Can Kids *Really* Learn to COOPERATE?

Yes—especially if frazzled parents steal a few lessons from game theory

By Paul Raeburn and Kevin Zollman

ILLUSTRATIONS BY EMMA HANQUIST

Sibling rivalry? We talk about it all the time, but what we're really concerned with is the incessant squabbling that can turn a happy home into what feels like a battleground. That's not rivalry—it's conflict. After repeatedly separating our kids and reminding them for the thousandth time that they should *try to be a little nicer to one another,* many of us begin to think we will never put an end to the fighting. But reducing the number and intensity of these conflicts is possible—if we strike the right bargain.

Here's where a little knowledge of human behavior and game theory comes in handy. Psychologists have found that how children approach negotiations—and whether they share or turn spiteful—depends in large part on notions of fair play. And game theorists have devised various ways to approach any negotiation—some of which are more likely to result in fair outcomes than others. Some schemes require an authority figure—like a parent—to enforce them, but others are designed to structure the bargaining so that no enforcer is needed. What that means is, with the right incentives, kids can be taught to reach fair agreements all on their own.

Everyone wins when children figure out for themselves that cooperation beats conflict—and decide to cooperate without threats from the parental authorities. The key is not that the kids will cooperate every time; they won't. But if they know they must meet in negotiation again—possibly even five minutes later to, say, decide which movie they are going to watch—they might figure out that cooperating this time could win them better treatment from a sibling next time around.

Learning to Cooperate

Cooperation is part of our biology. It is not limited to adults or even to humans. It occurs within many species—from fish and bats to birds and monkeys. Harvard University psychologist Elizabeth S. Spelke, a pioneer in the study of infant cognition, has examined how children learn to cooperate. She notes that human adults prefer to share with three groups of people: close relations; people who have shared with us, whom we want to reward by being generous in return; and people who have shared with others because we like to reward generosity even if it is not directed at us (game theorists call this "indirect reciprocity"). The problem is that we don't know how we acquired those preferences. Are they encoded in our development? Do we learn them through our experience of others' generosity, our religious education or our families?

In 2008 Spelke and psychologist Kristina R. Olson, now at the University of Washington, ran a series of experiments to try to answer those questions. First, they investigated kids' willingness to share with family members. Working with a group of 20 boys and girls around four years old, Spelke and Olson represented each child using a doll, which they called the protagonist. They gave each child their protagonist doll and gave the doll resources to share—plastic bananas and oranges, rubber ducks, candy, and more—with other dolls, which were described to the kids as sisters, friends or strangers. Even at this young age, the children directed their protagonist dolls to give more gifts to siblings than to friends and more to friends than to strangers.

In a similar experiment, the scientists read the children a story, in which some of the other dolls gave presents to their protagonist doll. In turn, the children then directed their protagonist doll to distribute more resources to dolls that had given more to them—demonstrating reciprocity. In one final experiment, the kids gave more resources to dolls that had been generous to others as compared with dolls that had not been generous to anyone.

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The studies, taken together, "provide evidence that three specific principles governing complex, mature cooperative networks emerge early in childhood," Olson and Spelke concluded. Children do not appear to learn these principles from adult experience or from religious or moral instruction. Instead they may arise through their intrinsic development or their interactions with other children. More important, they could also be learning these principles from their family environments.

This kind of generosity—and the special concern for siblings—is related to children's interest in cooperation and sense of fair play. "Probably fairness evolved to support cooperation in some way. We don't know exactly how that works yet," says psychologist Katherine McAuliffe, now at Boston College. But she and her colleagues have several hunches. One idea is that

FAST FACTS
PLAYING NICE

1. Even kindergartners have a sense of fair play and will share more with specific groups—family, friends and people who have been generous with them.
2. Parents can tap this notion of fairness to encourage children to cooperate with one another and avoid spiteful behavior.
3. Using classic strategies from game theory, kids can learn to establish fair agreements on their own, without any intervention from a parent or other authority figure.

we need to know what we are going to get from cooperating, relative to what we are putting out, she explains: "You want to avoid situations where you're being exploited." If we are each trying to maximize our gain in any situation, then we are more prepared to cooperate when it makes sense for us.

Establishing Fair Play

Consider the pickup dilemma: Putting away the Legos, puzzles, costumes and My Little Pony collection that accumulate on the kids' bedroom floor. (Where did we *get* all this stuff?) It's time to clean up, but neither of your kids will budge. Each is waiting for the other to start. Cooperation seems as remote as kids asking for a handful of kale as an after-school snack.

Success in this kind of scenario typically comes only after siblings have negotiated repeatedly with one another over a period of years, honing their notion of what is fair. To get there, you need to put in place a variation on the game theory classic the Prisoner's Dilemma, which we'll call the Repeated (or Iterated) Prisoner's Dilemma. In the Prisoner's Dilemma, two prisoners are separated and given the option of confessing or saying nothing. If they both say nothing, they both get shorter sentences for a minor crime. If one confesses and the other doesn't, the confessor goes free, and the other gets a longer term. If both confess, they get equal, intermediate sentences. Silence by both would be best for both—they would only get short sentences. But one of the first and most lasting achievements of game theory has been to show that both will always confess. Without knowing what the other will do, they have no choice. Each prisoner wants to guard against receiving a stiffer sentence.

In the Repeated Prisoner's Dilemma, the two prisoners—or let's say siblings—face the opportunity again and again to keep silent or tell on the other one (confess). Now the game becomes more interesting. Your son might choose to tell on your daughter; she might respond by telling on him, too. But if your son keeps silent, maybe the next time your daughter will offer him the same consideration in return. Why? Because she sees that kindness can be good for both of them. If we can get siblings started along this path, cooperation will most likely increase, with the good behavior of one reinforcing the other.

Game theorists have proved this to be true. They call the strategy "tit for tat." We realize that tit for tat might sound like the last thing we want to encourage. But in game theory, it means that if your son begins with a cooperative move, your daughter can cooperate, by staying silent, or she can defect, by

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telling on her brother—but whatever she does, he will do exactly the same thing she does from then on. If she cooperates, he cooperates again. If she defects, so does he. See the logic? Tit for tat is game theorists' version of the Golden Rule.

One of the leaders in research on cooperation is Robert Axelrod, a professor of political science at the University of Michigan. Whereas some say children will never cooperate in the absence of authority, Axelrod has a more optimistic view of human nature. He believes that people can cooperate even if they are not concerned about the welfare of others or the welfare of their group as a whole. Around 1980 he demonstrated this point by creating a simulated computer competition in which game theorists play the Repeated Prisoner's Dilemma game against one another. He asked actual game theorists to offer the strategies they thought would be most successful. Fourteen experts stepped up.

When he ran his computer simulation using those first 14 entries, tit for tat—submitted by the now late mathematical psychologist Anatol Rapoport of the University of Toronto—beat all the other more complex strategies, "to my considerable surprise," Axelrod wrote. It was the most effective at encouraging cooperation in the Prisoner's Dilemma. This was big news. Cooperation was emerging in the absence of any threat from above. Or, as Axelrod put it, "cooperation based solely on reciprocity seemed possible." To be sure of the findings, he ran the computer tournament again. This time he got 62 entries from computer geeks, biologists, physicists, and others. The entries included all kinds of fancy mathematical strategies. Rapoport once again submitted tit for tat. Once again, it won.

So when your kids face the pickup dilemma, each one has an incentive to defect, as in the Prisoner's Dilemma. But in the Repeated Prisoner's Dilemma—as in the playroom—they soon meet again, when the stuffed animals have migrated to the center of the floor like a herd of wildebeest gathering on the African savanna.

The mathematically proven best parent tactic is to encourage your kids to adopt tit for tat. Your daughter and son alternate putting the toys away one at a time until the room is clean. They have both contributed equally to the work, and you can reward both with ice cream. Keep the game going, keep track of whose turn it is and be scrupulously fair. Each child has the incentive to clean up the room because doing so will encourage the other one to do the same.

Beyond Tit for Tat

If you think that this approach won't work with *your* kids, think again. Axelrod points out that it has worked in situations that are far more volatile and dangerous than sibling relationships. One of the most improbable appearances of cooperation appeared in Europe during the bloody trench warfare of World War I. Frontline soldiers, with orders to kill their opponents, devised a kind of tit for tat that considerably reduced the bloodshed. In what is referred to as the live-and-let-live scenario, soldiers on one side would refrain from shooting to kill—if the other side reciprocated.

So which of your kids will lay down arms first? You can try to initiate cooperation by taking turns with one child until a recalcitrant sibling jumps in. Or you might try the opposite strategy: You become the person who refuses to cooperate. It works like this: When the kids refuse to pick up the toys, you say you will step in and pick them up yourself. And neither of the kids will get ice cream. Often they quickly realize that they should cooperate before you clean up and they lose their reward.

Your efforts to harshly disrupt the game prompt your kids to cooperate. And remember the next time the situation arises, your children might very well decide to clean up the clutter before you can intervene, having learned that cooperation

can be easier—and lead to more ice cream—than defecting.

Axelrod has taken this a tactic even further, adding in the concept of generosity. Suppose your son grabs the first handful of Lego bricks. Your daughter grabs the next. And so it goes until she decides that she's tired and doesn't want to continue. According to tit for tat, your son should stop, too—the rule is that he does whatever she does. But suppose he believes that she will step up again and finish the job. Then he should continue to pick up the Legos, giving her a chance to change her ways and once again pitch in. This is what Axelrod calls *generous* tit for tat. Your son allows your daughter to slack off a bit now and then.

Or the opposite could happen. Your daughter refuses to take her turn picking up bricks, and your son stops picking up, too. Your daughter, sorry that she has destroyed the cooperation, decides to pick up another handful of Legos, and your son reciprocates. This is what Axelrod calls *contrite* tit for tat. "A strategy like generous tit for tat is likely to be effective," he writes, as can contrite tit for tat "because it can correct its own errors and restore mutual cooperation almost immediately."

When kids realize that they have to negotiate repeatedly with one another, they figure out that cooperating this time could win them better treatment from a sibling next time around.

But this doesn't always work. Spite—the shady relative of cooperation (to paraphrase game theorists Rory Smead of Northwestern University and Patrick Forber of Tufts University)—can kill cooperation. We're talking here about the psychological definition of spite—being willing to pay a cost so that someone else has to endure a greater cost. Spite can destroy sibling cooperation faster than anything, but until recently, little was known about whether children would act out of spite. A few years ago McAuliffe explored that very question.

The Power of Spite

We know that humans are unique in one respect—they cooperate with complete strangers. Animals don't usually do this. This cooperation probably relates to humans' sense of fairness and aversion to inequity. This aversion appears in kids around age four or five. McAuliffe and her collaborators conducted much of the research that established this. But what McAuliffe wanted to ask beyond that was: *Why* do kids reject inequity? Why are they sometimes willing to forgo their own resources to deprive somebody else of a richer reward?

To find out, in 2014 McAuliffe and her colleagues recruited pairs of children, ranging in age from four to nine, and compared them with pairs of adults in an experiment designed to see who would act out of spite versus frustration. They doled out either fair or unfair shares of candy to the pairs and found that even young children would act out of spite if they got the raw end of the deal, preferring that no one get any candy to letting another child win. That is, they didn't simply reject their unfair share (that's frustration); they wanted to cause a little pain to the party that got the sweeter deal. Interestingly, the adults did not act out of spite, possibly because they were "more worried than children about not appearing resentful or jealous over candy in front of another adult," McAuliffe and her colleagues wrote. In these trials, spite tended to disappear around age eight, when kids begin to feel uncomfortable if they receive more candy than another child.

What, then, is the takeaway message for parents? First of all, young children tend to be angry when they get less than their fair share of anything—candy, stickers or screen time. And the research suggests that four- and five-year-olds just aren't capable of anything else. So make sure that the benefits of cooperation are divided equally between the kids. If one stands to gain a lot more from cooperation than the other, spite might just rear its ugly head and destroy the utopia you are trying to create.

Second, although it might seem obvious to us that getting too much candy isn't fair and that we should give some back, it's not obvious to kids, at least until they are in the fourth or fifth grade. As McAuliffe and her team write, "Our findings suggest that young children show a sophisticated capacity to maintain their competitive standing relative to others, with older children in addition showing concerns about fairness." If they show that concern for fairness at the appropriate age, you're on the right track. You're raising kids who are going to be fair and generous—which prepares them to enter that crazy world out there, where these qualities will serve them well.

And third, children can be taught to cooperate. It will take patience and sometimes the resolve to deny them treats when they haven't cooperated in picking up Legos. But hang tough. This can work. Game theory proves it. **M**

MORE TO EXPLORE

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