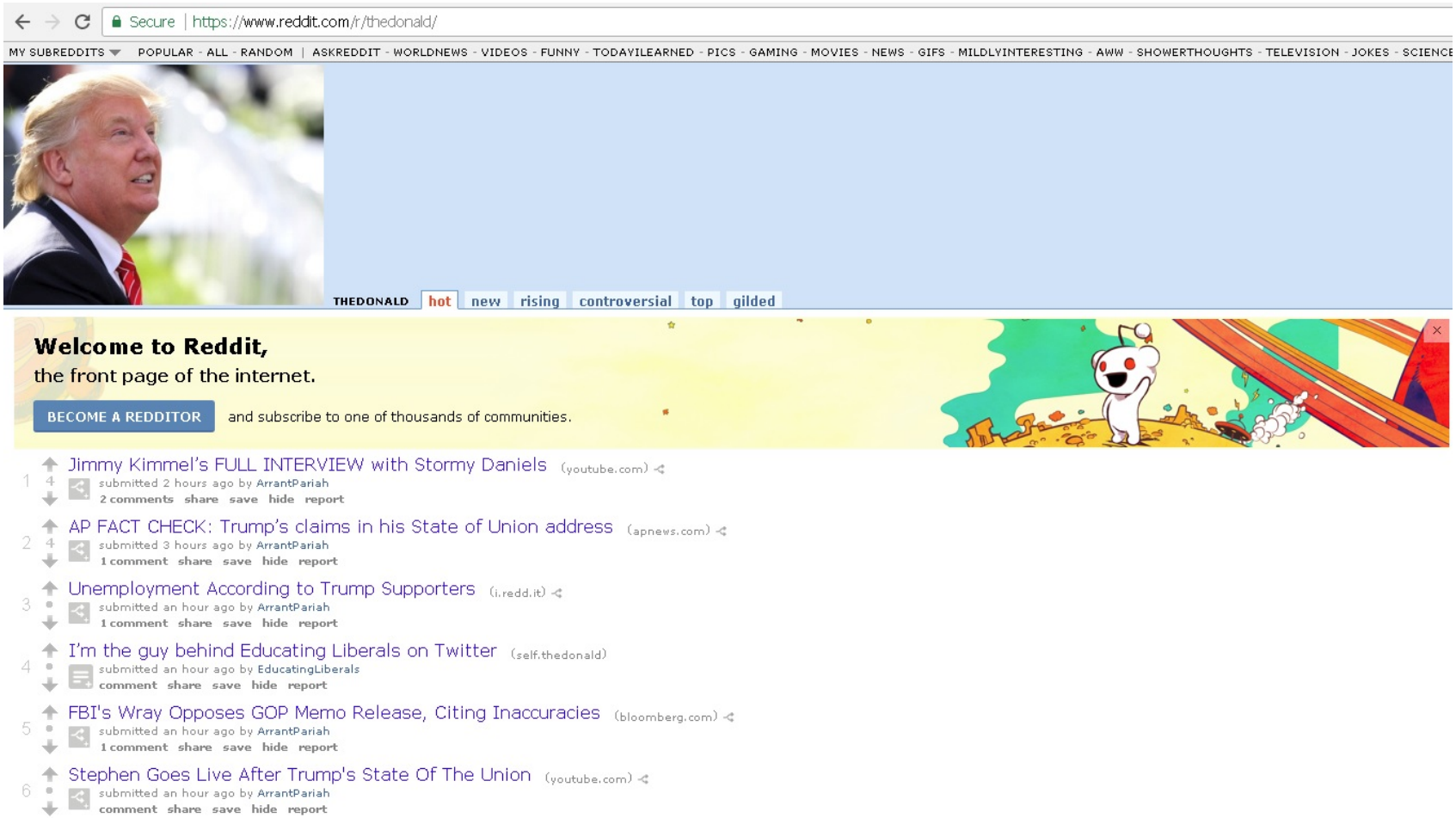


Figure: Virtual Communities **easily** form around **like-minded** people

Protocol: Virtual payments are substantially easier

Figure: **Easy** "payments"/affirmations: Retweets, likes, upvotes, etc

Protocol: Preferences in one dimension

Setting

1. A single virtual community with no disagreement over what is "good".
2. "Goods" cost effort to create.
3. Affirmations are limited and/or costly to give.
4. Affirmations cannot be consumed.
5. Minimum consumption threshold, heterogeneous draws of income.

Protocol: More puppies please!

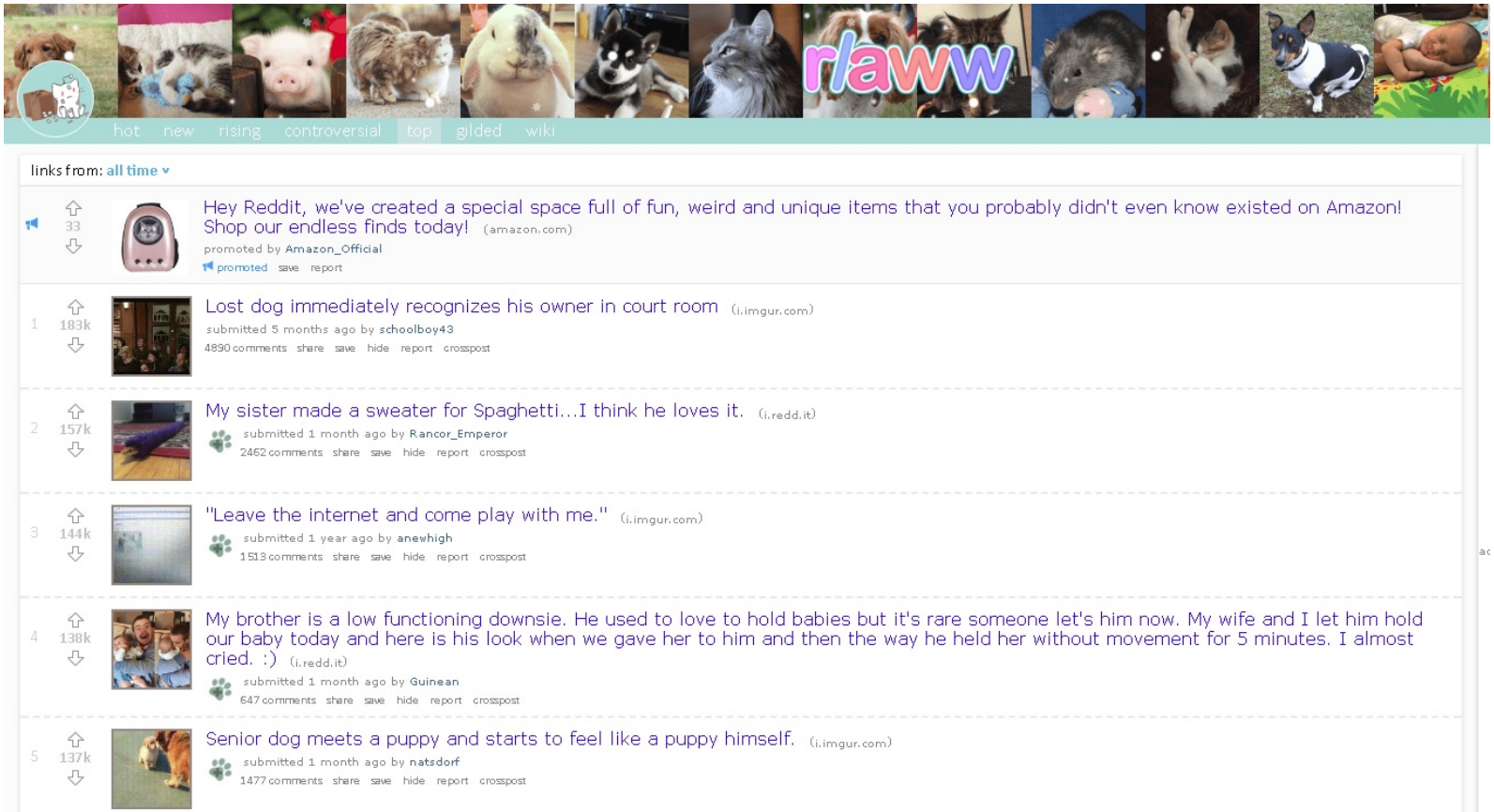


Figure: Only those with a camera and time can produce content

Assumption: $\sum_i u'(\textit{cuteness}, \cdot) > \text{Cost'(Puppy Pic)}$

Protocol: Key problem and economic solution

Optimal taxes

1. A planner taxes everyone $u_i'(\textit{cuteness}, \cdot)$.
2. Pays the creator of the puppy the cost.
3. Everyone is clearly indifferent.
4. The planner redistributes $\sum_i u'(\textit{cuteness}, \cdot) - \text{Cost'(Puppy Pic)} > 0$.

Good but less important detailed questions:

Who is the planner? What are marginal utilities and costs? Who pays the tax? Who participates? How do you implement? What if people can't pay?

Takeaway:

An improvement is possible. How close can we get to it?

Protocol: Implementation in One Community

1. In each Δt, a Bitcoin dividend (funded by a donor) is issued.
2. The dividend is distributed proportionally to token holdings.
3. Each user may give a token in each period Δt.
4. To give the token, the giver must keep his wallet active:
   - prove humanity (captcha)
5. A token giver will also receive a token.
6. All wallets depreciate at some natural rate λ_n
7. All wallets with updated proof-of-humanity depreciate at $\lambda_h < \lambda_n$.

Protocol: Implementation with Multiple Communities

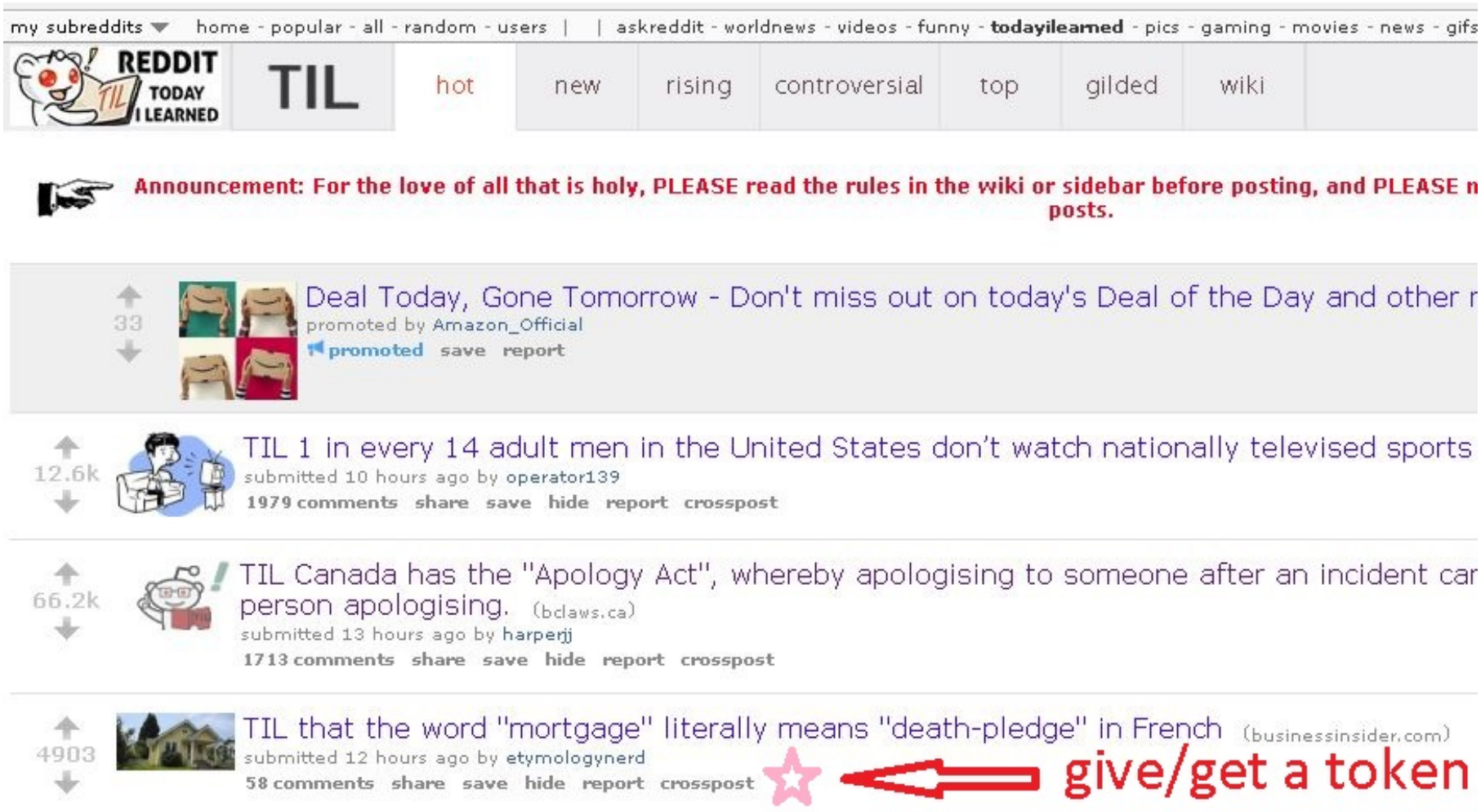
1. In each Δt, a Bitcoin dividend (funded by a donor for now) is issued
2. The dividend is distributed proportionally to token holdings
3. Each user may give $w(j,t)$ tokens in each period Δt in any community.
4. $w(j,t)$ is the social weight assigned to community j at time t.
5. To give the token, the giver must keep his wallet active:
   - prove humanity (captcha)
   - rank communities (the system gives a user 2 communities, he picks one)
     alternative:, ranking of community members in **other** communities
   - the community ranking determines $w(j,t)$
6. A token giver will also receive w(j,t) token
7. All wallets depreciate at some natural rate λ_n
8. All wallets with updated proof-of-humanity depreciate at $\lambda_h < \lambda_n$.

Protocol: Where does this lead to?

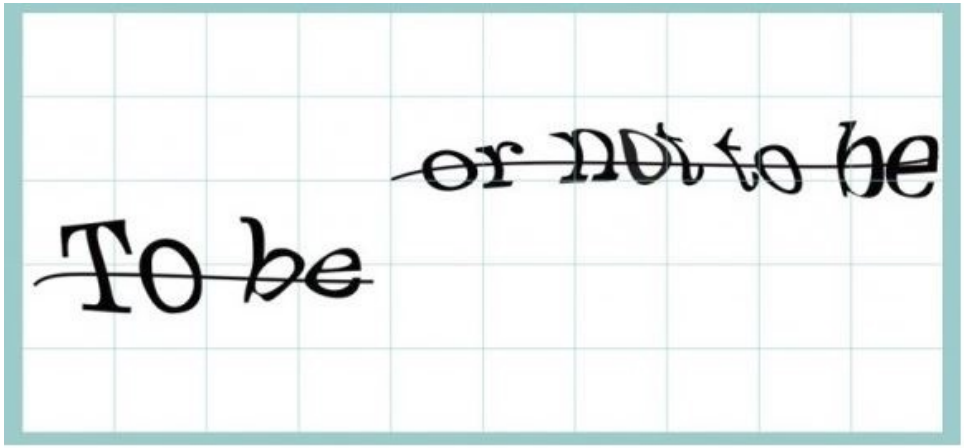
Features:

1. Our protocol can be embedded into existing on-line communities.
2. Community members retain full control over their own communities.
3. A rogue community will simply be down-ranked by others.
4. New communities can form if necessary.
5. The protocol does not dictate what is good.
6. A donor cannot dictate where his donation goes it.
7. Impossible to centralize the production of tokens.
8. Possible to punish by down-voting and rewarding individual history.

Implementation: Graphical UI



Implementation: Graphical UI



Proof of Humanity: To be or not to be

Giver : PassiveConsumer_123456
Receiver : PublicGoodProd_123456
Community : 0.35 (236 of 3467 communities)

Puppies! or Puppy Fur Maybe?

Implementation: Graphical UI

Balance:	235.3457 tokens
Distributions:	0.2354 BTC
AssetWallet:	1BitcoinAddress
DaysSincePoH:	0 ⇦ No token hoarding
7DayTokenLoss:	35.3456 ⇦ Multiplicative depreciation
7DayDividends:	0.0023 BTC The most you own, the faster you lose
List of Donations	
List of Giving	
Community Activity	

Implementation: Proof-of-Humanity

No know decentralized proof-of-humanity solution exists.

Requirements

- A human proves humanity by doing work costing **positive time**.
- The community can verify proof-of-humanity with much less work.
- Upgradeable to stay ahead of AI.
- Lightweight.
- **DECENTRALIZED**.

Solution: Piggy back on existing projects.

Implementation: Funding

Possibilities

- **Donations:** Buying tokens and reinvesting returns is a donation.
- **Purchase human intel:** Captcha style source of revenue.
- **Survey:** Pay to post questions? How to prevent spam?
- **Participation:** Pay to bring this reward system into a community.

Each of these has issues...

Implementation: Why each feature exists

- **Proof of Humanity:** Social mining and preventing unequal token distribution.
- **Community ranking:** Letting society decide which communities it values.
- **Wallet Decay:** Prevent unequal token distribution. Enables donations.
- **Give to Get:** Promote participation and accumulation tokens at public good providers providers

Conclusion

- Sketched a system where public goods are encouraged without a donor dictating what goods should be created.
- Using Proof of Humanity mitigates inequality in the redistribution system.
- Resources accumulate to those who produce these public goods without the influence of a third party or a central organizer.
- How to bring money to the system remains a challenge. We assume donations for now.