Games Children Play

Children's games and play provide valuable lessons on the nature of the world and ways of coping with the environment.

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Children begin inventing games shortly after birth to generate and test their theories of how the universe operates.

Maria Montessori, Italy's first female physician, observed that children continuously manifest what appeared to her to be built-in intelligence. For example, immediately after the trauma of birth (perhaps 12 to 48 hours, when the adrenaline level has fallen to normal) babies apparently are ready to play a primitive form of Peek-a-Boo with their mothers uninterruptedly for up to 20 minutes. This pleasurable game appears to coincide with an early critical "sensitive period" that prepares children to psychologically bond themselves to their mothers and, through them, to their families and ultimately to the entire human species. (For a discussion of animals' and humans' sensitive periods, see Montessori (1972) and Thorpe (1961).

Other more recent observations of the newborn child suggest that we must revise our views of the infant's abilities to reason about the universe. According to a 1981 *Newsweek* article

> The child may recognize causality not because he learns it from experience or because he reasons it out by pure thought. Rather, he seems to use intuition: he can see only relationships that fit intuitive categories already in his mind. Causality is one of those categories (Begley, 1981).

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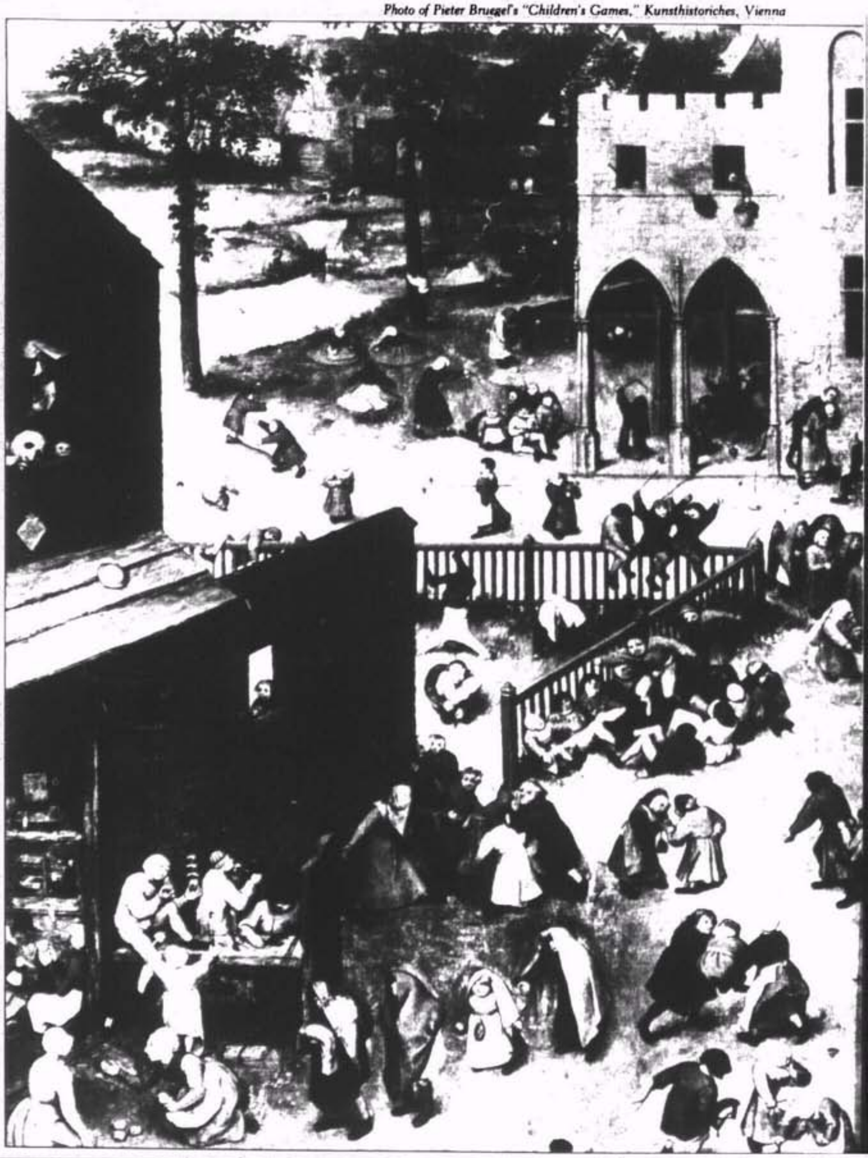
Photo of Pieter Bruegel's "Children's Games," Kunsthistoriches, Vienna



The uppermost question that appears to be constantly in the infant's mind is not, "What is the nature of the thing that caused this event?" Infants apparently are "programmed" to learn to experiment and hypothesize immediately from birth and thus to seek causation for everything they experience. Is it this genetic "pre-wiring" to experiment, to find causation, that "compels" all children to play? Thus the first "rule" of the universe that the child apparently learns from the game of Peek-a-Boo is the rule of bonding: The universe loves the child and responds to the child's needs and inborn curiosity.

After Peek-a-Boo, we observe the evolution of playful experimentation almost constantly manifest in infants. Children push, pull, and manipulate objects in a large repertory of movements to try to discover their natures. That evolution of the "will to play" continues to accelerate throughout childhood (Huizinga, 1950).

The Will to Play

Pieter Bruegel brilliantly captured this cultural universal, the child's will to play, in his painting, "Children's Games" (1559–60), which hangs at the Kunsthistorisches Museum, Vienna. Bruegel's painting contains at least 78 children's games, nearly all of which have survived over these 422 years, including Blind Man's Bluff, Bowling Hoops, Building with Bricks, Crack the Whip, Hide and Seek, King of the Mountain, Leap-Frog, Marbles, Playing Store, Playing with Dolls, Whipping Tops, and others.

Several fascinating aspects of children's psychology are illustrated in this painting; for instance:

- Over 200 children are in the painting and not one adult. Was Bruegel illustrating a learning principle? While children do require teachers, do they learn best in a balance between dependence on and independence from adults?
- The painting carries the eye from Bowling Hoops, to remote groups of playing children, to two distant church spires, and beyond to a golden horizon. By this masterly use of perspective, Bruegel implies an infinite series of games, most not yet discovered by those then newly-united and newly-awakening Europeans. None of the board games (Chess, Checkers, Kalah, Go, Backgammon), nor Dominoes, Kites, Swings, nor any of the card games is shown.
- It is impossible to imagine the children in Bruegel's painting being secretive about their games. The games are public, open to all. The scene is, in spirit, opposite to any idea of secretive or protected knowledge. One senses that a child "flows" from one game to another as the child develops or grows tired of one of them. Bruegel seems to be saying that games (and intellect?) are contagious.

Bruegel is echoed in our century by physicist Richard Feynmann of the California Institute of Technology. Feynmann reportedly attempts to disarm his apprehensive first-year physics students by telling them they should not be anxious about learning physics since he learned 95 percent of the subject before he entered school. The students, of course, laugh since they assume he is joking. However, the table of contents of Feynmann's three-volume *Lectures in Physics* includes only about 200 basic physics ideas. If we glance at Bruegel's games and analyze them, we realize that Feynmann is not joking at all.

For example, with the hoop (Bruegel depicts two in the foreground), children discover, play with, or reinforce in their minds the "laws" of inertia, momentum, centrifugal force, friction, gravity, equilibrium, and so on. We may test this fact by giving little Carlos a metal hoop to play with. If we bend the hoop while Carlos isn't watching, the next time he starts to play with the hoop, Carlos will straighten it out. In straightening the hoop before starting to play with it, Carlos demonstrates that he learned in a few minutes of play a fundamental principle of physics: "The efficiency of a wheel depends on all radii being of equal length." No one will have lectured the child on this, nor given him the relevant mathematical theorems. He will have independently arrived at this "law of the universe" by experimentation or, in children's version of experimentation, in play.

Feynmann and Bruegel articulate the same law of children's learning: in play they learn not only physics, but most of their "scientific" knowledge.

Learning from Play

There seems to be an unlimited set of children's games in human cultures that teach one or more psychomotor, social, or intellectual skills. In general, the present cross-cultural repertory of children's games appears almost limitless even before the advent of electronic games and before educators will have developed a theory of games to inform ethnographers' recordings of cultures.

A few examples might be instructive. Hocart (1909) describes two Fijian games—*Fitshin*, similar to Pick-up-Sticks, and *Veinbuka*, a running tag game. What Hocart did not see (perhaps because he had not developed a theory of games to guide his observations) was the pedagogically more important, older, and more widespread game, Four Cowries. Four Cowries is played with four shells (*cowries*). Two children alternate tossing the shells to the ground. If all four turn up, the child gains eight points; if all four turn down, the child gains four points. Then, using a finger, the child flicks one cowrie with another and, if a third cowrie is not touched or disturbed, gains one point. When more than one shell is disturbed, the turn passes to the other player. The first player reaching a designated numerical goal wins.

It is fascinating to watch five- or six-year old Fijian boys playing the game. They often compute running scores faster than an adult, and they fully understand the geometry of "straight lines." Africa, India, and China similarly offer a wealth of competitive games. Kalah (variously: *Wari*, or *Ayo* or *Wawo* in Africa; *Sung-ka* in the Philippines) apparently originated in Sumer and has survived mainly in Africa and the Philippines. Haggerty (1979) says Kalah is 7,000 years old and has been continuously played on three continents. Children and adults play the game from a very early age, sometimes at four or five years. The game involves moving counters, usually 48 hard seeds, around 12 holes and into one's "kalah" or bowl. While the play is very simple, it is too complex to describe here. However, Haggerty argues that the game is "the best all-around teaching aid in the country" since it "develops intuitive decision making," "confirms and structures the habits of moving from left to right as in reading and writing," teaches all the basic mathematical operations, and involves pure reason.

My own experiences in Nigeria, where I served as the principal of the Advanced Teacher Training College at Port Harcourt, support the above evaluation. The student who most impressed the head of mathematics at that college came from a family who lived near Onitsha on the Niger River. No one of the older generation in his family could read or write. Yet the student made A's in all his university level courses, including mathematics and physics. When asked to produce a proof of an algebraic theorem, that student produced one that was superior to both the proof offered by the author of the textbook and by the lecturer. The student had played Kalah (Ayo) as a child and thereby had mastered, probably at the appropriate "sensitive periods," basic mathematical ideas. (African middle-class children who have played Kalah generally outscore their Afro-American counterparts in mathematical abilities. Such comparisons tend to refute some genetic arguments about Afro-Americans' mathematical abilities and suggest alternative hypotheses to explain the relatively poorer performance of American blacks on mathematical tests.)

A child's IQ, relative intelligence, and problem-solving abilities may relate directly to the number of games the child has mastered at the critical or sensitive periods of his or her life. This statement must be treated as a hypothesis since we have as yet no compelling proof. But there is some guiding evidence that should enable educational researchers to establish or reject this notion.

The Significance of Play

Karl Groos (1901), who pioneered in the study of children's games, wrote of the significance of play: "Observations of men and animals force us to recognize its great importance in the physical and mental development of the individual; that it is, in short, preparatory to the tasks of life."

Groos' judgments were sanctioned by Adler (1927), who wrote almost 30 years later:

> Games are not to be considered as haphazard ideas of parents or educators, but . . . as educational aids and as stimuli for the spirit, for the fantasy, and for the life-technique of the child. *The preparation for the future can be seen in every game.* [italics added.]
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> Above all else games are communal exercises; they enable the child to satisfy and fulfill his social feelings. . . .
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> Play is indivisibly connected with the soul. It is, so to speak, a kind of profession. Therefore, it is not an insignificant matter to disturb a child in his play.

In looking at games, Bruner (1966) took us conceptually one step beyond Groos to the level of theory, to abstraction, where a specific solution to a specific problem is generalized to the level of predictive understanding, that ability we call the "rational faculty," the preeminently human faculty:

> A game is like a mathematical model, an artificial but powerful representation of reality. Games go a long way to getting children involved in understanding language, social organization, and the rest; they also introduce the idea of a theory to these phenomena.

This remarkable statement, largely untested as far as I know, served as a guiding hypothesis for 17 of my students at the University of the South Pacific who wanted to find out how much they could improve the thinking abilities of young children (age 5½ to 6½ years) via games and other devices. The students accepted the IQ scores as the most

accurate available measure of thinking abilities. In effect, the students asked, "How much can we boost IQ scores through games or other measures?"

The students, inservice teachers with an average of 14 years experience in the public school system of a South Pacific nation, devised individual strategies to improve a child's IQ. The strategies involved such treatments as tutoring, educational games, excursions, improved diets, regular exposure to music, physical education regimes, and so on. Two recent but traditional types of IQ[1] tests, the Child's Intellectual Progress Scale (CHIPS) and the Children's Adaptive Behavior Scale (CABS), were administered as pretests to 425 children in 17 classrooms in the Suva, Fiji, area. Four of the children in each classroom were then randomly selected to undergo the previously decided treatments over a six- to eight-week period. Another researcher post-tested the whole group without knowing which of the pupils had been in the "experimental group."

The strategies that appeared to offer immediate promise of dramatically raising the IQs of the children in the experimental group included:

1. Tutoring, both general and mathematical, using the children's textbooks or homework as the principal "tools." The IQ gains ranged up to 12 points.

2. Reading enrichment, where outside children's books were read, discussed, and used as a vehicle to improve thinking abilities. The IQ gains ranged up to 9 points.

3. Educational games. IQ gains ranged up to an average of 19 points.

Two games in particular were associated with the highest IQ gains. First is the commercial version of Kalah, "Space Wawo." This version teaches the basic mathematical operations using counters of six different colors to teach other concepts in addition to mathematical ones—for example, astro-biological concepts where each color represents a molecule, or astronomical concepts where the different colors represent bodies in a solar system. The second game is called "Inventive Quotient." This game uses cards with regular playing card symbols (spades, hearts, clubs, diamonds) plus eight additional independent variables (alphabet; degree symbols; integers; exponential numbers, base 2 and base 10; arithmetic signs; symbols for the two genders and for 13 of the major constellations; and four colors). The instruction booklet gives rules for 40 kinds of IQ-improving games.

The evidence from the 17 classrooms is not compelling: The data were gathered by inexperienced researchers; some of the "treatment methods" yielded negative results; the experiments have yet to be replicated by disinterested researchers; and there were no analyses of covariance. Nevertheless, the evidence was somewhat persuasive. The data and data analyses were checked by three disinterested psychologists and a statistician. And the Pygmalion Effect was controlled.

However tentative the findings, they do suggest that for children age 5½ to 6½, IQ increases of at least one-half of a standard deviation, 8 points or more, can be expected from expert tutoring or expertly guided reading enrichment.[2] And it may be true that at these ages the greatest IQ gains may come from several types of educational games, if the treatment averages about 20 to 30 minutes a day for four to six days per week, for at least six weeks.

The Philippines seems to have anticipated such findings by encouraging all their school pupils to play Chess to develop their abilities to concentrate and solve logical problems. And in Venezuela, kindergartens and schools began in 1981 to devote one hour a day to teaching children how to think in creative, critical, and dialectical ways by using games and mental exercises. The Venezuelan government hopes to increase children's IQs up to 30 points.

I believe American schools should undertake a similar experiment: make play central to the curriculum for children aged 7 to 11 years, for at least one hour every school day. Then compare the results, measured by IQ tests, with children not so exposed.

The speed of the shift toward intellectually refining the mind of every human being is visibly accelerating. Games in the curriculum promise to be important tools in our conscious endeavor to find and develop the talents and faculties of every mind.□

[1] The CHIPS IQ test (copyrighted by The I.Q. Company, Suva, Fiji), uses a brief picture vocabulary test plus pattern analysis, verbal reasoning, and mathematical reasoning and computations, and spelling. I developed this test to help parents monitor their children's intellectual progress. Richmond and Kicklighter, of the University of Georgia, designed CABS (copyrighted by Humanics Incorporated, Atlanta, Georgia) to measure essentially social adaptable behavior (social IQ) among children requiring special education.

[2] For a more detailed account of the experiments, see Maxwell, 1980.

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