Roles in Online Collaborative Problem Solving

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Motivation

Effective collaboration and teamwork is important for successful problem solving in groups. But we’ve all been in groups where sometimes a few members dominate the conversation, and others shy away into the background. Or sometimes, a group converges quickly on someone’s idea, but does not fully explore all the alternatives.

_How can we encourage equitable, full participation in online collaborative problem solving environments_, as well as take advantage of the affordances provided by a computer user interface?

CoSolve

We have built a web-based, collaborative environment called CoSolve, that allows users to pose problems and work collaboratively with other users to explore different solutions using a tree visualization of possible states (solutions).

We are using CoSolve as a platform to explore ideas about collaborative problem solving and design.

Roles System Design

We propose a system of user roles that map to CoSolve functionality as a way to encourage more equitable participation from all members.

The user interface will display, to other users, which user is assigned to which roles, as well as how many of the three types of actions the users have performed, to show how well they have been fulfilling their role.

<table>
<thead>
<tr>
<th>Role</th>
<th>Purpose</th>
<th>CoSolve Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstormer</td>
<td>Freely suggests ideas without self-censoring or criticism</td>
<td>Creates new states (ideas / possible solutions) in the tree</td>
</tr>
<tr>
<td>Supporter</td>
<td>Evaluate ideas by giving supporting arguments</td>
<td>Adds “thumbs up” annotations to states</td>
</tr>
<tr>
<td>Critic</td>
<td>Evaluate ideas by giving critical arguments</td>
<td>Adds “thumbs down” annotations to states</td>
</tr>
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Our hypotheses are that:

1) Given specific roles, users who otherwise would not have known how to—or been reluctant to—participate, will increase their participation;

2) Giving users visual feedback on roles in the user interface increases their awareness of their team, the quality of their teamwork & collaboration;

3) If all users are explicitly given a chance to suggest ideas freely, and evaluate ideas from all sides, there will be more overall ideas, better critical evaluation of the ideas, and hence, better overall solutions.

Proposed Evaluation

In Autumn 2010, we are performing a user study in which subjects will use CoSolve to explore solutions to a simulated city management and planning game.

Subjects will be divided into teams of three members and asked to collaborate to solve the CoSolve game problem, remotely, over the course of three days. Each team belongs to one of two conditions:

**Conditions:**

- **Control**: team uses CoSolve without roles.
- **Experimental**: CoSolve will automatically assign each team member to one of the three roles (Brainstormer, Critic, Supporter), and change their roles each day such that each team member has a chance to try each one.

CoSolve will log all actions taken by the users, as well as users’ communication via chat. Using this data we will measure:

- **Equitable participation**: What percentage of the final solution did each team member contribute to? (in terms of tree states created, etc.)
- **Role conformance**: In terms of system actions performed by users, how well did each user follow his or her role?
- **Quality of solution**: did users in the experimental condition reach a solution more quickly, or that produced a higher overall game score, than the control condition?

Acknowledgments

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