Common knowledge that help is needed increases helping behavior in children

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Abstract

Although there is considerable evidence that at least some helping behavior is motivated by genuine concern for others' well-being, sometimes we also help solely out of a sense of obligation to the person in need. Our sense of obligation to help may be particularly strong when there is common knowledge between the helper and the helpee that the helpee needs help. To test whether children's helping behavior is affected by having common knowledge with the recipient about the recipient's need, 6-year-olds faced a dilemma: They could either collect stickers or help an experimenter. Children were more likely to help when they and the experimenter had common knowledge about the experimenter's plight (because they heard it together), than when they each had private knowledge about it (they heard it individually). These results suggest that already in young children common knowledge can heighten the sense of obligation to help others in need.

Keywords: common knowledge, helping, prosociality, obligation, strategic behavior, children

From early in ontogeny, humans engage in helping behaviors that benefit others but are costly to themselves. Beginning in infancy, children help others achieve their goals (Warneken & Tomasello, 2006) and support those in distress (Svetlova, Nichols, & Brownell, 2010). The motivations underlying acts of helping have been widely debated. One main motivation is a genuine concern for the plight of others (Hastings, Zahn-Waxler, & McShane, 2006; Hepach, Vaish, & Tomasello, 2012). This is supported by findings that young children show concern towards others in distress and help irrespective of extrinsic rewards, praise, or presence of observers (Warneken & Tomasello, 2008, 2012; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). A positive relation between sympathy and helping (Eisenberg, 2000) provides further support for the idea that at least some helping is motivated by concern for others' well-being.

However, helping is also sometimes performed solely out of a sense of obligation to the person in need. There are at least two ways in which a sense of obligation can come about. It can be second-personal, i.e. the obligation is directed to a particular person, and/or it can be more general/abstract and based on societal norms such as "one should always help when one can." When acting out of a sense of obligation, the helper feels she owes aid to the helpee and the helpee can hold the helper accountable if she does not provide it (Darwall, 2012; Gilbert, 2014). The obligation felt is likely particularly strong when there is common knowledge between the helper and helpee that the helpee needs help. Imagine that a young man is sitting in a crowded bus and an elderly woman walking with a cane enters. The man knows he should offer his seat, but he would prefer to sit himself. However, once the woman makes eye contact with him, they know together that she needs help. He now feels additional pressure (beyond general societal pressure) to offer his seat, because under the conditions of common knowledge her need is mutually manifest. This common knowledge of the helpee's plight removes plausible deniability: Since the woman's need is mutually

known between them, the man cannot plausibly deny knowing she needs help and therefore justify not helping. In contrast, without common knowledge, with only private knowledge of the woman's plight (e.g., if he just saw her enter through the reflection in the window), the man could plausibly deny knowing about her predicament and remain seated.

Two separate lines of research, mainly from joint action contexts, suggest that young children 1) sometimes act out of a sense of obligation, and 2) have some understanding of common knowledge. First, several studies have demonstrated 3- and 5-year-old children's sensitivity to the obligations present in joint activities (Gräfenhain, Carpenter, & Tomasello, 2013; Hamann, Warneken, Greenberg, & Tomasello, 2011; Kachel & Tomasello, 2019). Furthermore, in helping contexts, 3- and 5-year-olds persist in helping longer if they have promised to help (Kanngiesser, Köymen, & Tomasello, 2017), and 5-year-olds apparently feel a sense of responsibility to help when they are the only person able to help (Plötner, Over, Carpenter, & Tomasello, 2015). Thus, children sometimes help because they feel like they should. But the role of common knowledge in increasing this pressure to help has not been studied.

Second, several studies have tracked the development of children's early understanding of common knowledge (see Bohn & Köymen, 2017, for a review). These studies find that although even 1-year-old infants are sensitive to what they know together with others (Moll, Carpenter, & Tomasello, 2007), it is only around 4-6 years that children can use common knowledge to solve coordination problems (Grueneisen, Wyman, & Tomasello, 2015; Siposova, Tomasello, & Carpenter, 2018). Although some studies of adults have indirectly explored the role of common knowledge in coordination and helping contexts using economic games and vignettes (Thomas, DeScioli, Haque, & Pinker, 2014; Thomas, Freitas, DeScioli, & Pinker, 2016), no previous studies in adults or children have investigated whether individuals actively and strategically modify their own helping

behavior depending on whether they have common knowledge with the helpee about the helpee's need.

In the current study, 6-year-olds faced a dilemma in which they needed to choose between collecting stickers for themselves and helping an experimenter. Children and the experimenter either had common knowledge (CK) about the experimenter's need for help (CK condition) or they each had private knowledge about her need for help (individual knowledge (IK) condition). We predicted that children would help more often and more quickly in the CK condition than the IK condition. We tested 6-year-olds because the best evidence for children's use of common knowledge is first seen at 5-6 years (Grueneisen et al., 2015; Siposova et al., 2018).

Method

Participants

Participants were 100 6-year-olds (50 girls, mean age: 6;6; range: 5;11-6;11). The sample size was determined based on a power analysis from pilot data to reach a power of 0.80 (pilot data N=23, the simulation consisted of 1,000 data sets with sample sizes from 10-100 children per condition with increments of 10). Additional children were tested but not included in analyses because they established common knowledge in the IK condition before the test phase (e.g., by telling the experimenter that actually they could hear her while wearing the headphones) (7), or because of apparatus failure (i.e., the sticker box closed before the test began or children figured out how to keep it open so they could both help and finish collecting stickers) (11). Children were tested individually in their kindergartens with prior consent from their parents. The university's ethics committee approved the study.

Design and materials

In a between-subjects design, participants were randomly assigned to either the CK or IK condition. Materials included a chair, musical toy (30x15x15 cm), headphones,

cardboard box (40x40x50 cm), barrier (200x180 cm), and two sticker boxes (30x40 cm), one for training and one for the test. Children accessed the stickers in the sticker boxes by opening a transparent door, which had an elastic hinge that closed the door automatically when it was not held open by hand. Once children left the sticker boxes, the door closed, and could not be opened again because a magnet kept it locked. The training sticker box contained 11 low-value prizes (paper pictures, 3x3 cm); the test sticker box contained 35 high-value prizes (star stickers, 2x2 cm).

Procedure

Training phase. After an assistant (E2) picked children up from their classroom, children met the seemingly-injured experimenter (E1), who was using a crutch to walk, and whose other arm was in a sling, in the hall. After entering the testing room, E1 unsuccessfully tried to take a musical toy off of a chair so she could sit down. This was done to demonstrate that E1 needed help to remove objects from the chair because her hands were occupied. E2 removed the toy from the chair for her, and E1 thanked her and sat down. Children, E1, and E2 briefly played with the musical toy. Then children and E2 went to the other corner of the room and E1 started reading a book.

To manipulate the type of knowledge children had, in both conditions, children were given headphones to wear. After children watched a video on an iPad, E2 instructed them to keep the headphones on (with no sound playing in them), and said, “You know what, [child’s name], when you have the headphones on, then everyone will think you can’t hear anything.” In the CK condition, she added, “Except [E1], she knows that you can hear everything.” When E1 heard her name, she stopped reading, looked at children and confirmed, “Mmhmm, I do know that you can hear me, isn’t that right?”, and then excused herself and left the room. In the IK condition, E2, using a soft tone of voice, instead added, “So [E1] doesn’t know that you can hear everything.” After that, E1 announced that she

would leave. As if just realizing it, she said, “Ah, right, you are wearing headphones and you can’t hear me at all,” while looking at children and E2, and left. Thus, in the CK condition, children and E1 knew together that children could still hear external sounds despite wearing the headphones. In contrast, in the IK condition, children learned that E1 would think that they could not hear any external sounds because of the headphones.

Next, in both conditions, E2 introduced the training sticker box to children. At that point the sticker box was covered by an overturned cardboard box, so first E2 removed the cardboard box and asked children to put it on the chair. E2 told children they could collect as many of the pictures in the sticker box as they wanted. She then demonstrated that once children left the sticker box, the door closed and it was impossible to open the door and access the pictures again. Then E2 led children behind the barrier and showed them the test sticker box with the high-value stickers inside.

After children began to collect the stickers, E2 excused herself and left the room. E1 re-entered shortly thereafter, and, from the doorway, looked at children, acknowledged their presence by saying, “Ah, [child’s name], you are still here,” and then repeated the manipulation: In the CK condition, she said, “You are wearing headphones, but I know that you can still hear me,” whereas in the IK condition, she said, “But you are wearing headphones and you can’t hear me.” In both conditions, E1 then walked towards the chair, but children could not see this from behind the barrier where they were collecting stickers; i.e., the barrier was positioned in such a way that children could see E1 only when she entered the room, but not when she reached the chair (see Figure 1).

Fig. 1. The setup during the test phase with the test sticker box, barrier, and injured experimenter who needed help to move an object off a chair.

Test phase. When standing next to the chair, in both conditions, E1 then provided a series of auditory cues revealing that she needed help to move the cardboard box that children had placed on the chair during the training phase. Note that none of the cues were specifically directed at children. Speaking aloud to herself, she said: (1) “Hm, I can’t sit down on the chair, because the box is there,” (2) “There’s a box here now, but I would like to sit down,” (3) “I can’t move the box away on my own,” (4) “Oh, my leg hurts.” In addition to these verbal cues, E1 was hopping on one leg, providing additional auditory signals from which children could infer that help was needed. There was a pause of approximately 10 s after each cue and the length of the test phase was approximately 1 min.

Children in both conditions thus faced a dilemma between collecting stickers for themselves and helping E1 by removing the box from the chair. Helping was costly: Children knew that once they left the sticker box, they would not be able to access the

stickers again. The only difference between the two experimental conditions was whether E1 and children knew together that E1 needed help (and children could provide it), or children and E1 each knew this separately. If children helped, the test phase ended and E1 thanked them. If children did not help by 10 s after the last cue, E1 managed to move the box off the chair herself, sat down, and announced that everything was alright. At the end of the test phase, E2 entered. To gain more insight into children's behavior, E2 asked children two exploratory questions: (1) "Tell me, [child's name], what did [E1] do here, what happened?" and (2) "Did [E1] know that you could hear her with headphones on?"

Coding and reliability

Helping. The main measures were whether children helped by moving the object off the chair within the 1-min duration of the test phase or not, and how quickly they helped. Latency to help was the time from E1's first auditory cue until children let go of the sticker box to help E1. If children did not help, they were assigned the full length of the test trial (the time in seconds between the first cue and 10s after the last cue).

Questions. For the first question, we coded whether children mentioned that E1 needed help (e.g., explaining that E1 could not put the box away alone, mentioning any of the cues E1 produced, describing their helping) or not (e.g., saying they did not know what happened, describing E1 moving the box off the chair herself). For the second question, we coded whether children answered correctly according to the condition they were in: that E1 did not know that children could hear her in the IK condition, and that she did know this in the CK condition.

Please see the Supplemental Materials for further coding.

Reliability. The main coding was done from the video-recordings by the first author. To assess inter-rater reliability, a coder naïve to hypotheses coded a random sample of 25% of children in each condition. There was perfect agreement on the measures of whether

children helped, and the questions. Reliability was excellent for latency to help and the duration of the test trial (ICC(2,1)=0.99; confidence interval 0.98-0.99).

Results

Helping behavior

To examine the influence of the type of knowledge on helping, we used a survival analysis, which allows for the estimation of the probability of helping from two variables: whether and how quickly children helped. The probability of helping in the CK condition was 111.5%[1] higher than in the IK condition (Cox-proportional hazards model, p=.026, hazard ratio=2.12, 95% confidence interval 1.09-4.09, see Figure 2). In the CK condition, 48% of children (24 out of 50) helped. For the children who helped, the average latency to help was 26 s (range 4-55 s). In contrast, in the IK condition, only 28% of children (14 out of 50) helped, and the average latency of helpers to help was 34 s (range 10-58 s).

Questions

Most participants mentioned that E1 needed help when asked what happened (Question 1), with no difference between conditions (CK: 61% of children IK: 65%, Fisher's exact test, p=.834, odds ratio=.87). Similarly, the majority of children correctly indicated whether E1 knew they could hear external sounds; however children responded correctly significantly more often in the CK than the IK condition (CK: 100% correctly answered E1

[1] In the Cox-proportional hazards model, hazard ratios represent the effect size. A hazard ratio >1 indicates a variable that is positively related to the helping probability ("the hazard") and negatively related to the duration of collecting stickers (the duration of "survival"). The CK condition increased the probability of helping (the hazard) by a factor of 2.115, or 111.5%. Estimation of the probability of helping in percentage: |1-hazard ratio|*100=|1- 2.115|*100=1.115*100=111.5% (Kassambara, 2017).

knew; IK: 85% correctly answered E1 did not know, Fisher's exact test, p=.006), not surprisingly, as only the IK condition involved reporting on a false belief (E1 thought I couldn't hear but I could). Three participants were excluded from both analyses due to missing audio.

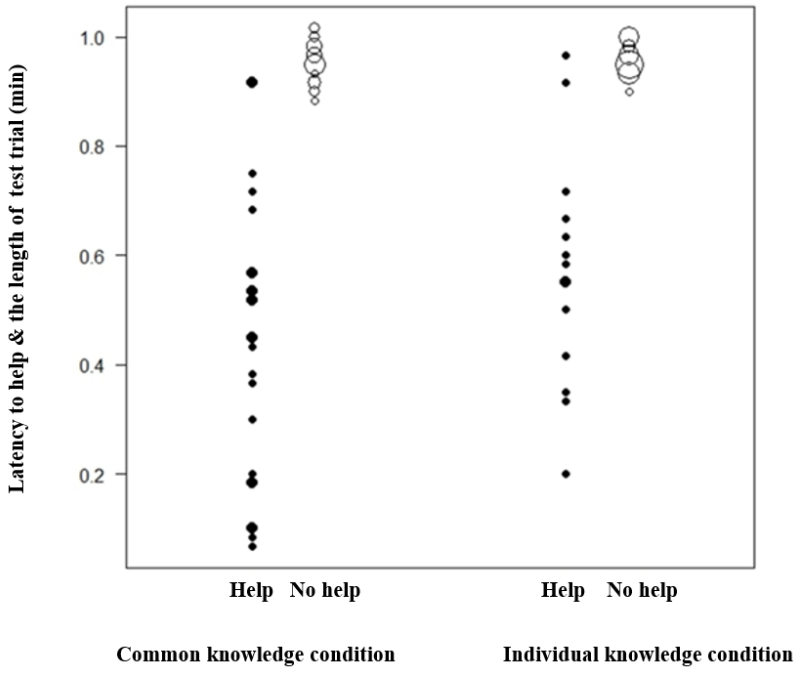

Fig. 2. The vertical axis shows latency to help and duration of the test trial in minutes. Full circles depict children who helped; empty circles depict children who did not help. The size of the circles represents the number of children.

Discussion

When children faced the dilemma of pursuing their own self-interest (gaining stickers) versus helping E1, children's helping was influenced by the type of knowledge state they had about E1's need for help. Children were more likely to help when they and E1 had common knowledge about her need for help (when they and E1 both knew that they both knew that E1 needed help) than when they had individual knowledge about it (when they and E1 both knew that E1 needed help separately). Because in both conditions children

and E1 both knew that help was needed, and the presence and behavior of E1 was identical, this study demonstrates that it was specifically the common knowledge between children and E1 that affected children's prosociality.

In contrast, if children had been motivated to help purely based on sympathy, their helping should have been the same in both conditions, as in both cases they could hear the cues that help was needed equally well. Several other mechanisms potentially driving helping behavior such as motivation to interact with others or to be rewarded, adopting the other's goal as one's own (Paulus, 2014), or retaining a positive self-image as a helpful person (Bénabou & Tirole, 2006) cannot explain the difference in helping either, as they should have affected both conditions equally. This is not to say that a concern for others' wellbeing (or other motivations) did not play any role: 28% of children in the IK condition still helped. However, helping increased significantly once the fact that help was needed was common knowledge. And/or, conversely, helping decreased significantly when the fact that help was needed was only individual knowledge. These two interpretations of the current results are difficult, if not impossible, to tease apart. That is, it is not clear what the appropriate baseline comparison would be: There is no neutral condition in between individual and common knowledge, and it is not clear what the prediction would be in a condition in which no information is provided as to whether there is individual or common knowledge and an ambiguous context allows children to assume either state. Thus while we mainly focus on the interpretation that common knowledge promotes helping, our findings can equally be taken as evidence that individual knowledge can encourage selfishness.

One plausible explanation for these findings is that common knowledge changes our sense of obligation towards others. There are at least two types of relevant obligations here. First, the sense of obligation can be general/abstract. The societal obligation "one should always help when one can" was arguably present in both conditions. However, children's

motivation to act on this obligation was likely stronger under conditions of common knowledge, because common knowledge makes the obligation especially salient. When both E1's plight and children's availability to help were common knowledge between them, this gave children an additional reason to live up to their obligation because they would be exposed as a bad person if they did not. That is, in the CK condition, common knowledge removed plausible deniability, so children could not plausibly deny knowing that their help was needed and thereby justify not helping. In contrast, in the IK condition, children might have realized, strategically, that plausible deniability gave them the opportunity to pursue their own selfish interests.

Second, the sense of obligation can be second-personal. A second-personal/relational obligation can arise in addition to the pre-existing societal obligation in common knowledge, because there is an immediate, direct, and concrete relationship between the helper and helpee, and the helper is accountable to the helpee (Darwall, 2012). It is also possible that once the helper and helpee know something together, to a certain extent they create a "we" (collective identity; Chwe, 2001), which then presumably highlights their obligations to each other (Tomasello, 2020). In addition, the lack of plausible deniability in the CK condition is relevant for the second-personal sense of obligation too, since E1was in a position to make a legitimate claim towards children (e.g., questioning why they did not help *her*), and children's recognition of that might have heightened their sense of obligation to help (Darwall, 2012).

These different ways in which a sense of obligation can come about are not mutually exclusive, and the current design does not allow us to conclude whether a second-personal or a more general sense of obligation, or both, were in place. One useful approach for future research would be to contrast common knowledge between the helper and helpee about the helper's awareness of the helpee's plight with similar common knowledge between the

helper and a third party. A second-personal account predicts that the sense of obligation driving the helping behavior would be stronger in the first case, whereas a general sense of obligation should elicit helping in both situations.

A possible example of common knowledge with third parties comes from studies on reputation management. Children help more when observed (Engelmann & Rapp, 2018; i.e., when children and third-party observers have common knowledge about children's behavior) compared to when they act on their own (when they have individual knowledge only). In those previous studies, however, the effects of common knowledge are not discernable from other observer effects which might impact prosocial behavior independently (e.g., by increasing self-awareness). In the current study, the presence of another person, E1, was held constant and children had the opportunity to improve their reputation with her by helping in both conditions, thus pointing precisely to the role of common knowledge in children's prosocial behavior.

Note, however, that it is also possible that one can strategically choose to help, without experiencing any feeling of obligation, so future research should investigate whether a sense of obligation is always present. For example, only when E1 and children had common knowledge about E1's need was E1 in a position to make a legitimate claim towards children (e.g., questioning why children did not help), and although children's recognition of that might have heightened their sense of obligation to help (Darwall, 2012), they might also simply have helped because they were afraid of retribution if they did not help. Similarly, children's aversion to disappoint E1's hopeful expectations about help could have further modulated their helping (Heintz, Celse, Giardini, & Max, 2015).

Future research should also address the question of how different routes to, and degrees of, common knowledge influence prosocial behavior. For example, making eye contact is another way people establish common knowledge, and it is likely that it increases

prosociality even more than the auditory cues used in the present study, as the sense of obligation becomes more personal and directed with eye contact (Siposova & Carpenter, 2019). Future research should also investigate the balance between a sense of obligation and the cost of helping. We are generally expected to help unless we can provide reasonable justifications for not helping (Scanlon, 1998). Children in this study faced a difficult dilemma between helping and gaining high-value resources. A few children even explained that they could not help because they were collecting stickers, apparently believing that this was a reasonable justification for not helping. This could also explain why overall helping rates were relatively low in the current study compared to previous studies in which helping was far less costly.

Although previous studies with adults have explored the role of common knowledge in coordination and helping contexts using economic games and vignettes (Thomas et al., 2014, 2016), this is the first study in either adults or children to investigate how common knowledge impacts helping in a live, interactive situation. Importantly, the fact that children and E1 both knew that they both knew about E1's plight was not communicated directly at test. Instead, E1 had previously communicated only whether she believed children could hear sounds when wearing headphones; thus children had to infer these knowledge states themselves when the need for help arose.

In summary, the current study provides evidence that common knowledge that help is needed increases helping behavior (and/or that individual knowledge decreases helping). The evolution of the social-cognitive skills needed to infer common knowledge might have played an important role in the evolution of human prosociality, as these skills could have heightened a sense of obligation to help with others' needs even at personal cost. Helping behavior can thus thrive in environments that allow common knowledge between helpers and helpees to arise.

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Data

The data that support the findings of this study are available in OSF at https://osf.io/jn5bg/?view_only=3b871d5c373840fe9eac537a37a902c5.

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