How tokens unlock robust cooperation in human societies even when memory fails

June 11 2026, by Sayan Tribedi

Credit: Image generated by the editorial team using AI for illustrative purposes.

Humans stand out in their ability to collaborate with people they may never meet again, often at their own expense. Scientists have long been intrigued by this unique feature, which facilitates everything from

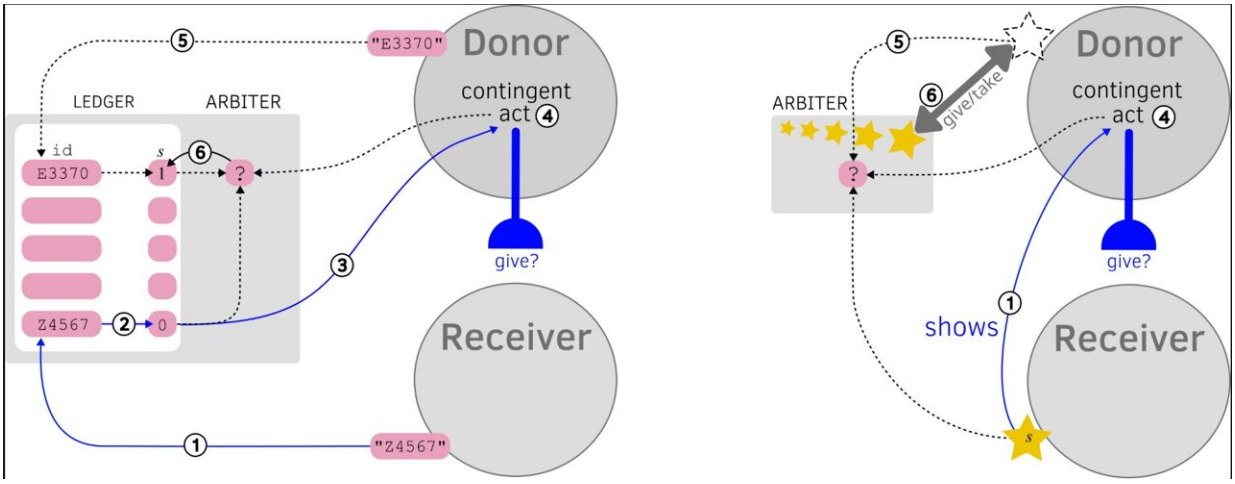
international commerce to philanthropy. Why do we choose to help someone we've never met, especially without any certainty of being repaid?

Indirect reciprocity, in which people cooperate to earn a good name that will help them secure help from someone else later, is said to be behind such behavior. The key ingredient here is memory—the ability to keep track of who has helped whom, and which reputations are worth trusting.

But think of a world where there is no need to memorize this intricate bookkeeping exercise. Wouldn't it be possible to create simpler rules that make collaboration easier and help societies flourish despite all the noise around?

A new study by Marcus Frean and Stephen Marsland provides food for thought about the conditions for collaboration and suggests a simple solution—tokens.

The findings are published in the journal *Proceedings of the Royal Society B: Biological Sciences*.



The fundamental difference between how traditional reputation systems (left) and token-based systems (right) enable cooperation. On the left, a complex 'ledger' tracks everyone's reputation, requiring constant look-ups and identification. On the right, tokens dramatically simplify the process: a potential helper simply checks if the recipient has a visible token, making interactions anonymous and much more efficient. Credit: Marcus Frean et al, Tokens enable cooperation without identification or memory, *Proceedings of the Royal Society B: Biological Sciences* (2026). DOI: 10.1098/rspb.2026.0323

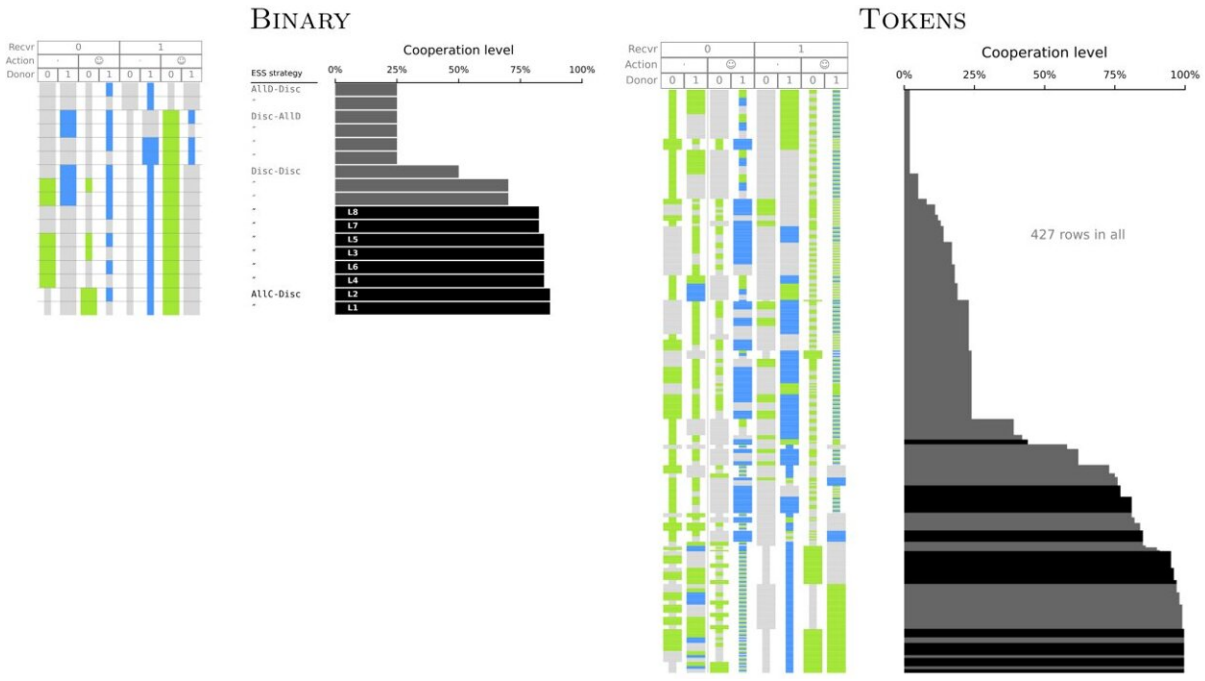
Forget faces—trust the token

Imagine replacing mental "credit scores" with a physical token. In the new model, when you help someone, you receive a visible badge of honor (a token). Later, anyone interacting with you needs only to see your token to know you've been helpful. There's no need to recall your name or history.

As the researchers explain, "If reputation is embodied in a recognizable token issued by an arbiter, donors can base their decisions on token possession rather than memory."

In other words, showing a coin or badge is enough proof of past kindness. This shortcut massively simplifies social bookkeeping—trust is handed out or withheld based on a token in hand, not on gossip or shared memory.

The authors even let agents collect multiple tokens (like stacking points for each good deed), rather than just a single binary "good/bad" marker. This turns reputation into a running score of kindness.



Visual comparison of the overall effectiveness of different cooperation strategies under noisy conditions. The left side shows that traditional 'good/bad' binary reputations lead to a limited number of cooperative outcomes. In stark contrast, the right side reveals that token-based systems support a much wider array of strategies, including some that achieve perfect cooperation, demonstrating their superior robustness and flexibility. Credit: Marcus Frean et al, Tokens enable cooperation without identification or memory, *Proceedings of the Royal Society B: Biological Sciences* (2026). DOI: 10.1098/rspb.2026.0323

In test simulations of standard donation games, they found that societies using these tokens achieved higher cooperation than classic models. Letting people hold many tokens makes the system more informative and reliable.

As one surprising result put it, allowing multiple tokens "promotes more cooperation than existing models of indirect reciprocity."

Resistance to error—robust cooperation

What if mistakes happen? In the real world, reputations get muddled by noise or miscommunication. Here, the token system shines. Even if tokens are occasionally lost or misassigned, tracking an ongoing tally of good deeds cushions the blow. A one-mistake slip won't erase a long history of holding tokens. In fact, the study shows that this token-based world is much more error-proof than a simple good-bad reputation ledger.

As the authors emphasize, "This advantage arises from greater robustness to noise and comes despite the absence of individual identification or shared memory."

Tokens make cooperation surprisingly resilient—they forgive flubs that would break a traditional system reliant on perfect recollection.

Interestingly, this also connects to how we use money. The researchers note that a token system is "reminiscent of typical real-world stranger interactions mediated by money rather than reputation." Just as anyone can accept cash without knowing your history, here anyone can see a token and "trust the token," not the person.

In effect, social standing is written into the environment (the token), not into someone's mind. With enough tokens circulating, society can reach near-perfect cooperation, even if no one in it recognizes anyone else.

From theory to practice: The road ahead

This model is a theoretical breakthrough, but can it work in reality? The authors admit practical challenges. You'd need a trustworthy "arbiter"—a system or institution to issue and reclaim tokens honestly. In

human terms, that's like a referee who rewards tokens for good deeds and takes them away for selfishness. Preventing fake tokens would be crucial.

The concept suggests fascinating parallels: Could digital badges, blockchain "coins," or reputation point systems serve as modern tokens? Future experiments might try awarding visible badges for cooperation in classrooms or online communities to see whether they spur kindness without complex record-keeping.

For now, the key insight is that cooperation doesn't require perfect memory or identity checks—sometimes, a simple object will do.

These tokens can help society stay cooperative even under noise. The idea opens new ways to design systems of trust: think digital currencies or status tokens that encourage helping strangers.

In essence, cooperation among strangers may be as easy as passing around a coin—letting objects carry our reputations.

More information: Marcus Frean et al, Tokens enable cooperation without identification or memory, *Proceedings of the Royal Society B: Biological Sciences* (2026). DOI: 10.1098/rspb.2026.0323