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## Laughing MATTERS

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### Abstract

An infant's laughter can reveal not only how babies think but also the serious reasons for this expression of joy

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**My son was three months old when he uttered his first laugh.** That he did so at a funeral was more than ironic; it was compelling. Surrounded by grieving funeral-goers, his tiny laugh was so powerful as to provoke his audience from sadness to joy—together and almost instantaneously.

This observation launched my empirical investigations into the early appearance and dramatic power of that simple phenomenon: infant laughter. As a developmental psychologist, I have studied the giggles and glee of babies for nearly a decade now in my laboratory at Johnson State College in Vermont. Psychologists such as myself are intrigued by why laughter appears so early and what, if anything, it can reveal about infants.

Laughter is universal. It is a hardwired response that comes online early—in the first four months of life—regardless of culture or native language. Whether a child is raised in Canada or Korea, Peru or Pakistan, her first laugh will delight her parents at about 14 to 18 weeks of age. A baby's laugh is easily recognizable, partly because of its genuineness. Like crying, it is hard to fake and, like yawning, is contagious. Its authentic quality makes it hard for parents to ignore. Scientists, on the other hand, have only recently caught on to its significance.

Of course, laughter is not exclusively an expression of amusement. In adults, it can occur in many emotional contexts, including when people are nervous, as a response to others' laughter or more simply when in the company of other people. But why do *infants* laugh? It is not so much a question of *what* they find funny. There is no universal joke for infants. (The funeral laugh was prompted by someone's sneeze.) Instead we must consider *how* infants extract humor from their environment.

In contrast to crying, which clearly urges an infant's caregiver into action, laughter seems like an emotional luxury. The fact that a three-month-old can have access to this ability—long before other major milestones such as talking and walking—suggests that her chortles, sniggers and guffaws have an ancient and important origin. Laughter can reveal a considerable amount about infants' understanding of the physical and social world.

## Baby Darwin

Laughter precedes language both in infancy and in the evolutionary chain, having been prioritized and preserved by nature. Indeed, several species, including chimpanzees, other apes and squirrel monkeys, engage in vocalizations during play that resemble laughter. These mammals—especially juveniles—display signature breathy and rhythmic sounds while frolicking together.

Evolutionary neuropsychologist Jaak Panksepp of Bowling Green State University and Washington State University has shown that the brains of all animals contain the neural circuitry engaged in human laughter. These areas include emotional and memory centers, such as the amygdala and hippocampus. Laughter seems to bubble up from below the surface of the cortex as an involuntary response while activating the pleasure systems in the brain. Famously, Panksepp has even documented, using technologies that allow humans to hear very high frequencies, that rats emit a rhythmic chirping sound when “tickled.”

In humans, infant laughter has gained the attention of a few prominent scholars. In the fourth century B.C., Aristotle posited that the first laugh marked the infant’s transition to humanness and served as primary evidence of the infant having acquired a soul. In 1872 Charles Darwin hypothesized that laughter, like other postural, facial and behavioral expressions of emotion, served as a social signal of “mere happiness or joy.” In his landmark volume, *The Expression of the Emotions in Man and Animals*, Darwin meticulously described the laughter of his own infant son, writing: “At the age of 113 days these little noises, which were always made during expiration, assumed a slightly different character, and were more broken or interrupted, as in sobbing; and this was certainly incipient laughter.”

Psychology, however, neglected the topic for decades. For most of its history, the discipline has primarily focused on negative emotions such as anger, depression, anxiety and major mental illness. This trend started to change about 40 years ago, when some psychologists began studying resilience to adversity, happiness and the psychology of well-being. A whole new subfield known as positive psychology was born.

Furthermore, it is only within the past 30 years that developmental psychologists have had methodologies for making inferences about infant cognition and emotion. One such method, the “gaze paradigm,” involves timing the duration of an infant’s stare. Several studies have demonstrated that babies will gaze longer at a novel object, which at its most basic level reveals that they can differentiate it from a familiar one.

In 1985 psychologists Elizabeth Spelke, now at Harvard University, and Renée Baillargeon of the University of Illinois at Urbana-Champaign coopted the gaze paradigm to study infants’ conceptual knowledge. Spelke and Baillargeon began presenting infants with possible and impossible scenarios—for example, one object, in keeping with natural laws, would not penetrate a solid barrier, but a second, similar object would appear to do so. They found that babies gazed longer at unexpected events. These findings led researchers to deduce that infants come equipped with some simple expectations about how objects

behave, which when violated results in their rapt attention. Such violations, it turns out, are powerful catalysts for humor.

## Funny Business

Stand-up comedians often exploit expectations to make audiences laugh. They build suspense and push the boundaries of norms and acceptability to provoke our laughter, whether with puns, zingers or witty retorts. For something to be funny, the person telling a joke and the person hearing it need some common knowledge. Humor therefore requires at least some rudimentary understanding of the physical and social world. This understanding can be based on experience and observation, which provide the foundation for what is “ordinary.” With that baseline, we can differentiate the ordinary from the absurd.

Research from my lab shows that infants as young as five months, just a month after laughter comes online, can independently manage this basic perceptual difference. In 2014 my colleagues and I published findings from an experiment in which we presented 30 infants with ordinary and absurd events. For example, an experimenter might squish and roll a red foam ball as an ordinary scenario, then wear it as a nose in an absurd iteration of that event. Not only did infants distinguish between the two, they laughed at the latter. The key finding was that their laughter was not made in imitation; it occurred even when the experimenter and infants’ parents were instructed to remain emotionally neutral.

Just a few months later, at about eight months of age, infants can be effective comedians and understand how to make others laugh without using any words. Psychologist Vasudevi Reddy of the University of Portsmouth in England calls this nonverbal form of humor “clowning.” She has documented babies from eight to 12 months engaged in numerous forms of clowning, for example, exposing their naked tummy while shaking back and forth, attempting to put their toes in a caregiver’s mouth while laying supine, or snatching a clean diaper and feigning disgust followed by a smile.

Infants this age also engage in teasing, such as smiling coyly as they intentionally disobey a parent’s directive not to climb the stairs or offering the dog a cheerio, only to snatch it quickly back with a cheeky grin. Such “fake outs” have been reported even earlier by parents of six-month-olds, at which point infants can employ fake laughter (or tears) to draw attention to themselves or be included in an interaction that others are enjoying without them. Recall that laughter is difficult to fake, so these displays are easily detected.

Most important, infants *create* these novel interactions. They decide when and with whom to employ these techniques. As such, these types of playful, teasing exchanges can give us a window into infants’ awareness. Teasing in particular requires at least a rudimentary understanding of others’ minds, a desire to engage, and a guess or prediction as to how to provoke the mind of someone else. To trick someone else means to know that someone else can, in fact, be tricked. This knowledge, referred to as a theory of mind, is a mature insight that has traditionally been credited only to children at least four years old. Although infants do not have the mind theory sophistication of older children, their ability to effectively tease and provoke others suggests they have at least some level of awareness.

## Great Expectations

Clowning and teasing reflect the primarily social nature of humor, but for something to make us laugh aloud in amusement, we need more than just the presence of other people. After all, infants spend most of their time *with* others, though little of their time laughing. This is because humor—whether for adults or infants—also requires a cognitive component: incongruity.

Incongruity refers to a situation that psychologist Elena Hoicka of the University of Sheffield in England describes as *misexpected*, meaning it creates a misalignment between what the infant expects with what she or he experiences. Misexpected events are slightly out of the ordinary. In contrast, truly unexpected happenings are completely shocking or surprising—and, as such, can be perceived as more disturbing or amazing than humorous. For example, when a cup is worn as a hat, it does not match the infant’s prior experience with cups (or with hats). If the cup transformed into an antelope, the situation would be totally unexpected.

Adults, children and infants alike find unexpected events interesting but not necessarily funny. Multiple explanations arise from the research employing the violation of expectation paradigm. When infants are presented with violations of natural physical laws—such as gravity, solidity, inertia or quantity—they stare at these “magical” events, but they do not laugh. If we contextualize Hoicka’s ideas into the larger research on infant gaze and interest, we can speculate that perhaps humor relates to misexpectations of social behavior. A toy flying through space and defying gravity is cause for wonderment. But Grandma wearing that toy on her head? Absolutely hilarious.

Humor theorists present one possible explanation through a phenomenon called incongruity resolution. To perceive an incongruity as humorous requires that the incongruity be resolved, which means understanding its cause or getting to the “punch line.” The “aha!” moment at which a listener decodes the nuance or double entendre of a verbal joke, for example, is the moment of resolution. It is the point at which the incongruous nature of why “a guy walks into a bar” becomes humorous, whether or not it is accompanied by overt laughter.

Forty years ago many cognitive psychologists argued that infants were not sophisticated enough to resolve incongruity. Psychologists Diana Pien and Mary Rothbart, both then at the University of Oregon, proposed that humor perception does not necessarily require advanced cognitive skills. In a study published in 2012 my students and I put that idea to the test.

When we asked 30 parents to “do whatever you normally do to get your baby to laugh or smile,” they resorted to wildly exaggerated “clowning.” Blowing raspberries, making odd faces, walking like a penguin and holding up stinky feet are hard even for an infant to miss. They are major permutations of ordinary daily interactions. At the very least, such behavior gets a baby’s attention. Starting at three and four months of age, we tracked these families through their first year and found that 40 percent of the youngest children laughed in response to their parents’ antics; by five and six months, 60 percent of the infants laughed.

Infants need not do much to resolve these misexpectations to find them funny. In fact, there are at least three clues available to them. Social context is one example: these absurd acts are performed by a social partner, which may be enough to bias the infant toward interpreting the behavior as positive. My colleagues and I have observed that parents typically pair clowning with their own smiling or laughing about 65 percent of the time. This combination signals that the antics are safe, satisfying and joyful.

A second factor is familiarity. Social partners often repeat silly actions over and over again until the infant laughs and then *because* she or he has laughed. It is possible that the caregiver's repetition allows the infant to either predict the action and its outcome—a resolution in itself—or infer the intentionality of the act. That Dad is balancing a spoon on his nose is not an accident if he repeats the act several times. Psychologist Amanda Woodward, now at the University of Chicago, has shown that, by their first birthdays, infants can infer intention from others' actions and speech.

A third element that may help babies differentiate between magical and humorous incongruities is that the latter are possible. Ultimately there is nothing magical about Mom wearing a cup as a hat. The nonmagical nature of humorous events may move infants, as well as children and adults, beyond that initial state of wonder to a final state of humor.

From eight months of age, infants can be effective comedians without words. Babies engage in clowning, such as mischievous attempts to put their toes in a parent's mouth.

Whatever their strategy, experimental evidence shows that although infants begin to laugh at humorous events at about five months of age, they can detect such activities even earlier. Four-month-olds in our study gazed at humorous events with intense interest, registering a significant heart rate deceleration. This physiological response is exhibited when they display the same interest in a stimulus, as well as when they smile.

Psychologist Stephen Porges of the University of North Carolina at Chapel Hill proposes that heart rate deceleration does not necessarily reflect joy so much as prime the infant for it. When babies are confronted with something novel, they stare at it, a response that is accompanied by a heart rate deceleration. Porges suggests that this physiological calm acts as a kind of resource, allowing the infant to remain oriented toward a novel and nonthreatening stimulus. When this reaction is combined with young infants' bias toward sociability, infants may benefit from this calming response to find pleasure in absurdity.

## All Together Now

Our work suggests that infants truly can perceive and create humor. But not all laughter relates to amusement. Although there is no evidence of infants laughing in discomfort, we know that adults can and do laugh without mirth. That observation may provide insight into its deeper purpose.

No matter how it is deployed, laughter is social. Robert Kraut and the late Robert Johnston, both then at Cornell University, ushered in the field of evolutionary psychology with a landmark 1979 study demonstrating that—among other things—bowlers were more likely to

smile not after achieving a strike but after facing the audience after a strike. Psychologist Robert Provine of the University of Maryland, Baltimore County, found that laughter is 30 times more likely to occur in the company of other people, regardless of whether anything amusing is happening. Provine's research shows that laughter usually follows banal comments such as, "I better be going!" or "Great to see you!" rather than comedic punch lines. In addition, people can be amused and not laugh at all.

For youngsters at play, laughter seems to signal both positive emotion and affiliation with one another. Evolutionary psychologists Robin Dunbar of the University of Oxford and Guillaume Dezecache of the University of Neuchâtel in Switzerland have proposed that laughter keeps us connected and in harmony as adults when we have long given up rough-and-tumble romps. This idea is especially supported by the contagious quality of laughter in groups of people, including strangers.

Laughter, therefore, serves as a kind of social glue, with many possible meanings. Someone's nervous giggle may prompt peers to provide comfort or assurance, and a mischievous chuckle can signal when roughhousing is meant purely in jest. Hoicka has described what she calls a "playful frame," in which social partners can interact in such a way that both actors interpret an interaction—such as teasing—as positive.

Indeed, four- to six-month-old infants are poised for positive emotion. Not yet wary of strangers or of separation from primary caregivers, infants are ready for interaction with anyone, increasing their opportunities for play, smiling and laughter at just the moment when that new response is available to them. From an evolutionary perspective, this joint emergence of laughter and sociability is wise.

Laughter—it turns out—has a serious side. Its value as a social signal and mammalian superglue explains why it comes "factory-installed" as part of infants' native hardware. At four months of age, infants' laughter most likely is neurologically jump-started by their intense attention toward novelty and the salience of the broad social context. But within one month, babies have enough cognitive sophistication to detect and interpret new, nonthreatening social events as funny, all by themselves. A few months later they can produce such events, too, much to the joy of everyone.

## THE AUTHOR

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**FAST FACTS****TINY GIGGLES**

1. By 18 weeks of age infants can laugh. Two months later children can clearly extract humor from their environment.
2. Laughter can be elicited in a very young child by presenting an out-of-the-ordinary event that defies expectations for social rules.
3. The profoundly social nature of this expression suggests it plays an important role in how we interact with and communicate with other people, which could explain why it emerges so early in life.

**MORE TO EXPLORE**

- Infant Clowns: The Interpersonal Creation of Humour in Infancy.  
Vasudevi Reddy in *Enfance*, Vol. 53, No. 3, pages 247–256; 2001.
- **How Infants Know Minds.** Vasudevi Reddy. Harvard University Press, 2008.
- Humor in Infants: Developmental and Psychological Perspectives.  
Gina C. Mireault and Vasudevi Reddy. Springer, 2016.  
From Our Archives
- **The Fantasy Advantage.** Deena Weisberg; March/April 2016.





Babies can laugh before they master speech. This ability may have deep evolutionary roots; several species, including bonobos, engage in breathy, rhythmic vocalizations, much like laughter, during playful interactions.



When an event violates babies' expectations, they stare. But such circumstances require a social context to be humorous. In addition, truly improbable events may be more startling than funny.