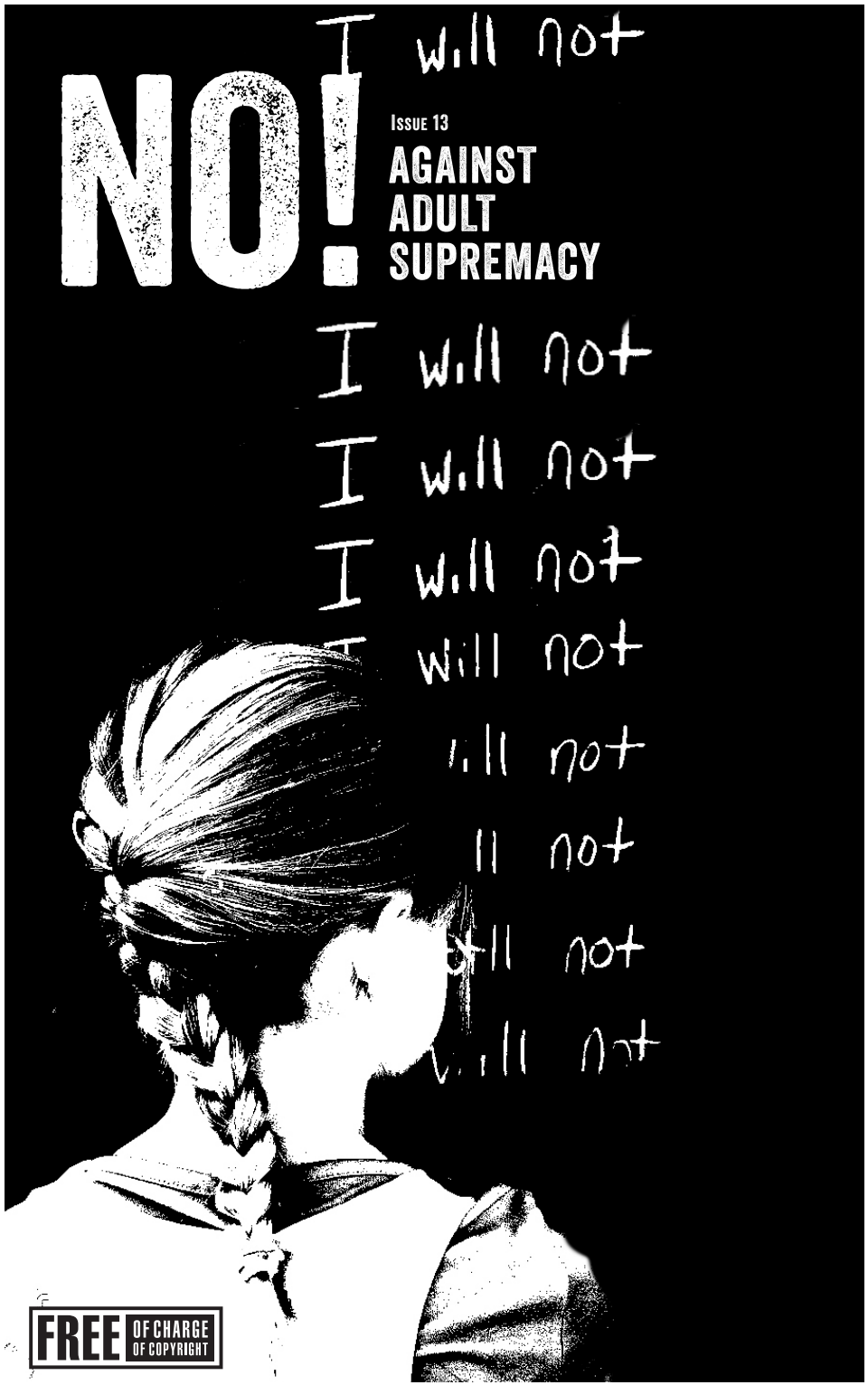
NO!

Issue 13

AGAINST ADULT SUPREMACY



> of other men's products; and with the respect for work, the appreciation of work, the desire to work, will come the pride of the true workman who will know how to maintain his dignity and the dignity of what he does.

Of course, that may sound like what Sudbury is, but it was written many decades before. Voltairine had other things to go off of however, like Fransisco Ferrer and his Modern Schools which serves as the partial basis for the title of her essay.

This leads me to my final point: I think what Gray, Sudbury and Voltairine all suggest here are great foundations for the building of an anti-work education. An education that builds self-reliance, individuality, versatility and generally speaking, a lack of needing others to meet ones needs. A lack of needing masters, gods, managers, bosses, CEOs, systems, societies, teams and anything else that may or may not interfere with the free action of individuals. Having individuals grow up to be self-reliant means they can work for themselves or freely associate with others on whatever basis gives them pleasure and seems most virtuous. They can depart at any time and in that way associations become a form of play itself. A way for people to practice free and voluntary actions that are meaningful to all participants involved, but are also seen as fun. Association becomes less about irrational biases, social signaling and social status. Instead, they become much more about the mutuality and reciprocity of each others individuality being optimized. About their individuality being respected by the actions of those they choose to associate with, for however long that may be.

An anti-work education would be done on this basis. Perhaps it wouldn't need schools and we could go farther into the realm of unschooling. Why shouldn't we dismantle the entire institution of schools itself and let children build their own structures and lead their own lives?

Let them abolish work in their own lives!

Issue 13

> Graduates were continuing to play the activities they had loved as students, with the same joy, passion, and creativity, but now they were making a living at it. There were professional musicians who had played intensively with music when they were students, and computer programmers who had spent most of their time as students playing with computers. One woman, who was the captain of a cruise ship, had spent much of her time as a student playing on the water, first with toy boats and then with real ones. A man who was a sought-after machinist and inventor had spent his childhood playfully building things and taking things apart to see how they worked.

Free play allowed these children to develop themselves into more than capable adults. Adults who can handle not only the faults in our state-capitalist system but come through looking not too shabby, honestly. They find their passions, they explore them and they take them to the end. Maybe that won't guarantee them a career as a CEO or mean they'll not be a bit weirder than other people in some important ways. But it's my hope that that weirdness will spread.

I'm always looking for excuses to mention my favorite anarchist, Voltairine de Cleyre, and her essay Modern Educational Reform is such an excuse:

> The really Ideal School, which would not be a compromise, would be a boarding school built in the country, having a farm attached, and workshops where useful crafts might be learned, in daily connection with intellectual training. It presupposes teachers able to train little children to habits of health, order, and neatness, in the utmost detail, and yet not tyrants or rigid disciplinarians. In free contact with nature, the children would learn to use their limbs as nature meant, feel their intimate relationship with the growing life of other sorts, form a profound respect for work and an estimate of the value of it; wish to become real doers in the world, and not mere gatherers in

test", as corny as it may sound, is life itself. It's not the regimented, organized and highly legible experiences of mandatory testing in schools. The tests we face in life are likely to be much more unpredictable and hard to follow then what stares us in the face on our desks. Gray uses China as a particular example:

> In an article entitled 'The Test Chinese Schools Still Fail' in The Wall Street Journal in December 2010, Jiang Xueqin, a prominent Chinese educator, wrote: 'The failings of a rote-memorisation system are well known: lack of social and practical skills, absence of self-discipline and imagination, loss of curiosity and passion for learning.… One way we'll know we're succeeding in changing China's schools is when those scores [on standardised tests] come down.' Meanwhile, Yong Zhao, an American education professor who grew up in China and specialises in comparing the Chinese educational system with the system in the US, notes that a common term used in China to refer to graduates is gaofen dineng, meaning 'high scores but low ability'. Because students spend nearly all their time studying, they have little opportunity to be creative, take initiative, or develop physical and social skills: in short, they have little opportunity to play.

I'm tired of the "real world" trope for college students and students. There are plenty of ways that real life (whatever that means) intersects with student life as well. There are ways that student life can be harder than the outside life (consider balancing a job and being a student…well many students likely don't have to given college debt) and denying these experiences seems nothing but belittling to me. All of that said, as tired as I am of this trope, the structure of college and anything below it are obviously restricted or liberated in high-minded ways by people who think they know better for others. Self-directed learning, here I agree with Gray quite strongly, better prepares children or anyone for the rough things life can throw at us. And what happens when Sudbury graduates move on to the "real world"?:

Against Parental Rights

Samantha Godwin

Excerpt: academia.edu/19663920/Against_Parental_Rights (Citations Omitted)

There is a significant disjunction between child protectionist theory and rhetoric and the extent of parental powers. The extensive deference to parental preference and discretion seems to have little to do with preserving children's interests and more to do with parental autonomy. We must conclude that only respect for parental autonomy and freedom, rather than child protection, would lead to the belief that parents ought to be granted rights beyond those narrowly derivable from a child's interests. This is true not only of the particular legally recognized parents' rights found in American case law, but also more generally for any conception of parental rights of an independent vitality. This raises normative problems for any version of parental rights independent from children's interests.

When the domain of a person's freedom is thought to extend beyond their body to include the exclusive control of physical things in the world, we think of those things as being their possessions. For example, someone who owns a car is legally at liberty to do with it

things that non-owners are not free to do with the car. Car owners are not necessarily at liberty to do everything physically possible to their car—they cannot legally set it on fire in the middle of a city street or drive it past the speed limit while intoxicated. The car's owner is, however, legally permitted to drive it (if licensed) and to exert control over it in ways that other people who are not its owner may not. Car owners can do these things because their car belongs to them. It is their car in the sense of it being a possession and not just having a certain relationship to them.

Restricting what an owner can do with their car, or imposing requirements for car ownership, is thought to restrict the car owner's freedom and autonomy, although such restrictions may be justified in reference to other values. In contrast, if a non-owner is restricted from using the same car without the owner's permission, their freedom is not thought compromised in the same way, because their unauthorized actions are considered theft, conversion, or vandalism. Such actions are beyond what is thought to constitute the domain of the non-owners freedom with regard to someone else's car precisely because it belongs to someone else and does not belong to them.

Parents' prerogatives with regard to their own children that adults do not generally have with regard to someone else's children are construed in a parallel manner. Just as the most basic and general rule of property is that owners may exert exclusive control over that which is their property, the basic attitude of most adults towards children is that it is not right to tell someone how to raise their own child or to try to do it for them. Just as a car thief violates the rights of the owner and not the car, the non-parent acting in deference to parental authority typically understands this deference as respecting the parent.

Relatively few in the political mainstream today speak of parents as the owners of their children, but the implied logic of paren-

I tried to apply to the Sudbury Valley School at one point, to become a staff member. Suffice it to say, it didn't work out, but I still hold a big spot in my heart for this school and what they do. Gray's example of Hunter Gatherer's seems too messy and filled with confounding factors.

But having read a few of Sudbury's own books (a requirement if you want to apply to a position there so you can understand their philosophy better) I can say with a better sense of judgment that what Gray says here seems true. Both through the philosophy of the school itself and the books that collect the stories of children who went there. The person Gray mentions, Karl Groos, was one of the first researchers on the subject of play. He developed a theory later called "practice theory of play". That by playing more and more animals become better adaptable to their environment and thus were more easily selected for natural selection in positive ways. I'm not sure how well this translates to humans but Groos apparently was:

> He pointed out that humans, having much more to learn than other species, are the most playful of all animals. Human children, unlike the young of other species, must learn different skills depending on the culture in which they are developing. Therefore, he argued, natural selection in humans favoured a strong drive for children to observe the activities of their elders and incorporate those activities into their play. He suggested that children in every culture, when allowed to play freely, play not only at the skills that are valuable to people everywhere (such as two-legged walking and running), but also at the skills that are specific to their culture (such as shooting bows and arrows or herding cattle).

And so too with Sudbury do children learn play as a form of practice from which to live by and adapt to their environments. There's an interesting way that people justify schools: Test scores. But what good are test scores if you can't exist outside of tests? The "real

Granted, my example in 3. is a superficial correlation at best, but that's my point. It's a struggle for me, because there's much to like about Gray for me, as I've said before. But his methods and citations (even when he does give them, as he did in his *Psychology Today* article) just aren't solid enough to build his case on. But let's move on from that and focus on some of his stronger points:

> In another branch of my research I've studied how children learn at a radically alternative school, the Sudbury Valley School … It's called a school, but is as different from what we normally think of as 'school' as you can imagine. The students — who range in age from four to about 19 — are free all day to do whatever they want, as long as they don't break any of the school rules. The rules have nothing to do with learning; they have to do with keeping peace and order.
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> …[T]he school has been in existence for 45 years now and has many hundreds of graduates, who are doing just fine in the real world, not because their school taught them anything, but because it allowed them to learn whatever they wanted. And, in line with Groos's theory, what children in our culture want to learn when they are free turns out to be skills that are valued in our culture and that lead to good jobs and satisfying lives. When they play, these students learn to read, calculate, and use computers with the same playful passion with which hunter-gatherer kids learn to hunt and gather. They don't necessarily think of themselves as learning. They think of themselves as just playing, or 'doing things', but in the process they are learning.
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> Even more important than specific skills are the attitudes that they learn. They learn to take responsibility for themselves and their community, and they learn that life is fun, even (maybe especially) when it involves doing things that are difficult. I should add that this is not an expensive school; it operates on less than half as much, per student, as the local state schools and far less than most private schools.

tal rights suggests a type of ownership or quasi-property interest in children. In many regards, this allocation of powers to parents functions as a sort of ownership, and some (though not all) of the putative legal interests that parents have in their children can be compared to property interests. For example, that the religious education of a particular parent's child is purportedly a matter of that parent's freedom, but the religious education of someone else's child is not, makes sense only if one accepts that in some way children belong to their parents as possessions that the scope of their freedom extends over. The idea that parents can impose on their child what others cannot, because that child is their child and belongs to them, and not to others, amounts to a belief that parents are functionally related to their children as car owners are to their cars. This is of course not to say that quasi-ownership is the only dimension of how parents relate to children legally or socially, but that it is a significant element in the function and legitimacy of parent-child power dynamics.

People often speak in possessive terms about people who are not their children—for example, "my friend," "my niece," "my dentist," "my employer"—without implying a possessory interest to control the friend, niece, dentist, or employer. Parental possessory interests, however, are much more than linguistic conventions. It is never thought to be a matter of an aunt's freedom that she should be able to compel her niece to visit a disliked family friend or to forbid her niece from associating with a child whom she distrusts. To do so would be thought to trespass on the niece's parent's rights to make choices for the niece. This is closely parallel to the way that using someone's chattel property without their permission would be a trespass against the owner's property rights. In both instances the actual interests of the possession in question does not directly enter into the equation—even if the aunt were acting in the niece's best interests, she would have no defense to violating the parents' interests in their child.

John Holt aptly observed that:

> the family was not invented, nor has it evolved, to make children happy or to provide a secure emotional and psychological background to grow up in.

If it just so happened that families based on parental domination over children were in fact the optimal legal arrangement for children, it would be a coincidence. Parents generally, and fathers in particular, have held dominion over their children for far longer than the "best interests of the child" rhetoric has been at the fore of legal and political discourse around children. Under ancient Roman law, fathers had the right to kill their children, and in the Massachusetts Bay Colony, children could be put to death for disobeying their parents under laws informed by a belief that children are born in sin and must therefore submit to adult authority.

Rather than viewing children within a protectionist framework, at least prior to the 17th century, children were regarded as the property of their fathers. In the 15th century, it was typical in England for fathers to contract out their children into indentured servitude in other adult's homes from the age of seven or nine until they were between fourteen and eighteen. Widely-cited historian of childhood Philippe Aries noted these arrangements in the Middle Ages were not thought to have anything to do with ensuring children's best interests, welfare, or optimal psychological development. Instead, adults could receive better service from children if they sent their own children to work for other adults while taking in others' children to work for them.

Contemporary parental rights—though no longer expressly articulated as property rights—continue to function much the same although diminished in scope. Unlike in the 17th century, given that it is now seen as morally abhorrent to regard people as chattel, the rhetoric and justificatory framework has changed completely while the scope of parents' pseudo-property rights in their children

> questionnaires given to normative samples of college students Empathy refers to the ability and tendency to see from another person's point of view and experience what that person experiences. Narcissism refers to inflated self-regard, coupled with a lack of concern for others and an inability to connect emotionally with others. A decline of empathy and a rise in narcissism are exactly what we would expect to see in children who have little opportunity to play socially. Children can't learn these social skills and values in school, because school is an authoritarian, not a democratic setting. School fosters competition, not co-operation; and children there are not free to quit when others fail to respect their needs and wishes.

So, "normative" samples are a good thing. But not linking to the studies in question isn't. Further, with any college study, it must be kept in mind that college samples don't necessarily reflect general populations. They are often small sample size studies that when not repeated (not applicable here though, to be fair) should be taken with a grain of salt, to say the least. Even when they are repeated, I would still stress that Gray's use of the word "accompanied" is masking the fact that he's only relying on correlations and studies from one portion of population to say this is the case.

And while, yes, you would expect less empathy and more narcissism from people who grow up less and less around others in the form of play there's a few issues with this:
1. An expectation does not equal a causation
2. Just because you expect result A from Thing B doesn't mean Thing B is the only possible thing that could've caused this chain of events. There are other causes that may have have roles or inputs in the chain of events you've been analyzing.
3. In this example, we could also expect a rise of narcissism and reduction in empathy from kids being around multi-media (TV, smartphones, the internet, etc.) than around other kids and playing with them. But yet, Gray doesn't seem to make a case that we should limit these things.

Once again, Gray hits on many of my ideological favorite spots. He emphasizes play, he advocates youth empowerment, self-directed learned, lauds the Subury Valley School, and in general, praises cooperation and egalitarian relations over authoritarian ones. So there's a lot for me to like about Gray's article. I even like his definition of equality:

> The golden rule of social play is not 'Do unto others as you would have them do unto you.' Rather, it's something much more difficult: 'Do unto others as they would have you do unto them.' To do that, you have to get into other people's minds and see from their points of view. Children practise that all the time in social play. The equality of play is not the equality of sameness. Rather, it is the equality that comes from respecting individual differences and treating each person's needs and wishes as equally important. That's also, I think, the best interpretation of Thomas Jefferson's line that all men are created equal. We're not all equally strong, equally quick-witted, equally healthy; but we are all equally worthy of respect and of having our needs met.

Now, I'm not sure if I agree with such a broad statement that Gray makes at the end. Some people's needs do come from a need to dominate others. Though, to be fair, I'm sure Gray would disagree this is a need that is equally worthy of respect. So perhaps I'm guilty of nitpicking here, which would, admittedly, be nothing new. In any case, the fact that Gray thinks to differentiate separate forms of equality, emphasize individuality over sameness and that a certain sort of respect is due to us in so far as we follow the golden rule of social play is a much better form of equality than I usually see advocated. Despite these admirable qualities of Gray's article he continues to denote possibly spurious correlations:

> The decline in opportunity to play has also been accompanied by a decline in empathy and a rise in narcissism, both of which have been assessed since the late 1970s with standard

has been only modestly curtailed. In other words, parental rights were property rights and remain functionally property rights, but it has become so taboo to speak of them as such, so that the way parental power actually functions has become obscure.

Many rights given to parents are especially property-like. Just as coverture laws historically held that a married woman's rights were subsumed into her husband's, such that her property belonged to her husband, in the U.S., parents have a "right to the child's services and earnings" in 47 of 50 states. Barnett and Spradlin have pointed out that being able to order a child to work and then seizing their earnings is in effect a type of economic slavery. The procedure for a child to be rid of parental custody is called emancipation, not coincidentally the term used to describe freeing slaves. Emancipation frequently requires that the parents have effectively abandoned their child or that the child has married with parental permission, reflecting very anachronistic notions of patriarchal property and power.

Although there is no free market in the sale of children, commercial gestational surrogacy is a lawful transaction in some U.S. states (such as California). The official understanding in many states is that surrogates are paid for their services, but in effect surrogates are paid to produce and surrender babies to someone else.

Richard Posner has argued that understanding surrogacy as a form of "baby selling" is mere "argumentation by epithet" and that what a surrogate sells "is not the baby but her parental rights." When one person sells her property to another, the sale legally transfers not the item itself (possession of which might be physically transferred without a sale, through theft or lending), but rather the legal property rights concerning the item.

Property ownership of chattel is not mere possession, but the legal right to control it, use it within the bounds of the law, and exclude others from using it without permission, and it is this bundle

of legal rights that is transferred by sale. Likewise, parental rights include the right to control a child and to exclude others from accessing that child. In this regard, arguing that commercial surrogacy sells not children but parental rights makes little sense: selling parental rights is selling the legal right to control a child, just as selling chattel property is selling the legal right to control the chattel property.

Even in states that prohibit surrogacy, parents are permitted other means of transferring rights over their children in a property-like fashion. Parents can "give up a child" for adoption by an adult of their choice, demonstrating a right similar to the right to alienate property through a gift (though not a sale). Children have no parallel right to claim adoption by a preferred potential parent. Parents can even decide who should "inherit" their children if they die while their children are minors by naming guardians in their wills, just as they can name beneficiaries to receive their personal property.

Although it is uncommon to expressly consider children as "property," it is not uncommon to think of children as possessions. Malfrid Grude Flekkoy argued:

> Many adults, some on the basis of teachings of their religion, others in spite of intellectual acceptance of the opposite, feel that they have the same right of possession to the child-product as to other products, or that the ownership right to their child is stronger than other rights of possession, even comparing these rights with the legal rights connected with some other products.

There was substantial discussion in the popular media in 2013 of whether or not children "belong to their parents" after MSNBC news anchor Melissa Harris-Perry stated in a promotional that "we have to break though our private idea that kids belong to their par-

Towards an Anti-Work Education

Doreen Cleyre

I've discussed Peter Gray before when I reviewed extrinsic and internal goals. As I said there, some of the research that Gray was using seemed shaky at best. Particularly in merely noting the correlation of various negative things that have happened to children in the last few decades with a lack of play. For example, the increase in depression, suicide attempts and so on can just as easily be attributed to better diagnosing mental illness and taking suicide more seriously and measuring the rate of it better. Neither of these things happening more necessarily has to do with a decrease in play even if the two match up on graphs.

Moreover, Gray's field of study, evolutionary psychology (EP), has widely been criticized as a science of "just-so" stories that are reductionist in method, restricting in its conclusions, and largely can't be tested. Now, I'm not an expert on EP and I'm not trying to suggest that the entire field is bunk, as others have. But I just want to stress some amount of caution before we proceed and consider an article Gray wrote back in 2013 on play called The Play Deficit.

skills. Droujkova views these criticisms as indicative of something much bigger: "They reflect rather deep chasms between different philosophies of education, or more broadly, differences in the futures we pave for kids. When we assign a lot of similar exercises, we picture kids in situations that require industrial precision." Giving children logic puzzles or open projects, on the other hand, indicates aspirations of them growing up to become explorers or designers. "It does not work that directly," she concedes, "but these beliefs dictate what mathematics education the grown-ups select or make for the kids."

There are also some who worry about whether this approach is practical for disenfranchised populations. Droujkova says that it can be led by any "somewhat literate" adult; the key is to have the right support network in place. She and her colleagues are striving to empower local networks and enhance accessibility on all fronts: mathematical, cultural and financial. They have made their materials and courses open under Creative Commons, and designed activities that require only readily available materials. "The know-how about making community-centered, open learning available to disenfranchised populations is growing," Droujkova notes, citing experiments by Sugata Mitra and Dave Eggers. Online hubs can connect like-minded community members, and online courses and support are available to parents, teachers and teenagers who want to lead local groups.

Droujkova says one of the biggest challenges has been the mindsets of the grown-ups. Parents are tempted to replay their "bad old days" of math instruction with their kids, she says. With these calculus and algebra games, though, "parents say they get a fresh start. … They can experience the joy of mathematical play anew, like babies in a new world."

ents or kids belong to their families and recognize that kids belong to whole communities." Although describing children as belonging to the community is also problematic in that it objectifies children as common resources, conservative media figures reacted with outrage of a different sort, believing that children do in fact belong to their parents. More recently, libertarian Senator Rand Paul made this point explicitly by making the statement that "the state doesn't own your children, parents own the children."

That parents' legal interests in children function as property rights does not of course imply that children are property as a matter of law on a formal level. There are also numerous ways in which children's status is not analogous to most forms of property. For example, although parents have some rights to transfer their child to another guardian, most property can be expressly sold, and few forms of property place nearly such substantial legal duties on owners as child custody places on parents. It is also of vital social relevance that while parents are often possessive of their children, they do not tend to conceptualize children literally as property and most would likely find terming them as such objectionable. Children also have legal claims on their parents. Nonetheless, to the extent that parental legal rights are in effect possessory interests or quasi-property rights, this ought to be a basis for regarding them as illegitimate and unwarranted.

the experience. Math circles, where people help one another, are growing fast and are one way to achieve this. Math know-how (activities and examples) "must come with communities of practice that help newbies make sense of it," Droujkova says. "One does not work without the other." Regardless, if learning is to be as efficient and deep as possible, it's essential that it be done freely. That means giving children a voice in which activities to participate, for how long, and also the level of mastery they want to achieve. ("This is the biggest clash with traditional curriculum development," Droujkova notes.)

Adults must be prepared for those times when a child would rather be doing something other than the planned activity. Says Droujkova: "The role of adults is to inspire, by saying things like, 'Ooh, what a complex shape—have you noticed the curve is made out of straight lines?' Provide math connections with whatever kids are doing. This is hard to do—it requires both pedagogical and math concept knowledge, but it can be learned. And everyone can easily give general support: 'How very interesting, I will investigate more.' You can then look online, or ask on a math circle forum, to find out what it means mathematically." It's also helpful to have a variety of interesting materials on hand and to be okay with the idea of kids taking breaks as needed. Droujkova has noticed that in most groups, there are one or two kids do something else, while the rest do the main activity. (The non-participants still absorb a surprising amount, she adds.)

Pushback has come primarily from two very different (and usually opposing) camps. One is the "let kids be kids" cohort, which worries that legitimizing the idea of involving toddlers with algebra and calculus will tempt Tiger Mom types to push their kids into formal abstractions in these subjects at ever younger ages, even though that would completely miss the point. Other critics fall into the "back to basics" camp, which contends that all this play will prevent kids from becoming fluid in traditional calculation

test taking and mundane exercises, but it does nothing for logical thinking and problem solving. These things are separate, and you can't get here from there." She doesn't expect children to be able to solve formal equations at age five, but that's okay. "There are levels of understanding," she says. "You don't want to shackle people into a formal understanding too early." After the informal level comes the level where students discuss ideas and notice patterns. Then comes the formal level, where students can use abstract words, graphs, and formulas. But ideally, a playful aspect is retained along the entire journey. "This is what mathematicians do—they play with abstract ideas, but they still play."

Droujkova notes that natural math—whose slogan is "make math your own, to make your own math"—is essentially a "freedom movement." She explains: "We work toward freedom at many levels—the free play of little kids, the agency of families and local groups in organizing math activities, the autonomy of artists and makers, and even liberty for us curriculum designers. … No single piece of mathematics is right for everyone. People are different, and people need to approach mathematics differently." For example, in a group learning about the properties of rhombuses, an artistically inclined person might prefer to draw a rhombus, a programmer might code one, a philosopher might discuss the essence of rhombi, and an origami master might fold a paper rhombus. Nor does everyone need to learn any particular piece of mathematics, aside from what's essential to function in his or her culture. Many people live to a ripe and happy old age without knowing calculus, for example. "At the same time, the world would be better off with a higher literacy for mathematics, and humanity as a whole needs advanced math to make it through the next 100 years, because there are pretty complex problems we're facing."

Children need to be exposed to a variety of math styles to find the one that suits them best. But they also need to see meaningful (to them) people doing meaningful things with math and enjoying

Play and Mathematics

Luba Vangelova

The familiar, hierarchical sequence of math instruction starts with counting, followed by addition and subtraction, then multiplication and division. The computational set expands to include bigger and bigger numbers, and at some point, fractions enter the picture, too. Then in early adolescence, students are introduced to patterns of numbers and letters, in the entirely new subject of algebra. A minority of students then wend their way through geometry, trigonometry and, finally, calculus, which is considered the pinnacle of high-school-level math.

But this progression actually "has nothing to do with how people think, how children grow and learn, or how mathematics is built," says pioneering math educator and curriculum designer Maria Droujkova. She echoes a number of voices from around the world that want to revolutionize the way math is taught, bringing it more in line with these principles. The current sequence is merely an entrenched historical accident that strips much of the fun out of what she describes as the "playful universe" of mathematics, with its more than 60 top-level disciplines, and its manifestations in ev-

erything from weaving to building, nature, music and art. Worse, the standard curriculum starts with arithmetic, which Droujkova says is much harder for young children than playful activities based on supposedly more advanced fields of mathematics.

"Calculations kids are forced to do are often so developmentally inappropriate, the experience amounts to torture," she says. They also miss the essential point—that mathematics is fundamentally about patterns and structures, rather than "little manipulations of numbers," as she puts it. It's akin to budding filmmakers learning first about costumes, lighting and other technical aspects, rather than about crafting meaningful stories. This turns many children off to math from an early age. It also prevents many others from learning math as efficiently or deeply as they might otherwise. Droujkova and her colleagues have noticed that most of the adults they meet have "math grief stories," as she describes them. They recall how a single course—or even a single topic, such as fractions—derailed them from the sequential track. She herself has watched more than a few grown-ups "burst out crying during interviews, reliving the anxieties and lost hopes of their young selves."

Droujkova, who earned her PhD in math education in the United States after immigrating here from Ukraine, advocates a more holistic approach she calls "natural math," which she teaches to children as young as toddlers, and their parents. This approach, covered in the book she co-authored with Yelena McManaman, "Moebius Noodles: Adventurous math for the playground crowd," hinges on harnessing students' powerful and surprisingly productive instincts for playful exploration to guide them on a personal journey through the subject. Says Droujkova: "Studies have shown that games or free play are efficient ways for children to learn, and they enjoy them. They also lead the way into the more structured and even more creative work of noticing, remixing and building mathematical patterns."

Finding an appropriate path hinges on appreciating an often-overlooked fact—that "the complexity of the idea and the difficulty

of doing it are separate, independent dimensions," she says. "Unfortunately a lot of what little children are offered is simple but hard—primitive ideas that are hard for humans to implement," because they readily tax the limits of working memory, attention, precision and other cognitive functions. Examples of activities that fall into the "simple but hard" quadrant: Building a trench with a spoon (a military punishment that involves many small, repetitive tasks, akin to doing 100 two-digit addition problems on a typical worksheet, as Droujkova points out), or memorizing multiplication tables as individual facts rather than patterns. Far better, she says, to start by creating rich and social mathematical experiences that are complex (allowing them to be taken in many different directions) yet easy (making them conducive to immediate play). Activities that fall into this quadrant: building a house with LEGO blocks, doing origami or snowflake cut-outs, or using a pretend "function box" that transforms objects (and can also be used in combination with a second machine to compose functions, or backwards to invert a function, and so on). "You can take any branch of mathematics and find things that are both complex and easy in it," Droujkova says. "My quest, with several colleagues around the world, is to take the treasure of mathematics and find the accessible ways into all of it."

She started with algebra and calculus, because they're "pattern-drafter tools, designer tools, maker tools—they support cool free play." So "Moebius Noodles" includes activities such as making fractals (to foster an appreciation of the ideas of recursion and infinitesimals) and "mirror books" (mirrors that are taped to each other like the covers of a book and can be angled in different ways around an object to introduce the concepts of infinity and transformations). "It's not the subject of calculus as formally taught in college," Droujkova notes. "But before we get there, we want to have hands-on, grounded, metaphoric play. At the free play level, you are learning in a very fundamental way—you really own your concept, mentally, physically, emotionally, culturally." This approach "gives you deep roots, so the canopy of the high abstraction does not wither. What is learned without play is qualitatively different. It helps with