

The 'I did it!' bias in multitouch tabletops: When equity is not enough

Nicola Yuill, Amanda Harris, Victoria Bonnett, Jeff Rick, Rowanne Fleck,
Paul Marshall & Yvonne Rogers University of Sussex and Open University

Multi-touch tabletops are seen as devices that encourage equity in collaborative work: everyone can join in, either by talking or doing, and people who say less sometimes tend to do more (Harris et al, 2009; Rogers et al., 2009). However, is it enough to consider equal contributions (verbal or physical) as measures of equity? In our work investigating how technology might encourage collaboration, we have been forced to question what 'good' collaboration is. Adults using tabletops certainly tend to perceive them as encouraging greater equity compared to mouse input, for example (Marshall et al., 2009). But when making a good collaborative decision, is it really possible to say *whose* decision it was?

In young children, close collaboration is marked by the 'I did it!' bias: the tendency to attribute to oneself the actions of others, through 'appropriating the mental experience' of the partner (Rogoff, 1990). In educational settings, a good tutor may often try to make an idea the child's own by giving progressive clues to the solution. This bias becomes harder to detect as memory improves, and as our ability to monitor the sources of information improves (Foley & Ratner, 1993). Studying children using tabletops gives us an ideal opportunity to question how we assess equity in collaboration. By asking users what decisions they think they made themselves, and comparing this with log data to see who made the physical change in reality, and looking at the partitioning of work between members of the group, we can see whether tabletops can produce such biases in groups working collaboratively.

We studied groups of 3 children working on a collaborative task -allocating seating in their classrooms - using a digital tabletop in one of two participation modes: single touch (only one person can move digital objects at a time) or multi-touch (everyone can act at once). We looked at different measures of participation: how much each person said; how much each one did; how equitable each group was in terms of the 3 members' share of the total verbal and physical contributions; the members' own beliefs about who did what; the log record of who moved what object.

Thirty children in Year 3 (age 7) and 15 children in Year 4 (age 8) worked in groups of 3 on OurSpace, a tabletop application showing the children's classroom with movable tables and pupils. Children had to find a good arrangement for the furniture and pupils, using the physical constraints of the classroom layout and information about the pupils (friendship groupings, visual acuity and talkativeness) in deciding who should sit next to whom. Each group had two sessions of about half an hour each. One session was multi-touch (all users able to move pieces at the same time) and the other was single touch (only one user able to move a piece at a time). Children had either the multi or the single touch condition first. Each group was made up of either all boys or all girls, and children were classmates. At the end of each session, each child was given a picture of the final layout and had to mark which user had moved each piece of furniture and each pupil. We video-recorded the session and logged touches on the table, and have described the general behaviour during the sessions elsewhere.

The children were at an age when the 'I did it!' bias starts to fade. Comparing the different ways of measuring equity of participation in this data poses some important questions about how to assess equity and collaboration, as follows:

- The younger group showed a significant ‘I did it!’ bias: the older children, more skilled in monitoring sources of information, showed no such bias. Older children were accurate enough not to show the bias. *How might groupwork with tabletops reveal and support how older children and adults may ‘appropriate’ others’ ideas?*
- The younger group only showed the bias in their first session, when they did not know they would be asked to remember who did what: by the second session, they were apparently taking care to remember who did what and were therefore accurate enough that no bias could show. *Should we care how much people collaborating effortfully think about who decided what?*
- The ‘I did it!’ bias did not differ between multi- and single touch, despite the fact that attentional demands are very different in the two set-ups. In single touch, all users can focus attention on one person’s action. In multi-touch, users can work in parallel, and need effort to attend to others’ actions. However, multi-touch interactions were more equitable in verbal participation. *How should we evaluate observed equity from ‘outside’ in comparison to perceived equity from ‘inside’: the ‘I did it!’ bias?*
- Groups showed more verbal equity overall when they experienced multi-touch before single touch than vice versa: a group’s history seems to produce interaction patterns that continue over sessions. We need to look at how people use and adapt to technology over time. *Can we use this ‘early advantage’ to encourage learners to continue working collaboratively?*
- For younger children, the multi-touch produced more verbal equity than the single touch: for older children, the touch set-up influenced content rather than amount of discussion. Single touch requires more management of turn-taking: some groups managed these negotiations better than others. *How do we design to support the characteristics and skills of different groups?*

In conclusion, young children working with tabletops seem to show appropriation of others’ ideas in attributing others’ moves to themselves, and for them, multi-touch surfaces supported verbal equity. For older children, though, there is no such bias in our task, and multi-touch surfaces were associated with different, rather than more, discussion. Designing to support collaboration requires us to consider the nature of shared information spaces in relation to cognitive maturity, group history and different forms of equity.

References

- Foley, M., & Ratner, H. H. (1998). Children’s recoding memory for collaboration: A way of learning from others. *Cognitive Development*, 13, 91-108
- Harris, A., Rick, J., Bonnett, V., Yuill, N., Fleck, R., Marshall, P. and Rogers, Y. (2009). Around the table: Are multiple-touch surfaces better than single-touch for children’s collaborative interactions? In *Proceedings of CSCL 2009*, pages 335-344. ISLS.
- Marshall, P., Hornecker, E., Morris, R., Dalton, N. S., & Rogers, Y. (2008). When the fingers do the talking: A study of group participation with varying constraints to a tabletop interface *Proc. Of IEEE Tabletops and Interactive Surfaces* Amsterdam, Netherlands.
- Rogers, Y., Lim, K, Hazlewood, R., Marshall, P. (2009) Equal Opportunities: Do Shareable Interfaces Promote More Group Participation Than Single User Displays? *Human-Computer Interaction*, 24, 79 - 116
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.