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Social Sciences (major), Evolution (minor)

**The institution as a blunt instrument:
Cooperation through imperfect observability**

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ABSTRACT

Observing others enables us to indirectly reciprocate their actions. In large societies, however, reliable individual observation is hard to achieve. Societies therefore rely on institutions to aid in observing cooperative behaviour and identifying those who cooperated. Institutions are integral part of modern societies. Here, we propose an evolutionary model in which an institution aims to label cooperators with a tag to verify their trustworthiness, as is the case for financial credit ratings or quality certificates. However, errors in assigning tags inevitably arise: the institution may accidentally leave some cooperators untagged or award tags to some defectors. Taking these two specific types of errors into account, we derive simple analytical conditions under which cooperation becomes stable and is favoured by selection. We find that these two institutional errors are not weighted equally in promoting cooperation: it is more detrimental to cooperation if tags are erroneously awarded to defectors than if they are mistakenly withheld from cooperators. Institutional tagging can lead to non-uniform interaction rates among cooperators and defectors, whereby cooperators benefit disproportionately by playing more games than defectors. This work sheds light on the significant role of institutions in promoting and maintaining societal cooperation.

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