Fairness in the Division and Completion of Collaborative Work

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Abstract
Fairness is often a concern when groups of people engage in collaborative tasks. Through the use of simple bargaining experiments, my PhD examines preferences for fairness during the allocation and completion of work. One goal of my work is to assess the applicability of existing theories about fairness to the context of CSCW. Overall, though, I aim to provoke discussion about how fairness preferences might be supported in the design of collaborative work tools.

Author Keywords
Collaboration; Division of Labour; Fairness.

ACM Classification Keywords
H.5.3. [Group and Organization Interfaces]: Computer-Supported Cooperative Work.

General Terms
Design, Economics, Experimentation, Human Factors.

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Introduction & Motivation
My doctoral research explores fairness in the distribution and completion of collaborative work tasks. There are several reasons behind my application to the CSCW doctoral colloquium. First, I would value the opportunity to gain critical feedback from the expert panel, particularly concerning my methodology and whether my ideas are of value to the wider rubric of CSCW. Second, I enjoy discussing the work of my peers and I would endeavor to ensure that my presence is of benefit to other students in the colloquium, primarily through constructive commentary on their work. Finally, I would value the opportunity to network with other PhD students in CSCW/HCI such that I am able to see what is happening in the community as a whole.

Research Background
Fairness is an important concept that regulates many everyday transactions in human societies. In the context of collaborative work, group members are often required to make decisions about how much effort they will invest in common projects; how task components should be allocated; and how rewards from group efforts should be distributed. Such decisions are often influenced by concerns about what is 'fair', referring to moral obligations, rights, and perceived entitlements required in maintaining interpersonal relationships [4].

The subject of fairness has been studied extensively in the fields of psychology and economics. With regard to the latter, a large body of work has emerged that explores social preferences using simple economic games. The canonical prediction in such studies is that people should behave selfishly in order to maximize personal rewards. What studies actually show is that, during group tasks and social dilemmas, people care about fairness and are content to punish those who do not behave in a suitably cooperative manner. These findings have led to multiple theories that attempt to reconcile fairness alongside other issues including reciprocity, competition, and rationality [1].

Despite this considerable body of work, researchers in CSCW have not yet addressed the subject of fairness in an explicit fashion. This may be because fairness does not seem like an especially important issue for technological design, yet a close reading of the CSCW literature reveals that fairness is actually an implicit concern in many studies. As an example, one study argued that video-mediated communication is better for conflict resolution because turn taking and equality of participation promote 'fairness' [2]. Another study revealed that fairness concerns led people to offer more assistance to human teammates over AI agents [6].

Problems related to fairness can also become salient during the design and evaluation of collaborative tools. For example, in an evaluation of a collaborative web search tool, Morris & Horvitz [7] found that participants did not use features meant for automatic division of labour because only one member of the team had control of the functionality. This distribution of control implied an unfair status difference that was contrary to the collaborative ethos of the group [7].

Research Focus

Since fairness seems to be an important concern during collaboration, one aim of my PhD is to reify this importance through studies of collaborative interaction. For scoping reasons, I focus on the division of labour and subsequent investment of effort in collaborative tasks. These are two areas in which fairness norms are likely to come into play during collaboration.

Division of labour itself has been characterised as a process of negotiation, where involved parties propose workload assignments and then accept or reject those allocations [3]. I attempt to model this process using an applied economic game. One benefit of this method is that it allows me to explore fairness in a succinct and controlled manner. Additionally, it allows me to explore how findings from the economic literature can be applied to collaboration. For example, in economic experiments, participants are typically incentivized with monetary payoffs. Although this is useful in terms of inducing profit-seeking behaviour, it is not clear how well the findings from such studies would apply during the allocation of workloads. Examining the applicability of prior findings is one of the ways in which I hope to understand fairness in the context of work.

Overall, I aim to take a mixed methods approach to exploring fairness in collaboration. On the one hand, I use applied economic games to probe issues surrounding fairness in the allocation and enactment of workloads. On the other, I am currently running a field study that examines division of work in the real world. My overall aim is to consider the relevance of fairness for collaborative systems by assessing whether fairness concerns are important and whether or not we can design technologies that account for them.

Research Questions and Methods

The work I aim to report in my thesis is directed by the following high-level research questions:

RQ1. What does 'fairness' actually mean?
RQ2. What is the role of fairness in collaboration?
RQ3. To what extent do people exhibit preferences for fairness when allocating and completing work?
RQ4. What are the implications of these preferences for collaborative tools and technologies?

RQ1 is motivated by dual needs: First, to operationalise and define fairness for the purposes of my thesis; and second, to draw a distinction between fairness and similar terms including *equity*. Equity is based on the simple idea that everyone should be treated equally, whereas fairness is more nuanced in that what is 'fair' may depend on a variety of situational and other factors. RQ1 is addressed through a literature review that consolidates the issues surrounding fairness while situating the thesis in the context of collaborative work.

RQ2 is derived from my desire to highlight fairness as a relevant issue for collaboration and CSCW more generally. Alongside my literature review, I have conducted a survey study of student teams working in collaboration on software development projects. The main finding was that fairness in the distribution and completion of work was positively correlated with the perceived quality of group outcomes, satisfaction with work process, and satisfaction with team member performance. Not only was fairness a foremost emotional concern for the students, but the failure of team members to contribute 'fairly' also had a negative impact on satisfaction in the group as a whole.

RQ3 was initially explored via a series of laboratory studies using a reductionist model of division of labour. Specifically, I examined fairness in the allocation and completion of collaborative information seeking (CIS) tasks using an applied version of the classic ultimatum game (UG) (see [5]). The basic idea is that participants have the opportunity to collaborate but must first come to an agreement about how to split the workload. If they agree, they can collaborate; if they do not, they must work alone. Whatever the outcome, participants then proceed to complete their agreed assignments. These studies probe fairness in the allocation of work while also allowing for comparison to the large experimental literature on the classic UG. I am also able to examine the strategies used to coordinate during the actual enactment of work. These studies have led to several key findings: 1. The modal outcome was a 50/50 split of the work, rationalized in terms of fairness. 2. Work process was synchronized in an interesting way, whereby task completion times were highly similar within-pairs but not between (suggesting a desire for fairness in the completion of work).

RQ4 raises the question of how fairness preferences could be supported within collaborative tools. This is more of an open question, but the fact that participants seemed to strive for equality in their task completion times suggests that designers could support this desire, perhaps through regulating collaborative contributions by providing awareness about effort. Such a metric would necessitate finer granularity than simple activity awareness, in turn opening up a host of issues concerning privacy. In the penultimate chapter of my thesis, I hope to study existing awareness metrics in order to propose a tentative design space for 'effort awareness' in collaborative tools.

Dissertation Status

I have completed a number of studies and several remain ongoing. As described above, I have finished the survey study and I have completed three empirical studies exploring ultimatum bargaining over division of labour. At the time of writing I am running a study where one team member simply delegates a chosen amount of work to their collaborator. In terms of maximizing monetary reward, the 'optimal' solution for the delegator is to assign all of the work to their partner, but what I have found thus far is that participants continue to allocate work fairly even though free riding would be a more optimal strategy. I am now trying to determine how these findings can be reconciled with respect to the foundational literature.

More recently, I have begun to explore other methods and am currently undertaking a field study of collaborative information seeking behaviour. This study has several aims. The first is to provide comparison to my empirical studies. The second is to gather insight into the various issues that arise when division of labour occurs during tool use in the real world. My hope is that, by studying the way searchers coordinate and allocate work, the study will also result in practical implications for the design of CIS systems.

In terms of my thesis, I have completed a substantial literature review that attempts to define fairness while building an understanding of what collaboration is and how it should be underpinned by technology. I also have an up-to-date review of the ultimatum bargaining literature alongside a review of CIS research and technology. I now have a tentative thesis structure and have several chapters in draft form.

Expected Contributions

I expect my thesis to result in a more complete understanding of how fairness relates to collaboration. My consideration of how findings from the economic literature can be applied to the context of CSCW forms a theoretical contribution. This contribution is made practical through the use of simple bargaining experiments that explore negotiation over workloads. I also provide a methodological contribution in the sense that the wider community can use the empirical model I have developed. Through considering the relationship between fairness, division of labour, and effort, I hope to open up a tentative design space that considers the potential for providing 'effort awareness' while also accounting for issues like privacy and context in collaborative work.

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