An open code pledge for the neuroscience community

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Abstract

Sharing of research code would greatly benefit neuroscience, but this practice is hampered by a collective action problem. Since the development of the internet, conditional pledge platforms (e.g., Kickstarter) have increasingly been used to solve globally-dispersed collective action problems (Hallam, 2016). However, this strategy has yet to be implemented within academia. In this brief paper, we introduce a general purpose conditional pledge platform for the research community: Project Free Our Knowledge. We highlight a new conditional pledge campaign that was initiated at Brainhack 2021 and aims to motivate a critical mass of neuroscientists to share their research code. Crucially, this commitment activates only when a user-defined threshold of support is reached. We conclude by sharing our vision for how the research community could use collective action campaigns to create a sustained, evidence-based movement for social change in academia.

The collective action problem in academia

Neuroscience relies on research code for experimentation, data cleaning and analysis. If individual researchers share their code openly, the collective neuroscience community benefits through verifiability, greater reproducibility and less unnecessary duplication (Eglen et al., 2017; Riquelme & Gjorgjieva, 2021). Most neuroscientists do not share their code, however, because non-article research outputs are not currently rewarded in academia and thus individuals may perceive sharing code as a risk to their career (Eglen et al., 2017; LeVeque, 2013). The global neuroscience community is thus trapped in a *collective action problem* (Olson, 1971): the community is failing to provide a public good (open source code) due to competing interests at the individual level (Coelho, 2013).

A new solution: Conditional pledges

Project Free Our Knowledge (FOK) aims to solve this class of problems by organising collective action between researchers. FOK facilitates *conditional pledges*: commitments to adopt open and reproducible research practices on the condition that *N* researchers pre-agree to take action (**Figure 1**). If the threshold is met, the pledging community takes action together, thus empowering individuals to achieve their common aims. If the threshold is not met, however, no further action is required, thus mitigating any risks associated with solitary action. FOK draws from prior conditional pledge platforms that have helped millions of globally-dispersed individuals overcome collective action problems in the economic (e.g., Kickstarter), cultural (e.g., Collaction) and political spheres (e.g. Pledgebank; Hallam, 2016), and seeks to bring a comparable but tailored solution to the research community.

The open source and citable code pledge

During Brainhack 2021, we developed a conditional pledge campaign that aims to motivate neuroscientists to share their code in a public repository (e.g., Zenodo, OSF) with a persistent identifier (e.g., digital object identifier; DOI). Coinciding with the present publication, we hereby invite all neuroscientists to take the *Open source and citable code pledge*:

> "I pledge to share the code underlying all of my future publications in a citable repository."

Pledgers can either begin sharing their code immediately (c.f., Gleeson et al., 2017) or wait until *N* neuroscientists have taken the pledge (*conditional pledge*; see the FOK website for details).

Next steps

We intend to promote the campaign through various communication channels and strategies (e.g., ambassador network; **Figure 1A**). If the campaign reaches the threshold, pledgers will be publicly listed and directed to take action together (**Figure 1B**). We will then analyse the campaign outcomes (e.g., pledge compliance, citation metrics) and use this information to maximise the impact of future campaigns that target a range of open and reproducible research practices in different research fields (**Figure 1C-D**). In short, we seek to establish a sustained, evidence-based movement for social change in academia (**Figure 1E**). We hereby invite all researchers to join us in this vision by proposing new campaigns and taking pledges on the FOK website today.

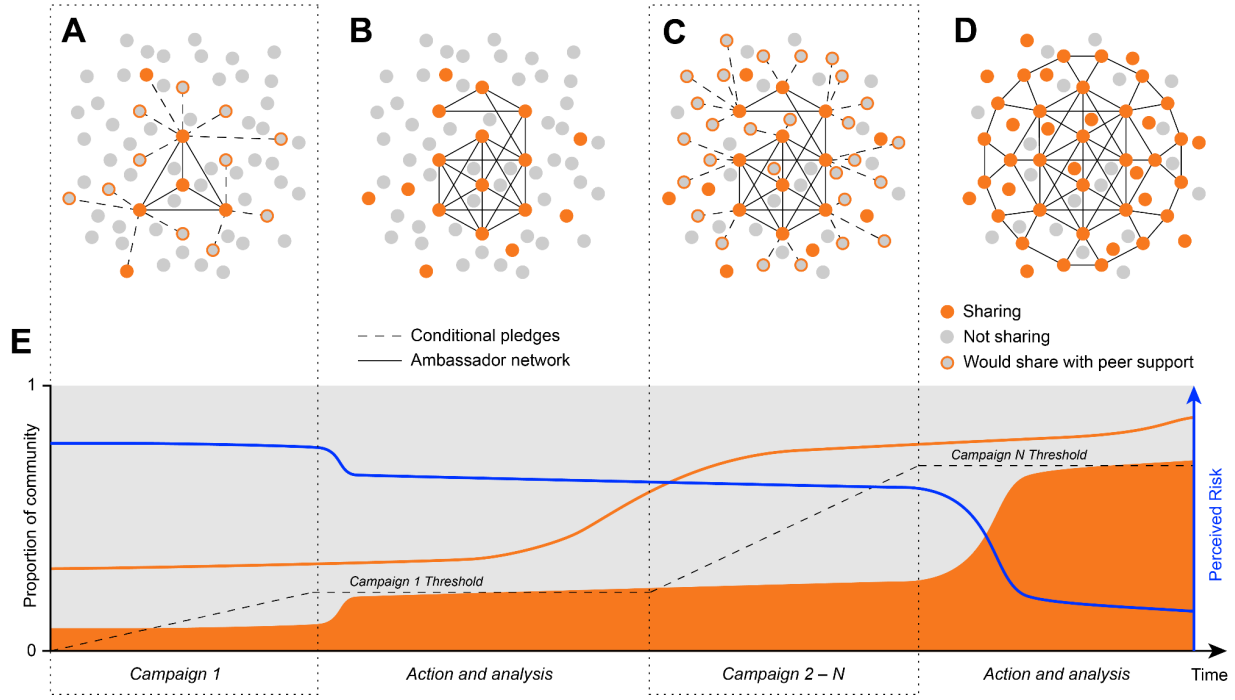

Figure 1. Using conditional pledges to solve collective action problems in academia (e.g., code-sharing in neuroscience). (**A**) Current state. A minority of neuroscientists share code (orange dots). A larger *latent group* (Olson, 1971) would be willing to share code if they were not alone in doing so (orange-bordered dots). Ambassador network (solid black lines) promotes the campaign. Researchers sign conditional pledges (dashed lines) to act when a predetermined threshold is met. (**B**) Campaign reaches the threshold. Pledgers share their code (orange dots). New ambassadors join the network (solid lines). Campaign outcomes are analysed and used to inform the design of a follow-up campaign (or multiple campaigns). (**C**) Follow-up campaign is launched. Ambassadors promote the campaign and a larger cohort of researchers sign conditional pledges. (**D**) Future state. The majority of researchers share code (orange dots), flipping the social norm so that individuals who do not share face social pressure (grey dots). (**E**) Developing a sustained movement for social change. At any one point, the number of researchers who would be willing to share code if they had peer support (orange line) is greater than the number of researchers currently sharing (orange patch). Each campaign serves to connect this latent group via conditional pledges (dashed lines) and coordinate collective action once the target threshold is reached. Successive campaigns leverage the established community to reach greater thresholds and/or motivate new behaviours (e.g., 'FAIR' code; Chue Hong et al., 2021; Goble et al., 2020; Lamprecht et al., 2020). Perceived risk to individuals' careers is inversely related to the number of people sharing (blue line). Following the *N*th campaign, sharing code becomes normative and perceived risks are dramatically reduced (note that campaigns can also evolve in parallel, rather than sequentially as pictured here).

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