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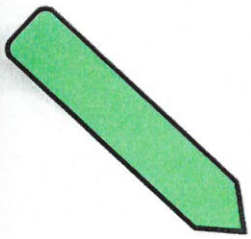
The Hungry Mind

The Origins of Curiosity in Childhood



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Capturing Curiosity

WHEN I WAS three I liked to eat bugs. I lived at that time in a tiny, gray-shingled house on the East End of Long Island, New York, in a small village called Sagaponack, which in the Shinnecock language means "home of the big ground nut." All around our house lay acres and acres of potato fields.

I rode a red tricycle, which I used like a scooter because I hadn't yet mastered proper tricycle riding. I'd stand on the ground behind it, bending forward across the seat to hold the handlebars, putting my left foot on the low bar that ran across the bottom back part of the trike, pushing off the road with my right foot. That was in the early 1960s, and I had much more freedom than children do now. I was allowed to tour around the quiet streets of Sagaponack on my own. Besides farm equipment, only a few cars a day would pass through. Perhaps my mother told me to be careful on the road, but beyond that, I was on my own. I had a daily round of visits I liked to make. First I'd go see Mrs. Nichols, who lived in a white-shingled house catty-corner to our gray house. She would let me sit in her big easy chair, and give me a cookie to eat. In those days I only wore dresses, the kind with smocking on the front. But often I'd forget to put on underpants, and with the logic of a three-year-old, I worried that without them I might pee in Mrs. Nichol's chair. Next I'd visit Ruth Hildreth, who lived three houses down from Mrs. Nichols and was our telephone operator. From there

I'd head toward the beach, about eight hundred yards farther down the road, where I probably hoped to find my older sister or brother. But I rarely got that far anyway. As I pushed my trike along the small lane, with the warm tar under my feet, I'd almost always find myself stopping on the road's edge, drawn in by the endless potato fields that lined my route to the ocean. I'd park my bike on the grass and crouch down on the edge of the field, butt dropped down, knees bent and up beside my ears, as only a three-year-old can do, breathing in the sweet aroma of the pesticides that mixed with the dry smell of dirt. I'd watch the small potato bugs crawl busily toward the green leaves of the potato plants that lay in long orderly rows as far as I could see. Potato bugs are larger than ladybugs, but like ladybugs they carry on their backs a dome-shaped shell, crisp and shiny, though theirs is decorated in orange-and-black stripes. I'd watch, mesmerized, as their spindly threadlike legs marched them forward, as if each bug was a small windup toy. Then suddenly, with no reason I could ever detect, two translucent wings would appear out of nowhere, and the potato bug would make its low short flight to a new surface. Inevitably, in a way that seemed similarly without volition, I'd reach down, lift one out of the dirt, and as delicately as a three-year-old can, I'd pop it into my mouth. Then I'd bite. I liked the crunching sensation, and the way its slight vibration felt inside my mouth, just before it died. In retrospect, that was my first deliberate investigation of the natural world. I wasn't hungry, and I wasn't particularly cruel. I was exploring what lay beneath the surface.

Nearly every three-year-old child has that same impulse, not merely now and then, but many times a day. During the first three years of life, the urge to find out defines us. But then what happens? Even the most casual observations of schoolchildren, teenagers, or friends in everyday life lead to the conclusion that as we get older we become less curious. The scientific literature agrees. Studies suggest that when children are between the ages of five and twelve, their curiosity diminishes. But is this a problem?

Most people seem to assume that such a decline is inevitable, if sad. Few researchers have asked why curiosity appears to diminish as children get older. And yet most of us, certainly those who are reading this book, believe that curiosity is enormously valuable. We assume that curiosity underlies many of civilization's most important accomplish-

ments: electricity, the use of antibiotics, and the theory of evolution, to name just three in the Western world. Nor do we think it is only the giants of human history whose discoveries are powered by the urge to know. Most of us believe that curiosity is an essential component of learning. One hears frequent talk about how important it is to make school interesting for children, the value of lifelong learning, and the benefits of a thirst for knowledge. When parents in the United States are interviewed, most spontaneously mention their kindergarteners' eagerness to learn, and often will actually use the word "curiosity" to describe their son or daughter. Moreover, that folk conception is correct. There is overwhelming empirical support for the idea that when people are curious about something they learn more and they learn better.

Given how valuable it is, especially during the process of education, it's odd that we know so little about how curiosity develops. We don't know much about what happens to it during the first twelve years of life, or how parents, schools, and other children shape a child's curiosity. We have been blithely incurious about curiosity.

FEELING CURIOUS

One reason why research on the development of curiosity has been sporadic, at best, may lie in the fact that it is a particularly slippery phenomenon. Take my moment by the side of the potato field. My three-year-old self must have felt an urge to know, but I probably wouldn't have been able to tell you that at the time. Even adults rarely pause and notice their own feelings of curiosity, which are often fleeting, or subsumed by more pressing concerns.

Curiosity begins as a feeling—a stirring, or a sense of mental unrest. Sometimes that feeling is more burning and palpable than others. Most, though not all of us, know what curiosity feels like. But often the feeling is buried amid other thoughts, emotions, and impulses. Because of that, it can be hard to locate or identify the internal experience of curiosity. Even when it's intense and stands out, it is often transitory (though of course not always—any literary scholar who has described a decades-long search to identify the author of a famous text, a historian who has tracked down a seminal relic from a significant

past event, a scientist who has labored for years to trace the origins of a particular disease, or the detective who has devoted months to seeking the culprit of a crime can attest to the power sustained curiosity). But for most of us, most of the time, curiosity comes and goes, often causing us to act without our even knowing we have felt it. It is not an easy mental experience to report or record.

Every reader of this book can probably think of a time when he felt curious or saw someone else expressing curiosity (asking a question, taking something apart, reading an encyclopedia). But to measure curiosity requires something beyond intuitive and casual recognition. In order to examine curiosity empirically, one must measure it. And to measure it, one must settle upon a definition. The hunt for a good definition (and with it, a good measurement) does not have a long history.

Daniel Berlyne was the pioneer in this area. The first researcher to study human curiosity experimentally, he defined it as a drive, like appetite or sexual desire. Berlyne argued that just as hunger spurs us to seek food and to eat, and our libido spurs us to seek partners and have sex, when something in the environment tweaks our curiosity, we try to satisfy that feeling by seeking information (Berlyne 1960). He argued that one could measure people's feelings of curiosity by observing their efforts to reduce that curiosity—you could understand the itch by measuring the scratch.

Berlyne based his initial experiments with humans on earlier work showing that when rats are placed in unfamiliar mazes or boxes, they explore the environment. The common understanding of this is that the rats perceived novelty as a threat, and were eager to reduce the threat of the unknown—they explored to reduce danger. But he quickly realized that interpreting the rats' search was harder than people had assumed (Berlyne 1955):

> Most investigations of exploratory behavior in the rat . . . have used the amount of perambulation through maze alleys as the dependent variable. These investigations have yielded many well-known findings, but running through an alley can be motivated by so many different drives and influenced by so many well-known factors that it seems rather an indirect way of revealing what we have called curiosity. Furthermore, whether more running necessarily means more curiosity than less running is a difficult question. Which animal is

> showing a greater exploratory tendency, one that explores a large number of objects or areas in a short time or one that spends a long time on a few and so remains relatively stationary. (239)

If it is hard to know what the rat's exploration tells you about its "experience," imagine how much harder it would be to make sense of human search behavior. Berlyne's lamentation about the inadequacy of rats revealed a central feature of curiosity—searching can never be wholly separated from the feeling that leads to the search. On one hand, humans might be easier to study because they could tell you something about why they were searching in a particular way or for a particular length of time. On the other hand, humans are exponentially more complicated than rats. This difference led Berlyne to identify a hugely important characteristic of human curiosity. We exhibit something few other species do—the urge to know about things that have no obvious or utilitarian function. We experience epistemic curiosity. This leads to the truly astonishing breadth of stimuli, topics, and events that seems to trigger the human appetite for information. We not only want to know how to get from here to there, what might be scary on the pathway home, or whether the plant matter before us is edible (all things any decent rodent would also want to know), but we also want to know what happened before we were on earth, how people we've never met are living their lives, how a given building or machine was put together, what caused a friend to behave the way she did, and why a certain novelist stopped writing. Our appetite for knowledge crosses all time zones, geographic regions, and zooms in and out from the grand to the minute. Given the nearly infinite range of things that might spark human curiosity, we cannot look to the stimuli for a definition. However, these endless and dynamic phenomena all have something in common. They all trigger our drive to find out for the same reason—in any given situation, our curiosity is aroused when we are surprised.

In his book *Surprise, Uncertainty, and Mental Structures*, Jerome Kagan argues that surprise shapes our mental life. To illustrate, he describes Nobel laureate Elias Canetti's shock that a group of men had been acquitted of murdering some workers in Vienna (Kagan 2002). A crowd of people gathered to object to the unjust verdict, and the police, in an effort to quell the violence, killed ninety people in the crowd.

Kagan then quotes Canetti: "Fifty-three years have passed and the agitation of that day is still in my bones" (10). We remember things (information as well as events) that rattle our sense of familiarity. Surprise not only etches things in our memory—it leads us, as it did Canetti, to probe the source of surprise. We seek to understand what we didn't anticipate. Curiosity, in other words, can be understood as the human impulse to resolve uncertainty.

Like Kagan, Jean Piaget thought humans were uniquely driven to make sense of their experiences (Piaget 1964b). It wasn't enough, in Piaget's view, to be able to navigate the world—humans, even four-month-old infants, are predisposed to understand the objects and events they encounter. This understanding emerges, in Piaget's framework, as a result of the young child's effort to explain the unexpected. Piaget thought that when young children confront an object or sequence of events that doesn't fit their mental schema, they attempt, however unconsciously, to understand why. Both Piaget and Kagan, like Berlyne, saw curiosity as a fundamental human urge. But they offered two essential additions to Berlyne's conception. First, their definitions stipulate that the internal urge is hitched to the outer world by way of thoughts concerning whatever event, information, or object an individual doesn't expect or understand. And second, both Kagan and Piaget viewed this powerful urge as the engine of early development. As the following pages will show, this second point is key.

WHEN FEELING BECOMES ACTION

So far I have pointed out that curiosity begins as a feeling of surprise, in response to something unexpected. That first feeling can be intense or mild, brief or sustained. Either way, it is, at first, a deeply internal experience. But that is only the starting point. To have any real psychological consequences, that first spark of curiosity must lead to something. When our curiosity is aroused (whether by an unexpected creature, a novel piece of information, or an ambiguous object), we lean in to carefully observe whatever has sparked the need to know. We touch, smell, or listen. As we get older that moment of cognitive arousal may lead to a search through our thoughts or even through books for buried information. The initial feeling of curiosity is pleasurable, but only for

a short period of time and only to the extent it can eventually be resolved (just as hunger pangs feel good when a meal is likely, and sexual arousal feels good when you're about to get in bed with someone). Like other forms of arousal, it is a catalyst for action of some kind or another. That action not only is what leads to knowledge—it is the reason we are willing to undergo the cycle again and again. Exploration and inquiry, the behaviors triggered by that first moment, are what interest those who want to study the role of curiosity in the educational process.

Chapter 9 CULTIVATING CURIOSITY

There is much more to learn about the development of curiosity, but researchers have already learned enough to conclude that the urge

to find out should be fostered in schools. Furthermore, the research provides valuable ideas about how to put curiosity at the center of the classroom. Below, I offer four ways that educators can nurture and guide children's impulse to find out.

The first idea is to fill classrooms with the kinds of complexity that invite inquiry. Teachers should provide children with interesting materials, seductive details, and desirable difficulty. Instead of presenting children with material that has been made as straightforward and digested as possible, teachers should make sure their students encounter objects, texts, environments, and ideas that will draw them in and pique their curiosity.

FOUR SUGGESTIONS FOR THE CURIOUS CLASSROOM

Children need access to books with good language and complex characters, fish tanks, terrariums, complex machines and gadgets, and conversations about the unseen and unseeable. In her book *"The Having of Wonderful Ideas,"* Eleanor Duckworth warned against the overly tidy, orderly classroom, suggesting that such a classroom probably would not contain children busily engaged in developing their own ideas. Along the same vein, I am not suggesting that children or teachers benefit from a chaotic environment, only that they need enough ambiguity to spark inquiry.

The second idea to emerge from the research is that question asking can become the goal of an educational activity, rather than a happy by-product. Teachers can develop activities that invite or require students to figure out what they want to know and then seek answers. One way teachers can do this is by encouraging students to use the Internet to ask any question that occurs to them—or arises during class discussions or while doing schoolwork. Google can be a curious person's best friend. For instance, recently, in one afternoon, I used Google to answer the following unexpected questions that popped up during a range of activities: Which of Henry VIII's wives came after Anne Boleyn? What kind of milk is mozzarella made of? What does the city of Hyderabad look like? The ease with which we can look things up online is exhilarating—and it makes the urge to know feel good more often.

Children need to feel the satisfaction that comes from having the chance to satisfy curiosity, and get information, even when it is not in the service of a teacher-driven task, or one that will result in a grade.

On the other hand, a teacher who invites students to ask questions without helping them seek accurate answers or acquiring a robust body of knowledge would leave the educational task half done. In the best of circumstances, a child who is genuinely curious doesn't rest until he or she has satisfied the urge to know. So to cultivate students' curiosity, teachers need to give them both time to seek answers and guidance about various routes to getting answers, such as looking things up in reliable sources or testing hypotheses.

Along these same lines, teachers can encourage students to think about whether their original question has been answered to their satisfaction. Such techniques are the bread and butter of the autodidact, and can be made the figure, rather than the ground, of the educational process.

When I began doing research on curiosity, my dream was to come up with a measure that could be used in schools. That way, I figured, teachers and administrators could see whether curiosity was or wasn't being encouraged in their schools. I have yet to fulfill that dream (though there are several labs where researchers are currently trying to develop such measures). But teachers don't have to wait for standardized measures to borrow from the methods we've already developed, using various simple techniques to get a sense of whether curiosity pervades a particular classroom. One of the biggest obstacles to improving educational practices that might encourage curiosity is that curiosity is never the thing teachers measure (instead measuring things like vocabulary size, or computational skills). It doesn't mean much for educators to say they value a quality like curiosity in children if they never assess whether it's present. In his groundbreaking book *Better* (2007), physician Atul Gawande encourages people in the medical profession to "count something." He means that causal intuitions about what's happening in one's workplace can be misleading. This observation is as true of schools as it is of hospitals. Few teachers readily see that they're discouraging students' questions, just as few parents readily see that they're short-tempered with their children. Even the most

thoughtful reflection at the end of the day does not provide the same information as actual recordings. Precise and methodical data collection enables teachers to learn things that are counterintuitive.

Teachers who watch themselves and count the number of questions students ask will see how much inquiry is being expressed in their classroom—and they'll learn how they respond to students' inquiries. To do this, teachers can audio-record lessons or conversations in their classrooms in order to count and categorize the questions their students ask. Video recording is another good tool for this kind of data collection. Teachers might regularly videotape activities in their classrooms and score one another's students (to increase objectivity and accuracy) on things like individual students' level of interest, the number of exploratory gestures students use when encountering materials or objects, and the duration of each student's engagement with one activity. Teachers who keep journals of their daily work with students might go through them at the end of the year to see how many occasions they created for students to figure out what they wanted to know—and pursue answers.

In classrooms where teachers are deliberately cultivating curiosity, they should see more of it in May than in September, they should see certain students learn to sustain their curiosity, while others simply become more ready to express it.

Finally, by simply by counting questions, a piece of the classroom dynamic that may have been invisible will become salient. Teachers can also use such data to discover what kinds of things individual students are curious about, who asks lots of questions, and who never asks even one. By attending to the quality of their students' questions, teachers can get ideas about how to help their students develop better questions. Finally, expressions of curiosity can serve as cues for thinking up new activities or topics to discuss.

One of the key findings of research is that children are heavily influenced not only by what adults say to them, but also by how the adults themselves behave. If schools value children's curiosity, they'll need to hire teachers who are curious. It is hard to fan the flames of a drive you yourself rarely experience. Many principals hire teachers who seem smart, who like children, and who have the kind of drive that supports academic achievement. They know that teachers who possess these

qualities will foster the same in their students. Why not put curiosity at the top of the list of criteria for good teachers?

How do we judge whether someone is truly curious? A teacher's thirst for finding out should be evident in what he or she has done or in how he or she behaves. Sometimes a teacher with plenty of curiosity has done scientific research or spent years studying some topic of personal interest (such as butterflies or architecture). Sometimes teachers' curiosity is expressed as an urge to know more about their students. Often teachers of young children excel because of their unending interest in early development. Either way, the teacher who knows what the itch to find out feels like is in a better position to foster that itch in students.

This book began with a potato bug, and ends with an ant. When my eldest son Jake was a senior in college at Wesleyan University, he lived off campus with three friends. One of them, Ian, was working on an honor's thesis in physics. During that year, the four friends spent a lot of time talking about their respective projects in art, political science, American history, and physics. They probably spent a lot of time doing things I shouldn't describe in this book. But they also spent a fair amount of time dealing with a serious ant problem. The house, on the edge of the Middletown campus, was riddled with ants, and the four young men couldn't seem to get rid of them. One day, when they were sitting on their porch, drinking beer, and talking, yet again, about the ant problem, Ian said, "Yeah, no one seems to be able to tell me what kind of ant it is. And the weird thing is, when I tasted one, it emitted this black inky stuff." My son Jake put down his bottle of beer, taken aback. "What? What do you mean 'when you tasted one'? You put one of those ants in your mouth?" Ian answered offhandedly, "Yeah, you know, I put one in my mouth to see what they tasted like, and when I bit down, this inky black stuff squirted out." To Ian, such unconstrained experimentation was second nature. But why should Ian be among the lucky few whose hunger for knowledge remains robust?

Einstein was only partly right when he said, "Curiosity is a delicate little plant which, aside from stimulation, stands mainly in need of freedom." It turns out that like many delicate plants, in order to flourish, curiosity needs to be cultivated.