Costly sharing in a virtual environment: Examining developmental trends from 3.5 to 11 years of age

Sylvia Pinheiro, Brendan Hancock, Montana Shore, Danielle Bukovsky, Sara Jones, Emma Liprot, Lexie Piccolo, & Valerie Kuhlmeier

Department of Psychology, Queen's University, Canada

Queen's University is situated on traditional Anishinaabe and Haudenosaunee territory. We are grateful to be able to live, learn and play on these lands.

Background & Aims

Developmental researchers are increasingly testing children online. A study conducted by our lab found that 88% of labs could not conduct in-person studies during the pandemic, and most will continue online testing post-pandemic.[1] This new testing environment may impact the study of social cognition in particular, as interactions with the experimenter are key aspects of the methodology.

Here, we focus on the study of sharing behaviour. In-person studies have suggested that children's sharing behaviour has a protracted development: young children first consider whether to share or not, and older children become more generous and egalitarian[2-4]. This development seems to be influenced by an adoption of social norms and increasing reputational concerns, specifically when sharing behaviour is observed[5]. However, little is known about how children will share in the online environment. We examined three aspects of virtual sharing with children aged 3.5 to 11 years.

(1) Does sharing behaviour increase across age in a virtual task? Does sharing behaviour differ when children have synchronous (sync) versus asynchronous (async) interactions with the experimenter?

(2) How does previous experience with technology, particularly video games which share some surface characteristics with the online testing environment, influence sharing behaviour in our task?

(3) What is the extent of caregiver technological assistance in a procedure like this, and does this assistance affect children's sharing?

Methods

Participants

Canadian and American children age 3.5 to 11 years old (M =7yr), assigned to two conditions.

Synchronous	Asynchronous	Total
122 (70F/52M)	45 (26F/18M/1ND)	167 (96F/70M/1ND)

Recruitment occurred via database, social media, and referrals. 87% of the sample was White, with 60% of households having an income of over $100,000 and 75% with one university-educated caregiver.

Procedure

- Caregivers completed a Qualtrics questionnaire (demographics, screen time, game preferences)
- Participants met with an experimenter on Zoom to set task, obtain consent and begin the task, either alone (async) or with the experimenter (sync) on our lab-designed videogame.

Game

- A modified Dictator Game version for children[6], interspaced with other tasks.
- Currency: Computer coins collected during tasks throughout the session

CONSTRUCT3

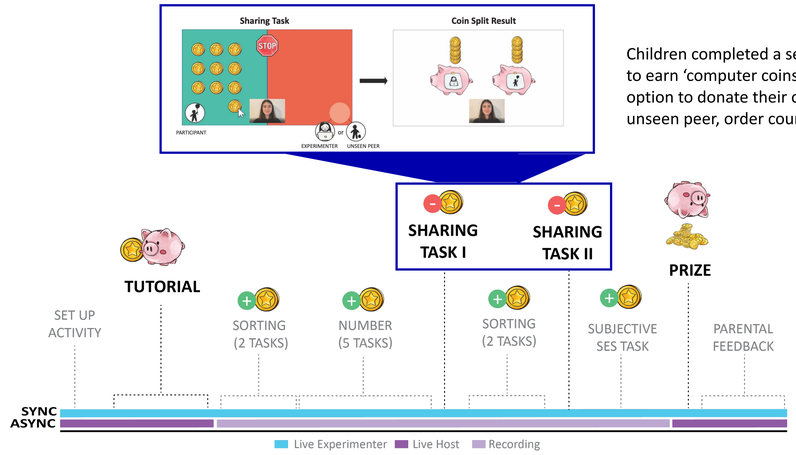
Game-development engine used to create testing session

Children earned virtual coins throughout the session

Coding

There was perfect agreement between 2 coders (κ=1).

Procedure



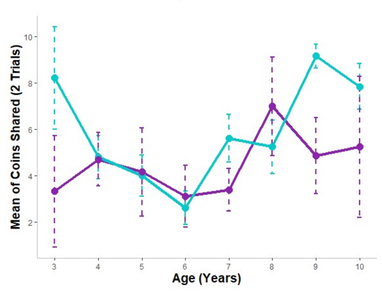
Children completed a series of activities in our lab-designed interface to earn 'computer coins'. In the two trials of the DG, children had the option to donate their coins to the recipient (the experimenter or an unseen peer, order counterbalanced) or keep them for themselves.

Children could trade coins for prizes of their choice at the end of the session.

Results

1) Age and Condition Differences

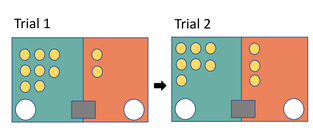
(A) Coins Shared by Age and Condition



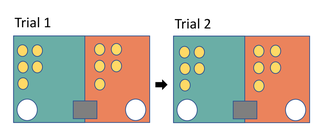
Age and condition predict number of coins shared. Older children shared more coins (β=0.08, p<0.01). Also, children in the synchronous condition shared significantly more coins than children in the asynchronous condition (β=0.24, p<0.01).

(B) Frequency Distribution of Coins Shared by Age Group and Condition

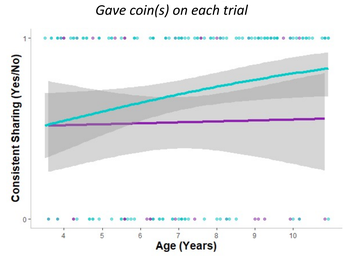
Sharing behaviour before and after Middle Childhood With the current dataset, there is some indication that older children's sharing behaviour is more affected by monitoring than that of younger children.



Consistent Sharing
Gave coin(s) on each trial



Equitable Sharing
Gave a total of 10 or more coins



Sharing patterns change with age. Previous research suggests that for younger children, sharing *consistently* is a developmental accomplishment, and that sharing *equitably* develops around middle childhood.[3-5] We found that age marginally predicted consistency of sharing across two trials (β=0.14, p=0.059) and was predictive of equitable sharing (β=0.43, p<0.01). There was no effect of condition.

2) Technology Experience

Number of coins shared by age, screen time (h), game playing (yes/no), and type of game preferred.

Variable	B	Sig
Intercept	1.854	<.001
Age	**.074**	**.002****
Screen Time	-.013	.747
Game Playing	-.508	.098
Collaborative	-.067	.157
Competitive	.012	.797

*p <.05

Table 1: There was no observed influence of hours of screen time, game playing, or gaming preference on the number of coins shared.
*Poisson regression conducted with synchronous condition dataset.

3) Caregiver Assistance

Caregivers reported little need to assist their child during the test session (Synchronous Condition).

- 14.7% (n=17) of caregivers reported helping with 'clicking' during the test session
- 0.81% (n=1) of caregivers reported assisting during the sharing task

These results may indicate the efficacy of the initial instructions provided to caregivers. The results might also be due to the 'clicking' familiarization activities that occurred during the tutorial (below).

Conclusions

1) Similar to in-person studies using the dictator game, we found that sharing behavior online was **influenced by age and monitoring**.
   - Children shared more coins and became more egalitarian in coin division with age,
   - Children shared more coins in the monitored (synchronous) condition than on the non-monitored condition (asynchronous).

2) There was **no observed effect of previous experience with technology** on sharing behaviour.
   - This may suggest that our experiment design is not influenced by external factors such as screen time and previous experience with game-like activities, and more dependent on age, monitoring, and other factors.

3) There was **little caregiver assistance during the test session**. Assistance that did occur, occurred primarily in the early sorting and number tasks.
   - This suggests that our initial instructions to the caregivers, and/or the 'clicking' familiarization trial, may have minimized the need for caregiver assistance.

Future Directions

- Continue data collection for completing the asynchronous condition (N=120).
- Analyze sharing in relationship to more specific gaming measures (e.g., social environment of gaming)
- Analyze sharing in relationship to socioeconomic status and subjective SES
- Complete data collection with our collaborators in Brazil

References

1. Shore, M., Bukovsky, D., Hancock, B., Liptrot, E., & Kuhlmeier, V.A. (in prep). A global snapshot of developmental research during COVID-19.
2. Dunfield, K. A., & Kuhlmeier, V. A. (2013). Classifying prosocial behavior: Children's responses to instrumental need, emotional distress, and material desire. *Child Development*, *84*(5), 1766-1776.
3. Smith, C. E., Blake, P. R., & Harris, P. L. (2013). I should but I won't: Why young children endorse norms of fair sharing but do not follow them. *PloS one*, *8*(3), e59510.
4. Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2007). Prosocial development. *Handbook of Child Psychology*, *3*.
5. House, B. R., & Tomasello, M. (2018). Modeling social norms increasingly influences costly sharing in middle childhood. *Journal of Experimental Child Psychology*, *171*, 84-98.
6. Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior*, *28*(3), 168-175.

Acknowledgments

Special thanks to all the families who kindly contributed to our study. Thanks to Dr. Valerie Kuhlmeier and our amazing team involved in every step of this study: planning, recruitment, testing and coding. A shout out to lab coordinator, Sara Jones, thesis students Brendan Hancock, Montana Shore, Emma Liprot, Lexie Piccolo, and research assistants Daniele Bukovsky, Ana Alexandru, and Kayla Gordon. Thanks as well to the other members of the Social Cognition Lab for their insightful suggestions, Ivan Melo for the help on the server set up, and Dr. Mark Sabbagh for data analysis consultation.