
The Special Value of Children's Age-Mixed Play

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From an evolutionary perspective, the normal social play of children involves kids of various ages. Our human and great-ape ancestors most likely lived in small groups with low birth rates, which made play with others of nearly the same age rare. Consequently, the evolutionary functions of children's social play are best understood by examining play in groups that include children of different ages. The author calls this kind of play "age mixed." He reviews the research on such play, including his own research conducted at the Sudbury Valley School in Massachusetts where students from ages four to about eighteen mix freely. He concludes that age-mixed play offers opportunities for learning and development not present in play among those close in age, permitting younger children to learn more from older playmates than they could from playing with only their peers. In age-mixed play, the more sophisticated behavior of older children offers role models for younger children, who also typically receive more emotional support from older kids than from those near their own age. Age-mixed play also permits older children to learn by teaching and to practice nurturance and leadership; and they are often inspired by the imagination and creativity of their younger playmates. **Key words:** age-mixed play; bidirectional learning; evolutionary functions of play; mixed-age play; Sudbury Valley School

THE PICTURE OF A GROUP of children all nearly the same age playing in a school yard may seem familiar to modern eyes, but it is an odd image from the long perspective of human cultural and evolutionary history. As anthropologist Melvin Konner pointed out more than thirty-five years ago, play among children close in age (same-age play) is largely an artifact of modern times.¹ Same-age play became common only with the rise of age-graded schooling and, still more recently, with the proliferation of age-graded, adult-organized activities for children outside schools. Over the history of our species, as natural selection shaped the brain mechanisms of play, children's social play usually occurred among individuals of different ages, often widely different ages. Therefore, if we want to understand the evolutionary value of children's social play—the adaptive functions that led natural selection to shape social play into its human forms—we should observe such play among children in age-mixed groups.

Anthropologists report that children in hunter-gatherer cultures spend most of their daylight hours playing and exploring, and that they necessarily do so in broadly age-mixed groups. Hunter-gatherer bands are small, composed of twenty to forty individuals including children, and individual women in such bands typically give birth only once every four years. So even if children wanted to play with others of their own age, they would rarely find more than one or two such playmates available and often none at all. A typical group playing together in a hunter-gather band might consist of half a dozen kids ranging in age from two to twelve, or seven to seventeen. Such age mixing in children's play would probably have occurred during 99 percent of our species history when we were still hunter-gatherers.²

Our prehuman ancestors typically engaged in age-mixed play as well. Great apes, including chimpanzees and gorillas, live in conditions under which same-age playmates for infants and juveniles are rare.³ Great apes give birth to one infant at a time, and groups are small, so there is little chance for two or more young apes to live close enough to play together. Play among infant or juvenile chimpanzees or gorillas occurs most often among those who are at least a year apart in age. Apparently, then, our play instincts evolved for millions of years—going back at least to our split from the lineages leading to the other great apes—under conditions in which normal social play was age-mixed play. The young of other mammals play with littermates, but we humans and great apes are not born into litters.

After the advent of agriculture—roughly ten thousand years ago—same-age play became possible because people began living in larger groups and a larger food supply allowed births to occur more closely in time, but such play was still not typical. Children's social play in all the traditional societies without age-graded schooling that anthropologists have studied is most often age mixed.⁴ In most societies, children care for their younger siblings, which often means including them in their play groups.

In his 1975 article, Konner urged researchers to pay more attention to age-mixed play, but his advice had little effect. Most researchers who study children's interactions of any type continue to do so in schools or in other age-segregated settings. Moreover, the dominant research paradigm in developmental psychology separates children by age for the explicit purpose of comparing one age group with another. In a study of play, this might mean that six-year-olds playing together are compared with nine-year-olds playing together, to see how the age groups differ in their play. In the standard research framework of devel-

opmental psychology, mixing six-year-olds and nine-year-olds would confound the experiment.

Ten years ago, Jay Feldman and I quantified the bias toward studying children in same-age groups by counting all articles concerned with interactions among children that were published between 1990 and 2000 in *Child Development* and *Developmental Psychology*, the two leading journals of child development.⁵ For this count, we defined *children* as all individuals of high-school age or younger, and (regrettably) we did not include studies that involved only interactions among siblings. We found a total of 234 articles concerned with interactions among children less than twenty-four months apart in age and only 4 that included interactions among children more than twenty-four months apart. More recently, I repeated the count for the years 2000 to 2010 with the same two journals and included studies of siblings. For this decade, I found 213 articles concerned with interactions among children less than twenty-four months apart and 19 that included interactions among children more than twenty-four months apart. Of those 19, 15 dealt exclusively with interactions among siblings, and 4 dealt at least partly with interactions among nonsiblings. In exhaustive literature searches, I have found very few research studies anywhere that focus on age-mixed play among children. What studies I have found provide the basis for this review.

Perhaps the clearest testament to the value of age-mixed play in our culture comes from the experiences of the Sudbury Valley School, an unusual democratically governed school located in Framingham, Massachusetts, where the self-directed play and exploration of students are the primary vehicles for education. Because I refer throughout this article to observations made at this school, a little background about it would be useful.

A day school, Sudbury Valley generally enrolls between 150 and 200 students ranging in age from four through the late teens. The school operates as a participatory democracy. Through the weekly School Meeting, students and staff together make all the school rules and all important school decisions on a one-person-one-vote basis, including decisions about hiring and firing staff. The adult staff members serve to maintain the school and to respond to the needs and requests of students, not to direct their education. Students direct their own education. The school gives no tests, records no grades, and demands no class attendance. It provides expertise and equipment to support a wide variety of educational endeavors, but it does not require students to make use of any of them. Students are free all day to move at will through the school's ten-acre

campus and two buildings (a large farmhouse and a renovated barn), to associate with whomever they please, and to do whatever they wish as long as they do not break any of the schools' democratically made rules. The rules are all designed to maintain peace, order, and individual rights in the school community, not to direct students' education. In this setting, children and adolescents spend their time playing, exploring, creating, reading, talking, and hanging out—as they choose—and in the process, they become educated. The school has operated in this way continuously since its founding in 1968, and its success as an educational institution has been documented by follow-up studies of the graduates.⁶ These studies reveal that the graduates have had no particular difficulties pursuing higher education and have succeeded in the whole range of careers valued in our society, including careers in the sciences, the arts, medicine, skilled trades, law, and business.

Daniel Greenberg, one of the school's founders and its principal philosopher, has long maintained that free age mixing among students is the key to the school's educational success.⁷ My observations at the school—and the research studies my former graduate student Jay Feldman and I conducted there—corroborate Greenberg's claim. In a quantitative study, we found that students at Sudbury Valley regularly interacted across large gaps in age despite the fact that the school was large enough that students could have interacted only with those of the same age if they had so wished. In fact, we found that more than half of the social interactions among students spanned age gaps greater than twenty-four months, and a quarter of them spanned gaps greater than forty-eight months.⁸ We found that age mixing was especially common in play; it was less common in serious conversations. In a subsequent long-term qualitative study, we documented and coded nearly two hundred separate interactions that occurred specifically between adolescents (age twelve and older) and younger children (defined as less than twelve years old and more than four years younger than the oldest adolescent in the interaction).⁹ In this article, I use some of our observations at Sudbury Valley, along with results from other studies in age-mixed settings, to describe the special value of age-mixed play. I start with the benefits for younger children in age-mixed groups and then turn to the benefits for older ones.

How Age Mixing Benefits Younger Children

Here, under separate subheadings, I describe three categories of benefits of age-mixed play for younger participants. Age mixing allows younger children to

engage in and learn from activities that they could not do alone or with just playmates of the same age (age-mates); observe and emulate models of activities more advanced than their own; and receive emotional support and care beyond that which age-mates could provide.

Age mixing allows younger children to play within their zones of proximal development

Most obviously, younger children benefit from age-mixed play because it introduces them to activities too complex, difficult, or dangerous for them to do alone or with just others of their own age. In the 1930s, the Russian psychologist Lev Vygotsky coined the term *zone of proximal development* to refer to the set of activities that a child cannot do alone or with others of the same ability but can do in collaboration with others who are more skilled.¹⁰ He suggested that children develop new skills and understanding largely by collaborating with others within their zones of proximal development. Extending Vygotsky's idea, the Harvard psychologist Jerome Bruner and his colleagues introduced the term *scaffolding* as a metaphor for the means by which skilled participants enable novices to participate in a shared activity.¹¹ The scaffolds consist of the reminders, hints, boosts, and other forms of help that lift the child up to a higher form of activity.

Educators and developmental psychologists often apply Vygotsky's and Bruner's concepts to interactions between children and adult teachers or parents, but I suggest that they apply even better to age-mixed interactions among children. Older children are closer in age, interests, abilities, energy level, and available time to younger children than are adults, and therefore older children are more likely to behave, for prolonged periods, within the younger children's zones of proximal development than are adults. When children play in age-mixed pairs or groups, the older, more skilled participants naturally, often unconsciously, provide scaffolds that raise the level of the younger participants' play. Here are some examples from the research literature.

THE SOCIAL PLAY OF TODDLERS, WITHOUT AND WITH THE INVOLVEMENT OF OLDER CHILDREN. According to Mildred Parten's classic theory of stages of play development, children of two or three years of age are incapable of collaborative social play.¹² When placed together, they engage in what Parten terms *parallel play*; they play side by side, paying some attention to one another, but not merging their play into a socially combined activity. As Konner pointed

out his 1975 article, however, such play is an artifact of the modern age-segregated nursery school or developmental-psychology lab. In an age-mixed environment, older play companions erect scaffolds that draw toddlers into collaborative social play.

Even four-year-olds can raise the level of play for three-year-olds. Two studies, conducted by different researchers in different preschools, compared the play of three-year-olds in age-segregated classrooms with that of three-year-olds in classrooms where three- and four-year-olds were mixed. In both studies, the three-year-olds engaged in more interactive social play and less parallel play in the age-mixed classrooms.¹³

In another study, using a balanced experimental design, researchers observed two-year-olds and five-year-olds playing in pairs. All the children attended the same, age-mixed day-care center, so they knew one another before the experiment. In the play situation, the children received a novel toy—a Fisher-Price camping set, designed to stimulate fantasy play—and were invited to play together with it. The researchers made comparisons of three types of pairings: two-year-olds with other two-year-olds, five-year-olds with other five-year-olds, and two-year-olds with five-year-olds. Not surprisingly, the pairs of five-year-olds played in much more complex ways—and much more socially—than did the pairs of two-year-olds. More interesting, the five-year-olds played at the same advanced level when paired with two-year-olds as they did when paired with other five-year-olds, and they used a variety of verbal and nonverbal scaffolding techniques to draw the two-year-olds to their level of play. Because the five-year-olds structured the roles for the two-year-olds in shared fantasy play and helped them play out the roles—providing them with the appropriate props, for example, and instructing them in what to do—the two-year-olds engaged in social, cooperative pretend play with five-year-olds that was beyond their ability when paired with two-year-olds.¹⁴

In another study, Ashley Maynard filmed and coded the behavior of pairs of siblings playing together in thirty-six different Zinacantec (Mayan) households in a Mexican village. Rather than set up play situations for them, Maynard unobtrusively filmed them as they played naturally in the context of the older child's family responsibility to care for the younger one. She focused specifically on dyads in which the younger child was two years old and the older one was anywhere from three to eleven, and she analyzed the results as a function of the older child's age. The children played at such everyday activities as making pretend tortillas, caring for baby dolls, selling products at a make-believe store,

and playing soccer. According to Maynard, every play episode also represented a teaching and learning episode as the older children always (consciously or not) helped the younger children play in more advanced ways than they could have alone. Even the three-year-olds helped by providing models of more advanced actions, which the two-year-olds observed and imitated. In general, the older the play partner, the more skillfully that partner increased the complexity and sociability of the two-year-old's play.¹⁵

By the age of eight, these children served as sophisticated guides for their younger siblings, giving them verbal explanations of how to play specific roles, providing them with appropriate props, helping them with difficult physical maneuvers, and modifying their own activities in ways that allowed the two-year-olds to respond appropriately. In one example, eight-year-old Tonik and two-year-old Katal gave a baby doll a bath. Katal wanted to do the washing herself, and Tonik enabled her by demonstrating the process, providing her with a glass of water to pour over the doll, and giving step-by-step verbal instructions on the appropriate way to wash a baby.

Young children not only acquire physical skills and knowledge about appropriate practices in their culture through such play with older children, but they also gain social skills. Preschool children with older siblings or other regular, older child playmates more ably see from another person's perspective, understand what is in another person's mind, and provide effective help to others than is the case for preschool children who lack such playmates.¹⁶ Toddlers with older playmates in age-mixed day-care groups score higher in language, general cognitive, and motor development—all measured by the Battelle Developmental Inventory—than toddlers in otherwise similar age-segregated day-care groups.¹⁷

HOW YOUNG CHILDREN GAIN LITERACY AND NUMERICAL SKILLS IN AGE-MIXED SETTINGS. Children who grow up among people who read, write, and use numbers often incorporate the "three Rs" into their social play. In age-mixed play, where the older children are more literate and numerate than the younger ones, the younger ones may acquire skills in reading, writing, and arithmetic through such play. James Christie and Sandra Stone conducted one study of this phenomenon over a two-year period in an elementary-school classroom.¹⁸ During the first year, the classroom included a mix of ages—kindergartners, first graders, and second graders. During the second year, the same classroom with the same teacher included only kindergartners. The classroom contained

a set of play centers, which remained constant over the two-year period. During free-play periods, the children played with whomever they wished, in whichever center they chose, with the one stipulation that no more than four children could be in any given center at a time. In the spring of each year, the researchers videotaped all the activity that occurred in one play center, the same center each year, for a total of fifteen hours of playtime each year. The center contained miniature furniture and kitchen equipment that fostered the playing out of domestic scenes. It also contained items that might foster reading and writing, such as children's books, cookbooks, newspapers, store coupons, empty food containers, and paper and pencils for writing.

The researchers found that the complexity of play and the amount of literacy activity in the play center were much greater when the classroom held a mix of ages than when it had children of kindergarten age only. No doubt the older children in the age-mixed classroom raised the average level of play. More interesting were the comparisons of just the kindergartners' behavior in the two conditions. In the age-mixed condition, the kindergartners played most often in groups that included at least one and usually more than one first or second grader, and, as a consequence, they were drawn into more complex play—and more play involving reading and writing—than occurred in the classroom with only kindergartners. On a per pupil basis, the kindergartners engaged in nearly four times more reading and six times more writing in the age-mixed condition than in the same-age condition.¹⁹ Most of this literacy behavior occurred in sociodramatic play. In play cooking, children read recipes. In playfully putting a baby to bed, they read bedtime stories. In a play birthday party, they wrote labels on presents.

In a conceptually similar study, education researcher Kay Emfinger videotaped and analyzed free play among children ranging from four to ten years in age at an age-mixed summer enrichment program. She found many instances in which older children exposed younger ones to numerical concepts beyond the younger children's abilities to understand or use alone. In one example, an older child explained how to give exactly seven drops of medicine—no more and no less—to a sick doll. In another, during a game of store, an older child explained to a younger one how much it costs to purchase two items in the case where one costs ten dollars and the other five dollars and how much change to give for a twenty-dollar bill. Such concepts appear far more meaningful to children in their own, self-directed pretend play than in the more abstract and less voluntary setting of typical classroom instruction.

Such findings parallel our observations at the Sudbury Valley School. At any given time of day at the school, we saw older and younger children collaborating at activities that involved numbers, reading, or writing. In card games, board games, and computer games that include keeping score, older children taught younger ones how to compute scores, a process that usually involved addition and sometimes subtraction and more complex calculations. In games using written words, older children with literacy skills read the words aloud to the younger children, or told them how to spell words that they needed or wished to type or write. In the process, the latter soon learned to recognize frequently used words. Many children at the school learned to read and write with no formal instruction at all, primarily through their age-mixed play with older children.

According to staff members of the school, students now learn to read and write (or, more precisely, type) at earlier ages than they typically did in the past, primarily because of the popularity of computer games, email, Internet social networking, and cell-phone texting. Children of all ages engage in a great deal of social play and exploration in which the typed word is the primary mode of communication, so they learn to read and type in much the same natural way they learned, earlier, to understand and produce oral speech.²⁰

EXAMPLES OF SCAFFOLDING IN ADOLESCENTS' PLAY WITH YOUNGER CHILDREN AT SUDBURY VALLEY. In our qualitative study of age-mixed interactions at Sudbury Valley, we observed many scenes in which adolescents enabled younger children to play games that they would have been unable to play with just age-mates, or enabled them to play at a higher level than they could have with just age-mates.²¹ For example, children under about age nine generally cannot play formal card games with age-mates. They lose track of rules; their attention wanders; the game, if it ever begins, quickly disintegrates. But at Sudbury Valley, children younger than nine often played such games with older children and adolescents. The older players reminded the younger ones of what they had to do. "Hold your cards up so others can't see them." "Pay attention." "Try to remember what cards have already been played." "Think ahead; if you play that card what will Johnny do?" Paying attention, remembering, thinking ahead—these are the elements of intelligence. For the card players, the reminders kept the game going and made it fun for all; but a side effect was that the teenagers helped the younger players build their general intelligence.

We also observed many examples of vigorous outdoor play in which adolescents facilitated the younger children's play at a higher level than they could

have with age-mates. In a game of four square, for example, the older players allowed Ernie (age four) to catch and throw the ball rather than hit it. Shawn (age seventeen) excelled at hitting the ball softly into Ernie's square so he could catch it.²² In an exuberant bout of boffing (fencing with soft padded swords), Sam (age seventeen) fended off seven attackers aged six- to ten-years, who chased him around trying to hit him with their swords. Sam adjusted his fencing movements to accord with the skills and style of each of the younger boys, thereby presenting each with an exhilarating challenge without overpowering any of them. Ed (a tall, athletic fifteen-year-old) played basketball with a group of eight- to ten-year-olds. He rarely shot, but spent much time dribbling while the horde of small boys who made up the opposing team tried to steal the ball from him. Then he passed to his single teammate, Daryl (age eight) and encouraged him to shoot.

In each of these cases, the teenagers adjusted their play to allow the younger players to engage in and enjoy the game, but the adjustments were clearly not sacrifices. In each example, the teenagers appeared to enjoy the game and learn as much from it as did the younger players. Shawn enjoyed exercising his ability to keep little Ernie in the game. Sam's fencing skills were exercised to the maximum as he fended off the horde of young attackers. And Ed, by not shooting and by repeatedly dribbling through the crowd of short defenders and setting up his young teammate to shoot, fully exercised his dribbling, passing, and play-directing abilities. Shooting and scoring himself would have been too easy and would have spoiled the game for everyone.

In a quite different example, a group of children ranging from ages four to eight played "bumper cars" on the slide. One child slid slowly down and sat at the bottom. Then the next kid slid down rapidly, attempting to bump the first off the end of the slide. After about twenty minutes of this—and variations of it—Rebecca (age fourteen) and two of her slightly younger friends came along and asked if they could join the slide play. After joining, Rebecca made suggestions that modified the game. First she introduced a game aimed at getting everyone onto the slide at once, sliding down together, and creating a huge pileup at the bottom. Then she modified the play into a game in which all the players had to line up and slide down together in order of height, so the biggest person would be at the bottom and the shortest person at the top of the pile.

Here, the sliding game became more complex after Rebecca joined the group than it had been before. According to Jean Piaget's theory of cognitive development, the youngest children in this scene could not have thought of

ordering themselves by height (because they lack the concept of seriation), but under Rebecca's guidance, they quickly grasped the idea and eagerly sorted themselves by height to engage in this new adventure. Rebecca's way of playing also made the game safer, by ensuring that the smaller kids were at the top rather than the bottom of the pile.

Age mixing provides the younger children with models to emulate

Young mammals of all species learn through the complementary processes of play and exploration. Play allows them to practice skills, such as chasing, fleeing, and preying; and exploration allows them to acquire information about the world around them, such as where foods may be found and where dangers lie. In children, the drives to play and explore often come together in the form of exploratory play, yet it is useful to think of them as fundamentally distinct. Children learn about their world through exploration, and they consolidate that information—both verbally and in motor patterns—in their play. The biggest part of exploration for children is observing other human beings, especially those who are older, more skilled, and more knowledgeable. Such observations include hearing as well as watching. Children attend to the conversations and actions of older children and adults, and they incorporate what they see and hear into their own play. This explains why young children in hunter-gatherer cultures play at hunting and gathering, why those in tortilla-making and farming cultures play at tortilla making and farming, and why those in literate cultures play at reading and writing.

In the opening chapter of *The Anthropology of Learning in Childhood*, David Lancy and his colleagues contend, "The single most important form of learning is observation."²³ Very little explicit teaching occurs in traditional societies. Children practice skills through active participation with others who are more skilled, and some verbal instruction may accompany these activities; but most often, children first learn about culturally relevant activities—and acquire other knowledge about their culture—just by observation. In an ethnographic study in Samoa, for example, Harold Odden and Philippe Rochat found that children too young to participate in the fishing or the politics of their village knew a great deal about both simply from watching and listening, apparently with no deliberate instruction or scaffolding at all.²⁴ The tendency to learn by attending to those who are older, including those who are just a few years older, constitutes a huge component of the natural means by which children educate themselves. In our culture, where children are so often segregated from adults and older

children, watching television may be a manifestation of a strong drive to learn by watching others.

There has been very little study in our culture of children's learning by watching older children or adolescents, though not surprisingly some research shows that children observe and imitate their older siblings more often than their younger siblings.²⁵ Although we have not studied observational learning in any formal way at Sudbury Valley, even casual observations made clear that such learning happens continually. Students at the school are surrounded by others of all ages from four on up who are engaged in a wide variety of activities. They can listen to or watch those who are a little older or a lot older, and they appear to spend a great deal of time doing both. It would be hard to overestimate the learning opportunities that come from such an environment. Young children hear the more sophisticated language and arguments—and observe the more sophisticated activities—of older students around them. And they incorporate what they see and hear into their own conversations and activities, including into their play.

From such observations children acquire not just information but also motivation. Children, by nature, want to do what older people—including older children—do; this is how they grow up. Five-year-olds who see older children reading books, playing ball games, and climbing trees want to do these things, too, and they integrate these activities into their own play, even when they are not playing directly with the older children. In discussions of how and why children learn to read at the school, some students told us that they became motivated to read primarily by observing older children read and talk about what they had read. As one student put it, "I wanted the same magic they had; I wanted to join that club."

Our research at Sudbury Valley focused on joint participation, not observation, but we could not help but notice that very often when a group of students did something interesting, others—usually younger—watched intently. Sometimes the watching led to subsequent participation in or imitation of the observed activity. Here is an example from my own notebook of observations at the school.

As I sat near the school's playground, I watched two ten-year-old girls easily and nonchalantly perform the trick of walking upright down the slide. A six-year-old girl nearby watched them more intently than I, and then she climbed the ladder and started gingerly to walk down

the slide herself. This was clearly a challenge for the little girl. She walked with knees bent and hands down, ready to grab the rails if she lost balance. I also noticed that the two older girls remained next to the slide and looked on with a degree of apprehension, ready to catch her, but not too obviously so, if she should fall. One said, "You don't have to do it, you can just slide," but the little girl continued walking, slowly, and beamed with pride when she made it to the bottom. Shortly after that, the two older girls began climbing a nearby tree, and the younger girl followed them in that activity too. The little girl was clearly motivated to do, with effort, what the older girls could do with ease.

In our study of age-mixed activities involving adolescents and younger children, we often noticed that the period of combined play followed a period during which the younger child simply watched the older. The watching appeared to motivate the subsequent combined activity. Bridget (age seven), for example, watched Maggie (age twelve) play solitaire. When Maggie finished, Bridget asked her how to play. Maggie set out the cards, explained the rules, and helped the younger girl play a full game, occasionally pointing out where a card went. In another example, Scott (age thirteen) was inventing and singing funny rap songs, with a golf club as a pretend microphone, while Noah (age seven) looked on laughing and giggling. Finally, Scott invited Noah into his play. He said, "Give me a beat." When Noah responded that he didn't know what that meant, Scott explained and demonstrated the process. Noah then copied Scott's beat noises while Scott made up another rap.²⁶

Age mixing provides younger children with additional sources of care and emotional support

Younger children not only learn from play with older children, but they also gain emotional support and care from them. This is perhaps most obvious among siblings. In traditional agrarian cultures, where families are large and both parents work, older siblings often provide most of the daytime care of younger siblings, and much of that care occurs in the context of play. Research in modern Western cultures indicates that compassionate older siblings help protect younger ones from the negative effects of parental conflict, abuse, and neglect.²⁷

Little study has been done of the care and support that older children give to younger ones outside of sibling relationships. One exception is a study by

Jeffrey Gorrell and Linda Keel of cross-age tutoring in a laboratory school, in which eighth graders tutored first graders three times a week in twenty-minute sessions. The researchers observed that at first the tutors spent most of their tutoring time trying to keep their tutees on task but that, by the end of the first month, the relationships became more playful and affectionate. The first graders began sitting on their tutors' laps, and there was a marked increase in such signs of affection as handholding, kissing, head-patting, and good-natured banter. According to the researchers, the relationships that best satisfied the affective needs and desires of the first graders were also the most successful in meeting the cognitive goals of the tutoring program.²⁸

Our observations at Sudbury Valley School revealed countless examples of affection and care between adolescents and young children.²⁹ We observed many instances when young children sat on the lap of adolescents. In some cases, the adolescents were reading to, talking with, or playing with the young children, but in other cases the adolescents were engaged in their own activities and the children appeared to be there just for the comfort and enjoyment of physical contact. We also saw many instances of young children approaching adolescents for help, advice, or approval, and most often the latter responded in ways that satisfied the child's needs or wishes. We observed adolescents helping young children find lost objects, reminding them to put away their toys, teaching them skills in the context of joint play, complimenting them on their creations, and resolving squabbles among them. And, we saw cases of prolonged friendships between specific adolescents and young children that grew out of play. The adolescents in these cases seemed to take special pride in the accomplishments of their young protégés. All this occurred even though the adolescents at the school have no formal responsibility to care for young children. They do so because they want to and because they find the young children's requests to be irresistible.

How Mixing Ages Benefits the Older Children and Adolescents

The developmental benefits of mixing ages go in both directions. Here I describe three categories of benefits for the older participants. Age-mixed play provides the older participants practice in nurturing and leading, opportunities to learn through teaching, and inspiration for creative and imaginative activities. I will

be brief here because these benefits are to a considerable degree the flip sides of the benefits for the younger participants that I have already discussed.

Age mixing allows older children to develop their capacities to nurture and lead

Experiences with younger children provide older children and adolescents with opportunities to be the mature ones in relationships and thereby practice nurturance and leadership.³⁰ Evidence for this comes from various sources. In a review of cross-cultural studies of social interactions among children, Beatrice Whiting concluded that boys and girls everywhere demonstrated more kindness and compassion toward children who are at least three years younger than themselves than they do toward children closer to their own age.³¹ In a study of boys, age eight to sixteen, in a subsistence farming community in Kenya, Carol Ember found that boys who helped their mothers care for younger children and infants at home—because they had no sisters who could do this traditionally feminine task—were on average kinder, more helpful, and less aggressive in their interactions with their peers than were boys who did not have such babysitting experience.³² Cross-age tutoring studies in Western schools commonly reveal increases in measures of responsibility, empathy, and altruism in the tutors.³³ Researchers have also found, not surprisingly, that children exert much more leadership when they collaborate with younger children in joint tasks than when they collaborate with age-mates.³⁴ All of the examples of age-mixed interactions described earlier as beneficial to younger participants can also offer opportunities for older children to practice nurturance and leadership.

Our research at the Sudbury Valley School suggested that older children are as often attracted to younger ones as the latter are to them. In our qualitative study of interactions between adolescents and younger children, we found that adolescents initiated 53 per cent of the interactions for which there was a clear initiator.³⁵ From an evolutionary perspective, such attraction may well serve functions related to the development of parenting and leadership abilities. We also observed situations in which older students instructed younger ones about appropriate ways to behave toward still younger students. For example, Sabrina (age seventeen) scolded Melinda (age eleven) for failing to put away the dress-up clothes that had been left out by the group of younger children with whom Melinda had been playing. Melinda said that she wasn't responsible for the clothes because the other children, not she, had brought them out and worn them. Sabrina told her that it was still her responsibility because she

(Melinda) knew the school rules and the younger children looked up to her as an example.

Age mixing allows older children to expand their understanding through teaching

Teaching and learning are sometimes described as bidirectional activities, in which the teacher and learner learn from one another.³⁶ Such bidirectionality seems to occur especially in cases where the difference in status or authority between teacher and learner is not too great, so that the latter feels comfortable questioning and challenging the former. A common finding in cross-age tutoring studies is that the tutors as well as the tutees come to understand the tutored concepts better.³⁷ Bidirectionality of learning also occurs, no doubt, in the context of age-mixed play.

When older children explain concepts to younger ones in age-mixed play, they must turn their previously implicit, unstated knowledge into words that younger children can understand. For example, the eight-year-old explaining to the two-year-old the steps in bathing a baby, in their combined doll play, may have been putting those steps into words, and thinking about them verbally for the first time. Likewise, children helping others learn to read or to use numbers in the context of play are, most likely, making certain phonetic or numeric concepts clearer to themselves as they explain them and answer the questions of younger children.

In our research on age-mixed interactions at Sudbury Valley, we observed many instances of back-and-forth discussions between older and younger students that seemed to expand the understanding of both. For example, when older students taught strategy games such as chess to younger ones, the questions asked by the younger ones often led the older ones to stop and think before answering. They frequently seemed to have had to reflect on their own understanding of why one move was better than another before they could articulate an answer.

We also saw such bidirectional learning in cases where younger students asked older ones for advice outside the context of play. In one instance, eight-year-old Eric complained to fourteen-year-old Arthur about two boys (ages nine and ten) who had been calling him names.³⁸ Arthur told Eric that he should bring a complaint to the school's Judicial Committee. Eric challenged this by replying, "They have freedom of speech." Arthur, after a moment's thought, replied that freedom of speech meant that they had the right to say those things, but that Eric also had the right not to hear them. In this case, the back and forth exchange

may well have led Arthur, as well as Eric, to think about the school's concepts of personal rights and freedoms at a higher level than he had before.

Age mixing fosters creativity in older children

Our observations at the Sudbury Valley School led us to conclude that age-mixed play is generally less competitive and more creative—in short, more fully *playful*—than is same-age play.³⁹ When children all nearly of the same age play a game, competitiveness can interfere with playfulness. This is especially true in our modern, Western culture, which puts so much emphasis on winning and on all sorts of comparisons aimed at determining who is better. In contrast, when children of widely different ages play a game together, the focus shifts from winning to having fun. There is no pride to be gained by the older, larger, more-skilled child in beating the much younger one, and the younger one has no expectation of beating the older one. So, they play the game more joyfully, in a more relaxed manner, modifying the rules to make the game both fun and challenging, but not overwhelming, for all. The basketball game during which the older, taller, more-skilled player did not shoot but just dribbled and set up his short teammate is a good example, and we saw many like it. Anthropologists have also commented on the lack of competition in the play of hunter-gatherer children and adolescents.⁴⁰ That is no doubt partly attributable to the cooperative, noncompetitive ethos that pervades such cultures, but I suspect that it is also partly a consequence of the age-mixed nature of their play.

In our observations at Sudbury Valley, even formal strategy games, such as card games and board games, were played in more creative, lighthearted ways when adolescents played with younger children than when they played only with those their own age. In chess, for example, the older, more-skilled player would typically create handicaps for himself or herself, such as by deliberately getting into difficult positions, or playing at lightning speed, or pointing out better moves to the younger player. The older players seemed to be using such games to experiment with new styles and strategies of play, which they were not yet ready to try out in serious competition.

Some of the most creative and joyful samples of play that I have witnessed anywhere were those of adolescents and younger children engaged in shared fantasy play. Here is an example from my observations at Sudbury Valley.

I was sitting in the playroom pretending to read a book but surreptitiously observing a remarkable scene. A 13-year-old boy and two

7-year-old boys were creating, purely for their own amusement, a fantastic story involving heroic characters, monsters, and battles. The 7-year-olds gleefully shouted out ideas about what would happen next, while the 13-year-old, an excellent artist, translated the ideas into a coherent story and sketched the scenes on the blackboard almost as fast as the younger children could describe them. The game continued for at least half an hour, which was the length of time I permitted myself to watch before moving on. I felt privileged to enjoy an artistic creation that, I know, could not have been produced by 7-year-olds alone and almost certainly would not have been produced by 13-year-olds alone. The unbounded enthusiasm and creative imagery of the 7-year-olds I watched, combined with the advanced narrative and artistic abilities of the 13-year-old they played with, provided just the right chemical mix for this creative explosion to occur.⁴¹

Just as younger children are inspired to engage in the sophisticated activities that they see among older children, the older ones are inspired to engage in the creative and imaginative activities that they see among younger children. At Sudbury Valley, one regularly sees teenagers playing with paints, clay, or blocks or playing make-believe games—all activities that most teenagers elsewhere in our culture would have long since abandoned. Sometimes such play occurs with younger children and other times without them, but it is nevertheless inspired by the presence of younger children and their playthings. Through such play, the teenagers become excellent artists, builders, storytellers, and creative thinkers. Many of the school's graduates go on to careers that require a high degree of creativity,⁴² and I suspect that their age-mixed play experiences are one cause of that.

Concluding Thoughts

Because it is far more convenient to study play in adult-controlled age-segregated settings (such as typical school classrooms) than in more naturalistic age-mixed settings (such as outdoors in neighborhoods), and because age-segregation fits the standard research paradigm of developmental psychology, most research on children's social play has focused on same-age play. Indeed, if beings from another planet were to try to learn about our children's social interactions by

reading our journals of developmental psychology, the aliens might well conclude that children interact only with adults and with peers of almost precisely their same age. They might wonder how and why we isolate six-year-olds from nine-year-olds or nine-year-olds from teenagers.

I have reviewed the sparse research literature that does exist concerning age-mixed play and have described, from this literature, clear educational and developmental advantages of such play. Children have more to learn from others who are older or younger than themselves than they do from age-mates. In age-mixed play, older children scaffold the behavior of younger ones, so that the latter play within their zones of proximal development and thereby stretch their abilities to higher levels. Even when they are not playing directly with older children, younger children in age-mixed environments learn by watching and listening to the older ones. Conversely, older children practice nurturance and leadership in interactions with younger ones and learn by teaching, and they are inspired by younger children to engage in activities that build their creativity and capacity for imagination.

The almost exclusive focus of play researchers on same-age play has produced at least some results that may have little to do with the evolutionary functions of children's social play. Earlier, I mentioned parallel play in toddlers as one example. Historically, prior to the development of age-segregated day care, such inept play would have been uncommon because toddlers were normally in the company of older children who would have elevated their play to something truly social. Another example concerns rough-and-tumble play among early-adolescent boys. Several researchers have concluded that such play is not entirely distinct from real fighting and that boys use it to establish dominance relationships.⁴³ This conclusion may well be valid in the age-graded schools where the research was conducted, but it is unlikely to have anything to do with the evolutionary functions of the rough-and-tumble play of young humans. Rough-and-tumble play is common in hunter-gatherer cultures, but it nearly always involves children and adolescents of widely differing sizes and ages and, according to various observers, is decidedly not competitive.⁴⁴

Nothing in this article should be construed as an argument that same-age play has no or little value. The advantages I have described for age-mixed play can occur to some degree in same-age play because children of the same age may nevertheless differ in abilities, needs, and perspectives. Moreover, same-age play offers children opportunities for full, equal collaboration. Even the competitiveness induced by same-age play can be construed as advantageous, as it may

help motivate achievement and, in a competitive culture, help prepare children for competitive adult work environments. My thesis in this article is that age-mixed play offers advantages for learning skills, culturally relevant information, cultural routines, nurturance, and leadership that go beyond those of same-age play. When children are not institutionally segregated by age, as occurs at the Sudbury Valley School, they choose to engage in a great deal of both age-mixed and same-age play, thereby experiencing the values of each.

Unfortunately, many children in our society today have little opportunity for age-mixed play. More and more, free neighborhood play—which was usually age-mixed—has been replaced by adult-directed, age-segregated activities for children and by indoor solitary play.⁴⁵ Before we move even further in this direction or give up on the idea of reversing this trend, we would do well to have a firm understanding of the evolutionary functions of age-mixed play and how those functions are still relevant to children's development today.

NOTES

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3. Konner, "Relations among Infants and Juveniles," 99–129.

4. Konner, *The Evolution of Childhood*, 495–96. For examples, see: Jaipaul L. Roopnarine, James E. Johnson, and Frank H. Hooper eds., *Children's Play in Diverse Cultures* (1994); JoAnn Farver and Carollee Howes, "Cross-Cultural Differences in Social Interaction: A Comparison of American and Indonesian Children," *Journal of Cross-Cultural Psychology* 19 (1988): 203–15.

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15. Ashley E. Maynard, "Cultural Teaching: The Development of Teaching Skills in Maya Sibling Interactions," *Child Development* 73 (2002): 969–82. Also see Ashley E. Maynard and Katrin E. Tovote, "Learning from Other Children," in *The Anthropology of Learning in Childhood*, ed. David F. Lancy, John Bock, and Suzanne Gaskins (2010), 181–205.

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19. I calculated this from the numbers in table 3 of Christie and Stone, "Collaborative Literacy Activity," 122.

20. For descriptions of children's learning of the three Rs through self-directed play

and exploration at the Sudbury Valley School and in home-school settings, see Peter Gray, "Children Teach Themselves to Read," *Blog at Psychology Today: Freedom to Learn*, www.psychologytoday.com/blog/freedom-learn (Feb. 24, 2010); and Peter Gray, "Kids Learn Math Easily When They Control Their Own Learning," *Blog at Psychology Today: Freedom to Learn*, www.psychologytoday.com/blog/freedom-learn (April 15, 2010).

21. Gray and Feldman, "Playing in the Zone of Proximal Development," 108–46.

22. In this and all other scene descriptions from Sudbury Valley, the students' names are pseudonyms.

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36. Gess LeBlanc and David J. Bearison, "Teaching and Learning as Bi-Directional Activity: Investigating Dyadic Interactions between Child Teachers and Child Learners," *Cognitive Development* 19 (2004): 499–515.

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38. Gray and Feldman, "Playing in the Zone of Proximal Development," 133.

39. For a definition of play and discussion of the inverse relation between competition and playfulness, see Gray, "Play as a Foundation for Hunter-Gatherer Social Existence," 479–84.

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