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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 44(44)

Authors

Nancekivell, Shaylene E
Fahey, Jason B

Publication Date

2022

Peer reviewed

Who Owns Your Information? Young Children’s Judgments of Who Owns the General and Personal Information Users Share With Apps.

Shaylene E Nancekivell (shaylene.nancekivell@umanitoba.ca)
Department of Psychology, University of North Carolina at Greensboro

Jason B Fahey
Department of Psychology, University of North Carolina at Greensboro

Abstract

The present study investigates young children’s reasoning about who owns the information users share with apps. 87 children ages 5-years to 10-years were asked to judge who owned two types of information after it had been willingly shared by users: general and personal information. Based on an informational autonomy account, we predicted that young children would judge that the user owns their personal information but not their general information. We found that by 8-years-old children were indeed more likely to judge that users own the personal information they share with apps than they were to judge that users own the general information they share with them. However, younger children judged that the general information was owned by the user at similar rates to the personal information. Further exploration of our data suggests these changes are likely driven by beliefs about the ownership of general information.

Keywords: ownership; autonomy; information; digital culture; cognitive development

Introduction

Children are spending increasing amounts of time on the internet. While online, they often use games and apps that access information about them, including their images, names, and GPS coordinates (Liu et al., 2016; UNICEF, 2018). The present study examines the mental models children use to reason about the information that apps access. Namely, it investigates young children’s intuitions about who owns the information users willingly share with apps, a common everyday behavior.

Beyond its practical importance for children’s digital behaviors, investigating children’s intuitions of who owns personal information has implications for our understanding of the conceptual representations on which children’s understanding of ownership rests—a topic long debated by philosophers and psychologists alike. In this way, the present work is also theoretically relevant, as it will offer insight to how children reason more about ownership and related abstract concepts. Indeed, prior work has established that young children reason in sophisticated ways about physical property. Young children are adept at identifying the owner of physical possessions (e.g., Blake et al., 2012;

Friedman et al., 2013; Kanngiesser et al., 2010; Malcolm et al., 2014; Pesowski & Friedman, 2016). For example, 4- and 5-year-olds will consider stereotypes, emotional reactions, and testimony when determining who owns a possession (e.g., judge a girl likely owns a doll; Blake et al., 2012; Friedman, Van de Vondervoort et al., 2015; Kanngiesser et al., 2010; Malcolm et al., 2012; Pesowski & Friedman, 2016). We also know that children recognize the complex rights owners’ have over their possessions that non-owners do not (e.g., Davoodi et al., 2020; Kanngiesser & Hood, 2014). For example, by 2-years-old children defend their rights to their property by protesting against transgressors, and consider owners’ rights when deciding how to distribute resources (i.e., when deciding who should get to keep what; Rossano et al., 2011; Pesowski et al., 2019). By 3-years-old children directly reference ownership in their protests, and by 4- or 5-years-old children will spontaneously use ownership to explain the acceptability of actions directed towards property (Rossano et al., 2011; Kanngiesser & Hood, 2014; Nancekivell, & Friedman, 2017).

This early emerging sophisticated appreciation of physical ownership is thought to be driven by an understanding of the self and their bodily autonomy (e.g., Belk, 1988, Fasig, 2000, Van de Vondervoort et al., 2017; also labor mixing accounts Locke, 1690/1978; Kanngiesser & Hood, 2014). For example, children’s appreciation that their property is under their unilateral control is thought to be the manifestation of a broader appreciation that their body and “selves” are also under their control (e.g., Van de Vondervoort et al., 2017).

The present study builds on this autonomy account by proposing that the principle of informational autonomy might likewise guide children’s beliefs about who owns different kinds of information. EU law defines informational autonomy as “control over one’s personal information...or the individuals’ right to determine which information about themselves will be disclosed, to whom and for which purpose” (de Terwangne, 2014; also see Tzanou, 2013; Kamleitner & Mitchell, 2019; Hornung & Schnabel, 2009). Under this informational autonomy account, children should judge that users own their personal information, as a user has the right to autonomously determine how information about themselves is used and accessed. We compare

children’s judgments about personal information to those about general facts. We predict that, unlike personal information, children will view general information shared with an app as unowned because such information typically falls outside the purview of any one individual’s control. We focus on children aged 5-years to 10-years because this is the age at which children have shown proficiency in reasoning about the ownership of other less tangible property types (e.g., ownership of ideas; Shaw et al., 2012).

We also chose this age range for two additional reasons. First, we based it upon prior work examining how young children reason about digital rights. This work has established that young children at this age (i.e., 4-years to 10-years) recognize technology “knows things about them” (Sun et al., 2021). It has also shown that children also have a basic understanding of their digital rights—at least in the context of digital tracking (Gelman et al., 2018; Gelman et al., in press). For example, by about 6-years-old children think it is less acceptable to track the location of someone else than one’s self (Gelman, et al., 2018).

The present work is also in part motivated by prior work looking at children’s (under 10-years) understanding of the distinctions among different types of knowledge. This work has revealed that young children are sensitive to the differences among private (i.e., secrets), cultural, and common knowledge (e.g., Soley & Kösele, 2021; Liberman et al., 2020). Similar work also shows that children understand the difference between generic and specific facts (e.g., Cimpian & Scott, 2012). Altogether these works suggest that children have the ability to reflect on the features of knowledge and information in sophisticated ways. Here, we are the first to test children’s appreciation that some types of information can also be owned.

Method

Participants

87 children ages 5-years to 10-years were tested in children’s museums in Greensboro, and Winston-Salem, North Carolina as well as the NC Zoo (Mean = 91 months, range = 61 to 131 months, 41.3% girls, 54% monoracial White). We are partway through data collection. The target sample size is 108 children.

Materials and Procedure

An experimenter told a story accompanied by pictures using a physical flipbook. The story was about a girl named Sally who was playing a game on her computer. Sally shares some pieces of information with the game one by one. After each piece of information is shared with the game, the experimenter told and then asked the child, “The game has that information now. Who does it belong to: Sally, the game, or no-one?”. If the child did not answer the question on the first try, the question was repeated once. Children were permitted to answer both (i.e., both game and Sally). Figure 1 shows how the game was introduced to the

children and the flow of one test trial. We used a computer game in the story because we believed that most children would be familiar with the concept of a computer game asking for information.



Figure 1: Introduction text and sample test trial

There were three pieces of information in the personal information condition and the general information condition and so six pieces of information total. The order of the information within each condition was presented in a fixed order, but the presentation order of each set of information (general vs. personal) was counterbalanced.

The exact pieces of information used were as follows:

- General information: 1) Sally told the game houses have kitchens. 2) Sally told the game kids go to school. 3) Sally told the game some girls like rainbows.
- Personal information: 1) Sally told the game she lives in a house on Kirk Street. 2) Sally told the game she goes to Smithson School. 3) Sally told the game she is a girl.

Results

First, we scored children’s responses by giving them a 1 for selecting Sally and a 0 otherwise (e.g., no-one, both, the game). As a reminder, children could respond in many ways (i.e., at least four) and so, although we do not know the precise nature of chance responding, it is far below 50% and likely closer to 25%. We entered children’s binary scores into a binary logistic generalized linear mixed model (GLMM) to assess how responses changed with children’s age in months (centered) and condition (personal, general; see Figure 1). Random effects were modeled as id nested in condition (e.g., 1+condition|ID). We found a main effect of age ($b = -.063$, $SE = .014$, $z = -4.70$, $p < .001$), a main effect of condition ($b = 1.07$, $SE = .31$, $z = 3.40$, $p < .001$), and an interaction ($b = .037$, $SE = .018$, $z = 2.12$, $p = .034$). Figure 1 displays Sally responses by children’s age.

To further examine our interaction, we next split our sample at the midpoint of 8-years-old. Figure 2 also suggests children’s judgments likely became sensitive to condition at around this point (Please also see item-level Figures 3 and 4 for similar trends). Indeed, the judgments of children under 8-years ($N=54$) were not sensitive to condition, $b = .49$, $SE = .32$, $z = 1.51$, $p = .13$. However, in

contrast, children over 8-years (N=33) judgments were sensitive to the condition information as they were more likely to select Sally as the owner in the personal information condition than in the general information condition, $b = 1.88$, $SE = .76$, $z = 2.48$, $p = .013$.

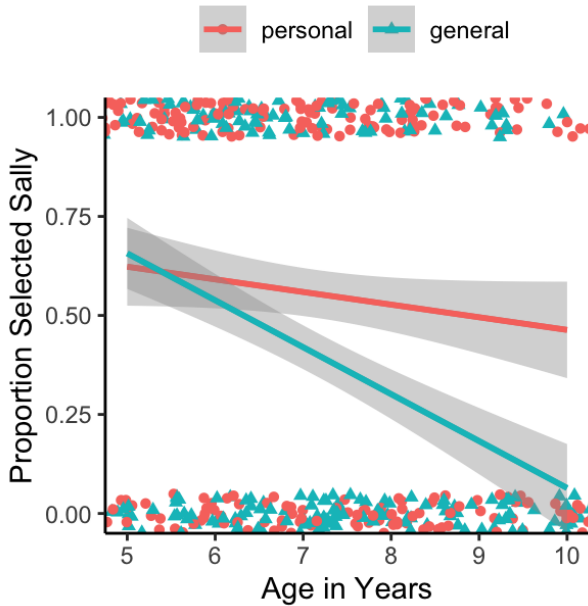


Figure 2: Children’s selections of Sally graphed by their age in years. Points are jittered for clarity.

As a reminder, the scoring collapsed all other judgments that were “not Sally” into one category. To help contextualize the age-related changes we detected, Table 1 displays the proportions of all selections (e.g., no-one owns judgments) divided by age-group and condition. This table suggests that compatible with the findings above children’s no-one’s judgments also increased with age in the general information condition.

Table 1: Children’s non-Sally selections displayed by age group and condition.

	Game	No-one	Both
Younger (< 8-years)			
Personal	.22	.17	.02
General	.28	.17	.01
Older (> 8-years)			
Personal	.34	.09	.04
General	.39	.33	.07

In response to reviewer comments, we next explored our data by information type or topic (i.e., item). As a reminder, our data was organized such that the topics of the general and personal information items were similar. For example,

in the general case there was a fact about girls and in the personal case the fact shared was that Sally was a girl. Two figures display children’s responses by condition and item. Figure 3 displays younger children’s responses whereas Figure 4 displays older children’s responses.

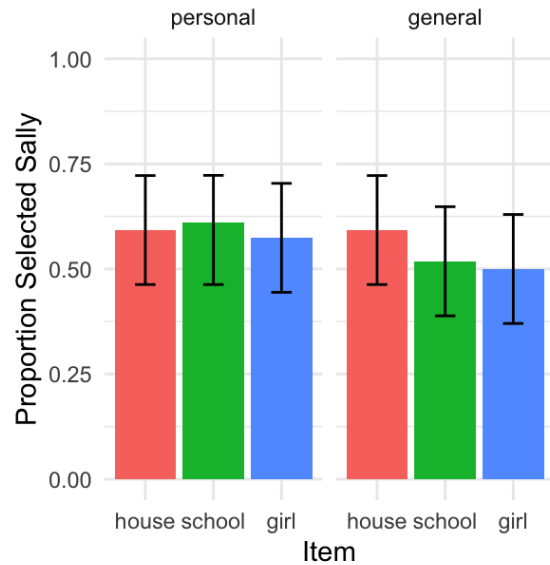


Figure 3: Younger children’s selections of Sally graphed by item and condition.

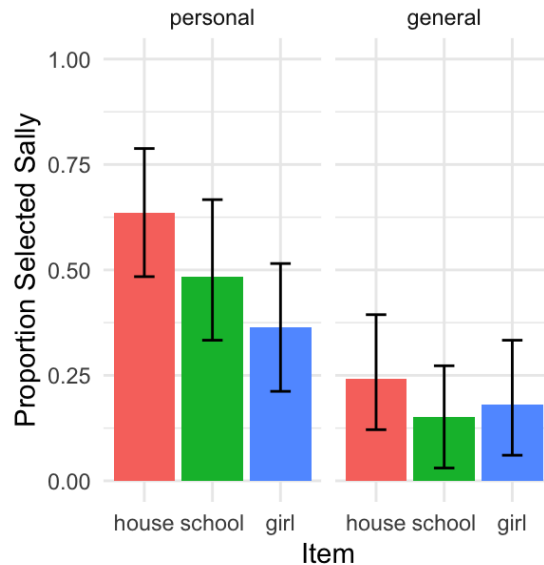


Figure 4: Older children’s selections of Sally graphed by item and condition.

The exploratory figures above suggest that the nature of the items may have been influencing older children’s, but not younger children’s, responses. This issue is further addressed in the discussion.

General Discussion

We examined how young children reason about who owns the information users share with apps. We found that by 8-years-old children were more likely to judge that users own the personal information they share with apps than children were to judge that users own the general information they share with them. In contrast, younger children judged that the general information was owned by the user at similar rates to the personal information. Age-related changes appear to be mainly driven by differences in children's reasoning about who owns general information. Specifically, older children appear to be more likely to think that no one owns general information than younger children.

We also discovered potential item effects in older children's responses wherein older children appeared to treat the personal gender information item differently than the other items. One possibility is that this occurred because in physical spaces gender information is often (thought to be) easily accessible via one's appearance (e.g., Blakemore, 2003). Indeed, its accessibility might make gender information feel less ownable as one cannot easily control others' access to it. This possibility offers opportunities to dive deeper into how children think about the ownership of different kinds of "personal" information. Specifically, one might explore if and how beliefs about the accessibility of information in physical spaces might be influencing thinking about its nature in digital ones.

By age 8-years, children's behavior was compatible with the informational autonomy account (de Terwangne, 2014; also see Tzanou, 2013; Kamleitner & Mitchell, 2019; Hornung & Schnabel, 2009). Specifically, we argue that children's judgments that personal information is owned and general information is not owned is likely based on an appreciation that users have the right to autonomously determine how information about themselves is used and accessed, but not general information as it falls outside the purview of any one individual's control. In this way, the present findings may support the central role that control or autonomy likely plays in children's early conceptualizations of ownership (e.g., Espinosa & Starmans, 2020, Van de Vondervoort et al., 2017). Ongoing work in the lab is currently being done to explore the links between children's understanding of information ownership and their ability to identify violations of owners' rights in the digital sphere.

There are a few explanations for the age-related changes we detected. The first, that we support, is that they reflect age-related increases in the appreciation that no one owns general information. This change might reflect growth in children's appreciation of the breadth of tokens in the world that are unowned. For example, other work examining the effects of one's ability to control an animal on children's judgments of its ownership status has found that older children's (7- and 8-years) ownership judgments are more sensitive (show greater effects) to control-related manipulations (Espinosa & Starmans, 2020).

Another possibility is that young children simply did not understand the task at hand. Namely, they may have been associating Sally with both kinds of information because she was associated with them during the story. This lower-level explanation would suggest that children's understanding of who owns both personal and general information is evolving with age. However, we suspect that the notion that information is owned may be more salient to children in cases of ownership violations and therefore such tasks may rule out this possibility.

The current findings also extend what is known about how young children reason about non-physical property like information, ideas, and virtual goods. Extant work suggests that during early/middle childhood children come to appreciate that ideas can be owned (Shaw et al., 2012). For example, children as young as 6-years-old understand that the person who first thinks of an idea (i.e., establishes first possession) owns it (Shaw et al., 2012). Here, we build on this work by finding that at around 8-years-old children also appreciate that non-physical personal information can be owned. As we learn more about how children reason about non-physical property, it will be interesting for future work to examine the ways in which children's reasoning is similar or different across property types. For example, it could be that more concrete virtual goods like in-game items are easier for children to represent than more abstract forms of non-physical property like information or ideals, and thus their appreciation that these items can be owned may develop sooner.

We currently only have 33 children over the age of 8-years and so the present study is limited in the conclusions it can make because of its small sample size. It is also limited in that we only asked children about a computer game and a small number of facts. Children may have differing beliefs about the information entered into a computer game and other mediums (e.g., educational apps).

In sum, as children age, they appear to reason in more sophisticated ways about who owns the information shared with apps, including when it is owned at all. These findings suggest the importance of understanding how ownership is instantiated in the new digital age.

Acknowledgements

We thank the families as well as our Living Lab Partners Greensboro Children's Museum, Kaleideum North, and the NC Zoo for their support and participation.

References

- Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research*, 15(2), 139-168.
- Blake, P. R., Ganea, P. A., & Harris, P. L. (2012). Possession is not always the law: With age, preschoolers increasingly use verbal information to identify who owns what. *Journal of Experimental Child Psychology*, 113(2), 259-272. 10.1016/j.jecp.2012.06.008
- Blakemore, J. E. O. (2003). Children's beliefs about violating gender norms: Boys shouldn't look like girls,

- and girls shouldn't act like boys. *Sex roles*, 48(9), 411-419.
- Byrne, J et al., (2018). Policy guide on children and digital connectivity. *UNICEF Offices of Data, Research and Policy*. Accessed on July 1, (2021). <https://www.unicef.org/esa/media/3141/file/PolicyLab-Guide-DigitalConnectivity-Nov.6.18-lowres.pdf>
- Cimpian, A., & Scott, R. M. (2012). Children expect generic knowledge to be widely shared. *Cognition*, 123(3), 419-433.
- Davoodi, T., Nelson, L. J., & Blake, P. R. (2020). Children's conceptions of ownership for self and other: categorical ownership versus strength of claim. *Child Development*, 91(1), 163–178. <https://doi.org/10.1111/cdev.13163>
- De Terwangne, C. (2014). The right to be forgotten and informational autonomy in the digital environment. In A. Ghezzi, A.G. Pereira, & L. Vesnic-Alujevic (Eds). *The ethics of memory in a digital age* (pp. 82-101). Palgrave Macmillan, London.
- Espinosa, J., & Starmans, C. (2020). Control it and it is yours: children's reasoning about the ownership of living things. *Cognition*, 202. <https://doi.org/10.1016/j.cognition.2020.104319>
- Fasig, L. G. (2000). Toddlers' understanding of ownership: implications for self-concept development. *Social Development*, 9(3), 370–382. <https://doi.org/10.1111/1467-9507.00131>
- Friedman, O., Van de Vondervoort, J. W., Defeyter, M. A., & Neary, K. R. (2013). First possession, history, and young children's ownership judgments. *Child Development*, 84(5), 1519-1525.
- Gelman, S. A., Cuneo, N., Roberts, S. O., Kulkarni, S., & Snay, S. (in press). The roles of privacy and trust in children's evaluations and explanations of digital tracking. *Child Development*.
- Gelman, S. A., Martinez, M., Davidson, N. S., & Noles, N. S. (2018). Developing digital privacy: Children's moral judgments concerning mobile GPS devices. *Child Development*, 89(1), 17-26. [10.1111/cdev.12826](https://doi.org/10.1111/cdev.12826)
- Hornung, G., & Schnabel, C. (2009). Data protection in Germany I: The population census decision and the right to informational self-determination. *Computer Law & Security Review*, 25(1), 84-88. [10.1016/j.clsr.2008.11.002](https://doi.org/10.1016/j.clsr.2008.11.002)
- Kamleitner, B., & Mitchell, V. (2019). Your data is my data: A framework for addressing interdependent privacy infringements. *Journal of Public Policy & Marketing*, 38(4), 433-450. [10.1177/0743915619858924](https://doi.org/10.1177/0743915619858924)
- Kanngiesser, P., & Hood, B. M. (2014). Young children's understanding of ownership rights for newly made objects. *Cognitive Development*, 29, 30-40.
- Kanngiesser, P., Gjerroe, N., & Hood, B. M. (2010). The effect of creative labor on property-ownership transfer by preschool children and adults. *Psychological Science*, 21(9), 1236-1241. [10.1177/0956797610380701](https://doi.org/10.1177/0956797610380701)
- Liu, M., Wang, H., Guo, Y., & Hong, J. (2016, February). Identifying and analyzing the privacy of apps for kids. In D. Chu (Ed.), *Proceedings of the 17th international workshop on mobile computing systems and applications* (pp. 105-110). ACM. [10.1145/2873587.2873597](https://doi.org/10.1145/2873587.2873597)
- Lieberman, Z., Gerdin, E., Kinzler, K. D., & Shaw, A. (2020). (Un) common knowledge: Children use social relationships to determine who knows what. *Developmental Science*, 23(6), e12962.
- Locke, J. (1978). Of property. In C. B. MacPherson (Ed.), *Property: Mainstream and critical positions* (pp. 17–27). Toronto, Canada: *University of Toronto Press* (Original work published 1690)
- Malcolm, S., Defeyter, M. A., & Friedman, O. (2014). Children and adults use gender and age stereotypes in ownership judgments. *Journal of Cognition and Development*, 15(1), 123-135. [10.1080/15248372.2012.728545](https://doi.org/10.1080/15248372.2012.728545)
- Nancekivell, S. E., & Friedman, O. (2017). “Because it's hers”: When preschoolers use ownership in their explanations. *Cognitive Science*, 41(3), 827-843. [10.1111/cogs.12358](https://doi.org/10.1111/cogs.12358)
- Pesowski, M. L., & Friedman, O. (2016). Preschoolers use emotional reactions to infer relations: The case of ownership. *Cognitive Development*, 40, 60-67. [10.1016/j.cogdev.2016.08.006](https://doi.org/10.1016/j.cogdev.2016.08.006)
- Rossano, F., Rakoczy, H., & Tomasello, M. (2011). Young children's understanding of violations of property rights. *Cognition*, 121(2), 219-227. [10.1016/j.cognition.2011.06.007](https://doi.org/10.1016/j.cognition.2011.06.007)
- Shaw, A., Li, V., & Olson, K. R. (2012). Children apply principles of physical ownership to ideas. *Cognitive Science*, 36(8), 1383–1383.
- Soley, G., & Kösel, B. (2021). The social meaning of common knowledge across development. *Cognition*, 215, 104811.
- Sun, K., Sugatan, C., Afnan, T., Simon, H., Gelman, S. A., Radesky, J., & Schaub, F. (2021, May). “They see you're a girl if you pick a pink robot with a skirt”: A qualitative study of how children conceptualize data processing and digital privacy risks. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1-34.
- Tzanou, M. (2013). Data protection as a fundamental right next to privacy? ‘Reconstructing’ a not so new right. *International Data Privacy Law*, 3(2), 88-99. [10.1093/idpl/ipt004](https://doi.org/10.1093/idpl/ipt004)
- Van de Vondervoort, J. W., & Friedman, O. (2015). Parallels in preschoolers' and adults' judgments about ownership rights and bodily rights. *Cognitive Science*, 39(1), 184-198. [10.1111/cogs.12154](https://doi.org/10.1111/cogs.12154)
- Van de Vondervoort, J. W., Meinz, P., & Friedman, O. (2017). Children's judgments about ownership rights and body rights: Evidence for a common basis. *Journal of Experimental Child Psychology*, 155, 1-11. [10.1016/j.jecp.2016.10.007](https://doi.org/10.1016/j.jecp.2016.10.007)