

An Overview of the Cognitive Processes Underlying Pretend Play  
and the Developing Imagination

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## Introduction

Pretend play is an intriguing enigma of childhood. On one hand, children all over the world engage in pretend play on a predictable timetable (Lillard, 2002).<sup>1</sup> Pretending appears to be innate; it is evidence of a biological process at work, manifesting according to the child's physical and cultural context (Smith, 2002). On the other hand, infancy and early childhood are the period during which children are trying to understand and adapt to *the real world*. Since young children's survival depends on adapting to reality, why do they pretend the world to be different than it is? What evolutionary function could pretending possibly support?

Developmental psychologist Paul Harris (2000)<sup>2</sup> points to a "revolution in human culture" occurring during the Upper Paleolithic, beginning approximately 40,000 years ago. A new power of imagination was gradually emerging; organized symbolic acts such as ritual burials and cave paintings served as physical props conjuring up an imaginary world different from their physical reality (Harris, 2000). Harris supports an *ontogenetic view* of human imagination; the capacity to imagine emerges very early in childhood and lasts a lifetime. Harris (2000) identifies pretend play as one of the earliest and most obvious signs of young children's imagination, and this emergent capacity to imagine alternative possibilities transforms children's developing conception of reality itself. Examining the biological processes occurring through pretend play and its connection to the developing imagination will shed light on the mystery of pretend play and its important place in human development.

## What is Imagination?

Imagination is a human capacity that allows us to transform what is, into what might be. The word "imagine" comes from the Latin *imaginari*, "**to form a mental picture to oneself.**" The etymology highlights several interesting points. First, imagination is a

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<sup>1</sup> Lillard, (2002) summarizes: earliest instances of pretending occur during the second year; there is often a dramatic increase in symbolic acts between 15-18 months; by 24 months pretending is in full swing; and socio-dramatic play appears around age 4, or earlier if the child has older peers or siblings.

<sup>2</sup> Paul Harris, author of *The Work of Imagination*, is considered by his peers to be a leader in the field of study of the imagination.

*mental* capacity; it is a power of the mind, an ability to move beyond what is sensorially present to an image, or combination of images, held solely in the mind. Second, to imagine involves a *picture*, a *vision*, from the Proto Indo European base *wied*, “to know, to see.” “To know” was the earliest meaning of the word “vision;” the meaning “sense of sight” came centuries later. And finally, *to oneself*, emphasizing that imagination exists privately within each of us.

The word “pretend” is commonly associated with the word “imagination.” Dictionary definitions of “pretend” (v. to use the imagination; or adj. existing in the imagination; make-believe) and “imagination” (v. to form in the mind) show this association, as do the nouns, “pretense,” which refers to “make-believe or things imagined,” and “imaginary play.”<sup>3</sup> Understanding how these terms are used together helps to clarify their interdependent relationship.

In psychological terms, imagination has two functions, “reproductive” and “creative.”<sup>4</sup> The reproductive imagination is the ability to picture things just as they are, making a true to reality representation or image of something. The reproductive imagination is sometimes referred to as “imagery” and is connected to memory. The creative imagination recombines these images in the formation of new images or ideas; the creative imagination does not stop at merely a faithful representation of what already exists. Both functions of the imagination, reproductive and creative, are based in reality because the images in the mind are based on the perceptions gathered by the senses from the real world.

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<sup>3</sup> The word “fantasy,” which also appears in discussion and research literature regarding imagination, will not be used in this paper, as it implies a leave from reality. “*The poet is in command of his fantasy, while it is exactly the mark of the neurotic that he is possessed by his fantasy.*” (Lionel Trilling, American literary critic)

<sup>4</sup> From *The Elements of Psychology*, by David Jayne Hill (1888) “Imagination is the soul’s power to recombine representative ideas... But in addition to the revival and remembrance of past experiences, we have the power to take the individual elements thus reinstated in consciousness and combine them into new forms. This, and not the mere imaging of ideas, is the proper sphere of Imagination” (p.114). From Dictionary.com- “in psychology, the power of reproducing images stored in the memory under the suggestion of associated images (reproductive imagination) or of recombining former experiences in the creation of new images directed at a specific goal or aiding in the solution of problems (creative imagination).”

Jacob Bronowski, author of *The Origins of Knowledge and Imagination*,<sup>5</sup> was fascinated by the relationship between the senses, particularly vision, and imagination. From the scientific standpoint, vision is a mechanical means by which perceptions of the world reach us, but metaphorically, vision is the means by which we come to understand. He writes,

***“We cannot separate the special importance of the visual apparatus of man from his unique ability to imagine, to make plans, and to do all the other things which are generally included in the catchall phrase, ‘free will.’ What we really mean by free will, of course, is the visualizing of alternatives and making a choice between them. In my view, ..., the central problem of human consciousness depends on this ability to imagine.”*** (Bronowski, 1978, p.18).

Imagination can be discussed from a neuroscience perspective as well as from the psychological and philosophical angles. The images the mind uses in imagination begin with sensory perception, but how we *perceive* things is not simply the product of sensory input. The brain receives signals from the senses and interprets or explains the signals based on an individual’s past experiences. In this way, the neural pathways of the infant brain develop based upon sensory experiences in the environment. Imagination and perception use the same neural circuits in the brain; but it is as if the imagination uses the circuits in reverse; taking what is already there and moving outward, reconstructing the pieces for a new creation (Berns, 2008).<sup>6</sup> This is another way to look at how the “true to reality” images from the reproductive imagination are the foundation for the creative imagination.

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<sup>5</sup> Jacob Bronowski was a mathematician and scientist. He wrote *The Origins of Knowledge and Imagination* in 1978, interweaving themes of philosophy, linguistics, ethnology and physics. He was particularly interested in the ideas of Immanuel Kant, who believed that ‘knowledge is based on the human senses.’

<sup>6</sup> Gregory Berns is a professor of Psychiatry and Behavior Sciences at Emory University and the Chair of Neuroeconomics. He is interested in how brain-imaging technologies can be used to study the neurobiology of human motivation and decision making. His most recent book is *Iconoclast: A Neuroscientist Reveals How to Think Differently*.

Neuroscientists have observed that while many neurons fire during a novel experience, with repetition, only a smaller subset of neurons process the stimulus. This makes the brain more efficient, using the brain's capacity for categorization – “Oh! This is like the other thing,” but it also makes it very difficult to imagine a truly novel idea. In order to provoke the imagination, we need new experiences that will force the brain's perceptual systems out of the standard patterns or categorizations (Berns, 2008). The brain's response to novel stimulus suggests that there is a strong connection between exploration and imagination. Exploration stimulates the imagination, and since children's minds develop through experimental exploration of their environment, exploring new possibilities is an essential element to how young children learn through imaginative play.

But imagination is not simply child's play. Imagination is a creative ability at the heart of music, language, science, mathematics, and art. Imagination is the foresight of consequences, and the resourcefulness to face and resolve difficulties. Imagination is central to all human progress and invention. To imagine is an individual's own capacity to know and understand, to visualize something not present to the senses in physical reality. Imagination is the human capacity to change, to evolve, to adapt, and even to think.

But how does the amazing and versatile capacity to imagine develop? If we consider other capacities, such as the development of language and the development of motor-skills, we can predict that imagination, like every other emergent skill (e.g. first words, walking), may involve a great deal of internal development before external signs, such as pretending, are apparent. This internal development is actually the foundational knowledge that infants begin to build in the first year of life.

### **The Foundations of Imagination**

Imagination is based on children's foundational knowledge about the world, but *how* this foundational knowledge is formed is the subject of fascinating research and debate

regarding “object representation.”<sup>7</sup> Object representation refers to how humans acquire knowledge- as “representations” held in the mind. In very general terms, the infant’s developing mind has the capacity to organize and process the characteristics and properties of objects and situations in order to build up an understanding of the real world. For example, when infants observe an event, the “object-representation system” in their developing brain takes in information about the properties of the objects for purposes of recognition and categorization. Other developing systems, such as the “physical-reasoning system,” can use that information to interpret and predict outcomes. This helps the infant learn how objects behave and react (Baillargeon, et.al., 2009).<sup>8</sup>

The infant’s representational knowledge provides a causal framework for understanding new information and placing it in context with existing information. Over time, infant’s initial representations gradually become richer and more detailed as they identify new variables in a predictable pattern, and encounter events that do not conform to their expectations. Infant learning comes when the feedback of the world does not match his representation of it (Baillargeon, et.al., 2009). When children pretend, they draw on the causal understanding of the physical and the mental world that they have built up during infancy (Harris, 2000). But how do we know if very young children have the capacity to pretend?

### **Imagination Begins Very Early**

A long tradition of conventional thinking, propelled by the theories of Freud and Piaget, claims that babies and young children are limited to the present reality in their thinking and experiences (Gopnik, 2009). These theories state that even while pretending, babies and young children cannot tell the difference between imagination and reality. Piaget, echoing Freud, considered imaginative play to be a retreat from reality. He writes in *Play, Dreams, and Imitation in Childhood*, “**Unlike objective thought, which seeks to adapt itself to the requirements of objective reality, imaginative play is a symbolic**

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<sup>7</sup> The study of object representation is beyond the scope of this paper; for more detailed reading, see *The Origins of Object Knowledge*, edited by Hood and Santos, Oxford University Press, 2009.

<sup>8</sup> The “systems” refer to innate capacities, or mechanisms, within the infant developing mind that enable the infant to construct their understanding of the world.

*transposition which subjects things to the child's activity without rules or limitations"* (Piaget, 1962, p.87). Piaget implies that pretend play is primitive phase of maladaptive behavior that will be outgrown as the older child replaces this early cognitive process with a more objective approach (Harris, 2000).<sup>9</sup> However, because pretending appears to be a universal characteristic of early childhood, perhaps it would be more beneficial to reflect on the biological function of pretending rather than to consider pretending a "maladaptive tendency" (Harris, 2000, p.6).

The recent surge of interest and scientific inquiry into early childhood cognitive development has shed much new light onto the development of the imagination, illuminating that *the conventional Piagetian thinking about imagination is wrong*. Although there are many questions yet unanswered, two things are clear; the capacity to imagine begins much earlier than previously thought, and pretend play is *not* a maladaptive expression of imagination. In fact, it is the *absence* of early imagination that is maladaptive, as indicated by studies linking autism spectrum disorders with the absence or deficit of imaginative play (Baron-Cohen, 2007; Harris, 2000).<sup>10</sup>

Simon Baron-Cohen (2007), at the University of Cambridge, writes, "It has long been recognized that human infants from age 9-14 months old, begin to pretend. For example, they may pretend that an object has characteristics that it does not have, for example, pretending a toy tea cup is hot."<sup>11</sup> General consensus indicates that children display the

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<sup>9</sup> In the first chapter of Paul Harris's book, *The Work of Imagination*, he offers a detailed account of the conventional thinking about young children and imagination stemming from Freud, Bleuler, Piaget, and Vygotsky.

<sup>10</sup> "Children with autism are very interesting for several reasons. First of all, they notoriously have difficulty making connections with other people, making sense of their lives and their own lives. Secondly, they are usually very impoverished in their ability to engage in pretend play... The classic authors in developmental psychology, people like Piaget or Freud, portray early fantasy and early pretend as something that is immature and will be outgrown. Piaget describes this narcissistic self-absorption of unrealistic fantasies and he talks about pretend play as a form of associative thinking that will eventually disappear as the child becomes more objective. But if you look at children with autism and see how restricted their imagination is, you are forced to the conclusion that imagination is probably something that we can't do without, and not something that we need to overcome." (Harris, in a 2002 interview for the Harvard Graduate School of Education newsletter *International Education*.)

<sup>11</sup> From his 2007 article, *The biology of imagination*. Simon Baron-Cohen, a developmental psychopathologist from University of Cambridge, has made contributions in the understanding of children's theory of mind, and the relationship between theory of mind and autism.

ability to engage in and recognize pretense in others between 18-24 months (Gopnik, 2009; Leslie, 1987; Leslie, 2007; Lillard, 2002).

But what does it mean to “pretend” or to “engage in pretense?” In order to understand how the imagination develops, it is important to remember the definitions explained earlier. The two verbs, “imagine” (to form in the mind) and “pretend” (to use the imagination) are frequently used interchangeably; as are the two nouns, “pretense” (make-believe, or things imagined) and “imaginary play” or “pretend play.” To determine if a child is actually pretending, at least one of three cognitive processes must have occurred:<sup>12</sup>

1. object substitution (one object stands in for another);
2. attributing pretend properties (pretending that dolly’s clean face was dirty) or
3. use of imaginary objects (pretending something was present that is not)

This definition of pretending separates *imaginary* play from *functional* play. Functional play occurs when children demonstrate knowledge about the conventional use of an object, such as rolling a ball back and forth, or using a small rake to gather leaves.

How is it possible that such very young children are able to pretend? Rutger’s psychologist Alan Leslie proposed a “meta-representational theory of pretense” (1987). Leslie’s theory is based on the infant’s capacity to form object representations, which he calls “primary representations.” The primary representation is faithful, accurate, and true to reality. It is these primary representations that build up the infant’s foundational knowledge about the world. In pretense, a mechanism in the brain makes a “copy” of the primary representation, or a “representation of the representation.” Leslie calls this a “second-order” representation, or a “meta-representation.” It is the meta-representation that is manipulated in the mind during pretend- the teacup becomes full of tea, or the block of wood becomes a car (Leslie, 1987). This meta-representation can be thought of as if the child were “quoting” someone else, stating the idea without committing himself to the truth of the meta-representation (Hobson, 2000).

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<sup>12</sup> Leslie, 1987

With Leslie's theory, pretend can take place "safely" because little children manipulate the *meta-representations*, not their primary representations (Baron-Cohen, 2007). Manipulating the primary representations would compromise the integrity of what the child knows to be true. If primary representations were manipulated, it would affect the child's literal understanding of the world and he would no longer know what was real and what was not, leaving him seriously confused. But Leslie's important insight was that ***"the normal infant is not confused by pretend play. They do not for a moment believe the pretend teacup really is hot"***<sup>13</sup>(Baron-Cohen, 2007). The essential truths of primary representations are "quarantined" during pretense; they are protected from being undermined because meta-representations are used during pretense (Leslie, 1987). Even a very young child can pretend to wash dolly's hands with a wooden block, but when his own hands are dirty he knows just where the real soap is and is not confused; he does not get the block of wood to wash his own dirty hands.

In *The Work of the Imagination*, an excellent review and discussion of imagination and pretense, Paul Harris, a developmental psychologist from Oxford, England writes, ***"In pretence, young children may step back from current reality, or go beyond it, but that does not necessarily entail any cognitive distortion of the general principles by which reality operates"*** (Harris, 2000, p.6). This echoes the "protection" idea of the primary representation in Leslie's theory. Young children take their understanding of the real world with them when they pretend; they may pretend to fly a car through the air, but they know that although planes and birds really fly, cars do not.

### **When Children Are Confused by Pretend**

There are, however, situations when pretend does confuse children. One of the obvious reasons children can distinguish real from pretend is because they already have sensory based knowledge of what is real- they know what a cup is and they know what a block is, therefore, they are not confused by taking a sip from a pretend cup. (Lillard, 2006).

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<sup>13</sup> Gopnik attributes young children's occasional fear during pretend (e.g. an adult is pretending to be a bear, and the child appears really scared) to their extreme emotional engagement in the pretend, not to belief that daddy has turned into a bear. She points out that while adults can be scared silly during a movie about dinosaurs coming to life and attacking us, we don't for a moment believe it is true.

When children do not have first hand sensory knowledge of reality, they generally look to their parents for confirmation of what is real and what is pretend. When parents support and encourage their children to believe in pretend (such as telling that Santa is real, or taking children to the shopping mall to visit Santa), *the children will believe* (Taylor, 1999). Furthermore, depending on the extend of the deception, the child's own sensory knowledge may appear to support this belief, for example, the child believes in Santa because he has seen Santa with this own eyes at the shopping mall.

Jacqueline Woolley, a psychologist at the University of Texas at Austin, studied the factors contributing to the age at which children learn to distinguish reality from fantasy.<sup>14</sup> She found that at the age of 3, around 75% of the children tested believed that both Santa and the garbage man were real. By the age of 5, children's certainty of the garbage man increased, and belief in Santa peaked, at 83%. It wasn't until age 7 that belief in Santa began to decline. Although other studies show that children as young as 3 understand the concept of what is real and what isn't, until they are about age 7, children can be easily misled by adult's persuasive words or by "evidence" that they see or experience directly (Wang, 2009). In another study, Woolley invented a character called the "Candy Witch." Researchers told children a story about the Candy Witch (she swaps Halloween candy for a toy) and showed the children a picture of her. Some of the parents supported Candy Witch belief by making the candy/toy swap at home. Nearly 2/3 of the children were convinced that the Candy Witch was real, particularly the children whose parents also encouraged belief in the character (Wang, 2009).

Marjory Taylor, author of *Imaginary Companions and the Children Who Create Them*, explains how 3 and 4 year-olds are also confused by characters and events on television. She describes how some 3 year-olds believe that an image of a bowl of popcorn would spill out if the TV were turned upside down. Other preschoolers speculated that characters on TV got really small and entered the TV through the plug in the wall. It is difficult for children to tell if a person on TV is "real;" does "real" mean "a real person," or is the person really that character? However, this kind of confusion also extends to

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<sup>14</sup> In Shirley S. Wang, "The Power of Magical Thinking" from the Wall Street Journal, December 2009.

adults who become so wrapped up in a TV story line that they forget the characters are not real. Think of Robert Young, who played Dr. Marcus Welby on TV and received thousands of letters from adults seeking medical advice (Taylor, 1999).

Unreal events depicted in storybooks can also confuse young children. When shown pictures of anthropomorphized rabbits sweeping and baking, and real-life pictures of mother birds feeding their young, 3 year-olds were not able to discriminate well between the real and fantasy pictures (Taylor, 1999). By the age of 5, Taylor reports, children were better able to make this distinction, as well as between fantasy and reality when shown pictures of events that could happen “in real life,” or “in a dream.” This suggests young children are unclear about pretend and unreal situations when their direct sensory information conflicts with reality. For example, when they *see* a picture or TV image, they are more likely to think it is “real.”

This is compounded by evidence that by 15 months of age, young children can apply something learned from a picture book to real life, and also transfer that information in the other direction (DeLoach & Ganea, 2009). For example, a toddler can learn the name for a robin in a picture book, and then identify a robin in the backyard, and vice versa. After learning the name of a real object, children were more successful transferring that name to a photograph than to a cartoon drawing of the object. ***“The fact that the iconic nature of pictures seems to have an important role in children’s ability to interact meaningfully with books has important educational implications; namely, that books with more realistic pictures are better for assisting young children’s learning”*** (Ganea, Bloom-Pickard, & DeLoach, 2008). In general, the more young children are exposed to anthropomorphized books, (animals or objects given human attributes) the more likely they are to confuse their beliefs about the properties of real animals or objects (DeLoach & Ganea, 2009).

### **Imagination and Theory of Mind**

In some ways, it is easier to understand how infants and young children learn about what is real and what is pretend in the *physical world*, than it is to understand how they learn

about these differences in the mental or *psychological world*. But the psychological and physical worlds interact whenever we imagine “what if,” “how come,” or “I wish.” How children develop mental concepts and beliefs, such as “I want,” “she thinks,” and the idea of “not real” and “imaginary” is an absorbing, yet unresolved, subject of constructive debate among cognitive scientists.

Andrew Meltzoff has spent the past decade developing a theory that infants progress from imitation of others, to a concept of others as being “like me,” to an understanding of other’s minds (theory of mind, or “mind-reading”). He argues that imitation and theory of mind are causally related, with imitation and the neural mechanisms that underlie it leading to an understanding of other minds. Through everyday experience, infants map the relation between their own body states and mental states, and then when they observe others acting as they have, are able to project onto others the mental state that goes with that physical action (Meltzoff, 2005). For example, if a young child is shown a picture of a girl standing in front of a blank paper on an easel, he is able to say that the girl is *thinking about painting*. The child observed the girl acting as he did, and projected what *he* thought when *he* stood in front of a blank paper holding a paint brush.

Although not all researchers agrees with all aspects of Meltzoff’s theory, they do agree it is clear that even very young children understand the fundamental difference between the physical world, and the mental world (Wellman, 2002).<sup>15</sup> For example, when 3,4, and 5 year-olds were told about one person who *had* a dog, and another person who was *thinking* about a dog, and then asked which “dog” could be seen, touched, and petted, even the 3 year-olds understood the difference and could judge correctly (Harris et al. 1991 study cited in Wellman, 2002).

A test involving 18 month-olds and adult’s snack preferences demonstrates the ability of very young children to recognize others’ preferences and desires as different from their

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<sup>15</sup> Henry Wellman, a developmental psychologist whose professional research focuses on children’s acquisition of foundational knowledge, discusses several current theories about how children develop a “theory of mind” in his excellent chapter “Developing a Theory of Mind,” in Blackwell’s *Handbook of Childhood Development* (2002).

own. In the trial where the adult tasted the snacks and indicated a preference for the broccoli (different than the toddler's preference for goldfish), the adult held her hand between the two snacks and asked for more. The 18 month-old toddlers overwhelmingly gave the adult more of what she preferred: the broccoli. The toddlers demonstrated their understanding that the adult had a different desire than their own (Repacholi and Gopnik, 1997, in Wellman, 2002).

The understanding that the contents of other's minds can be different than one's own is fundamental to imagining another's point of view, or thinking about how someone else might respond to a situation. A very obvious example of this appears when children listen to a story; they readily shift their perspective to the point of view of the different characters. This ability continues well into adulthood; every time we read a novel, biography, or historical narrative we accept the invitation to view the world from another perspective (Harris, 2000). Understanding of others' minds links the imagination to the development of social cognition and empathy.

### **Imagination and Causal Thinking**

How children think about mental states, both their own and others, and knowing the difference between what is "real" and what is "in the mind," are central in developing imaginative thinking. The new science regarding young children, imagination, and learning indicates that the abilities that infants and young children use to learn about the physical and mental world, are the very same abilities that allow them to "change the world" and imagine alternate realities and possibilities that don't yet exist. As children learn about the real world, their brains create causal maps of how the world works; these idea maps enable children to imagine new possibilities and imaginary worlds that differ from reality (Gopnik, 2009).

Gopnik (2009) describes how through everyday conversations, developmental psychologist Henry Wellman showed that children understand what is possible or impossible, informed by their causal knowledge of the physical, biological, and psychological worlds. For example, the children he talked with clearly understood that

although Johnny could *decide* to hold his arm up in the air, he couldn't just *decide* to jump in the air and stay there, or decide to grow taller, or decide to walk through a table. Gopnik tells the charming story of a little boy they tested who demonstrated his causal understanding by acting out alternate possibilities. He made his prediction and then said, "Watch! Table, I will walk through you!" Then he dramatically walked into the table and bumped against it. "Ow, see, you can't do it." (Gopnik, 2009, p.38).

Harris also describes causal understanding in very young children. In one study (of many), he worked with 2 year-olds who demonstrated they understood the implied consequences of a pretend action. For example, when Teddy Bear was put in a box for a pretend bath, the 2 year-olds understood that the box could be "filled with water," Teddy would be "wet," and could be "dried" with a pretend towel (Harris, 2000). In order to make sense of the pretend actions, a child would need to set aside his understanding of what is physically real (Teddy wasn't really dirty; if Teddy really needed a bath, why put him in an empty cardboard box) and make pretend causal actions to go along with a pretend situation. Harris argues that the *pretend stipulation* (Teddy is having a bath), the *causal chain* (Teddy gets "wet," "soaped" and "dried"), and the *suspension of physical truth* (Teddy isn't really wet) are all understood by 2-year olds (Harris, 2000, p.26).

Young children use the knowledge they gain from their everyday experiences to develop their causal understanding of the world. With these causal maps of how the world operates, not only do children understand how to navigate the real world, they can also explore alternate possibilities. Exploring alternate possibilities of reality is a profound and pervasive human activity, referred to as "counterfactual thinking," or thinking about the facts "counter" to reality.

### **Imagination and Counterfactuals**

Adults use counterfactual thinking every day, throughout the day. Counterfactual thinking involves the "shoulda, woulda, coulda's" in life. Counterfactual thinking influences our decisions and emotions, and influences the course of history on a personal level, regarding the most rudimentary plans for the day, to a global level, involving

political and environmental issues with far reaching consequences. Every decision we make, every time we consider hypothetical possibilities and imagined outcomes, we are using counterfactual thinking. Emotions ranging from anxiety and regret, to satisfaction and accomplishment, come from considering what might happen, what might have been, and the risk of making a decision and acting on it. Counterfactual thinking involves temporarily suspending reality, understanding causal relationships, and considering other points of view and the effects of our actions. In short, counterfactual thinking is the human imagination at work.

The mature skill of considering and managing alternatives might seem to be a very adult activity, but children as young as 18 months show an ability to consider simple outcomes and act accordingly. In an experiment using a common ring-stacking toy, researchers taped over the hole in one of the rings. The 15 month-old toddlers would try different means to get the taped ring on the stack with the others and eventually give up, but the 18 month-olds would stack all of the regular rings, then hold up the taped ring and not even try it. Other responses included throwing the taped ring across the room, or picking it up and saying “No!” or “Uh-oh.” The 18 month-old toddlers were able to look at the ring, and based on their experiences with typical rings and stacking, act according to what they *imagined would happen* if they attempted to put the taped ring on the post (Gopnik, 2009).

Gopnik also found that in a similar study with 15 and 18 month-olds, the older babies were able to imagine a new use for an object, in this case, a toy rake. The 18 month-olds discovered that if they placed the rake just so, they were able to get a desired toy that was out of reach. However, the 15 month-olds either ignored the rake, or couldn't figure out how to use it as a tool. Other studies indicated that even the younger babies could solve problems insightfully if they had enough the background information (Gopnik, 2009).

In another study with older preschoolers, 3, 4, and 5 year-olds were told a story about walking across the floor in muddy boots, and then asked, “What could you have done so that the floor would not have gotten dirty?” The 3-year-olds were able to generate

appropriate possibilities, but the 4 and 5-year olds came up with significantly more possibilities (Guajardo and Turley-Ames, 2004; in Beck, Robinson, Carroll and Apperly, 2006). The children tried to engage in the same type of counterfactual thinking when asked both short and long causal chains, but when there were more steps in the story, it was more difficult (Beck, Robinson, Carroll and Apperly, 2006). This indicates there is a developmental progression in the application of counterfactual thinking.

These are just a few examples of the research on the development of counterfactual thinking. While there is some disagreement about the age at which children begin to think counterfactually, research indicates that imagining simple outcomes appears in the second year of life (Gopnik, 2009). Two and three year-olds can understand how an observed outcome might have turned out differently (Harris, 2000). Three year-olds demonstrate the ability to speculate on a real and potential outcome of a simple situation (Guajardo and Turley-Ames, 2004), developing into thinking counterfactually around age 4 (Beck, Robinson, Carroll and Apperly, 2006). Around 5 or 6, children are able to acknowledge multiple possibilities for outcomes, and gradually their counterfactual thinking assumes a more mature quality<sup>16</sup> (Beck, Robinson, Carroll and Apperly, 2006).

Research also suggests that young children use a simpler strategy than adults in their counterfactual thinking. The more mature, adult, ability to *contrast and compare* potential outcomes develops throughout childhood and is in line with theories that take a “complexity-based account of the development of children’s reasoning” (McCloy and Strange, 2009). In trials with younger children, who were not asked to explain *why* there was more than one possible outcome or *how* they chose the correct one, younger children could respond more closely to the adults’ response (Beck, Robinson, Carroll and

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<sup>16</sup> “We suggest that there are real limitations on 3- and 4-year-olds’ thinking about counterfactuals and future hypotheticals. They can pass standard questions in these domains by putting aside what they know about reality and speculating about single events. However, in keeping with the undecidability and ambiguity literature, acknowledging multiple possibilities poses serious problems for them. By around 5 or 6 years children can acknowledge multiple possibilities, as shown by our behavioral undetermined trials, and performance on our open counterfactual questions has improved. Only by this age can children’s thinking about future and counterfactual possibilities have the mature quality of speculation about genuinely alternative worlds.” (Beck, Robinson, Carroll and Apperly, 2006)

Apperly, 2006). This indicates a later application of metacognition, the ability to “think about thinking,” to counterfactual reasoning.

### **Summary**

The development of the imagination begins with the representations of the real world that form infant foundational knowledge about how the world works. With a limited but functional repertoire of these representations in place, even very young children use their understanding of causal regularities to explore possibilities in a make-believe world. This is not an immature stage that children grow out of, but the entry into the uniquely human, life-long capacity to imagine alternatives to reality. As Gopnik (2009) writes, ***“Understanding the causal structure of the world and generating counterfactuals go hand in hand. In fact, knowledge is actually what gives imagination its power, what makes creativity possible”*** (Gopnik, p.46).

The imaginary worlds of pretend play are just as important for young children as the real world. It is not that young children can’t tell the difference between real and imaginary, they simply enjoy both. The advantages of childhood protect children from adult responsibilities and demands, giving children the time and space to exercise their developing imagination and freely explore alternatives to reality, without fear of choosing the wrong path. The ability to imagine other possibilities is simultaneously as simple as having a birthday party for your stuffed animals and as profound as finding the trinomial cube in the pink tower.

The responsibility for educators lies in understanding the processes inherent in the development of imagination, the relationship between imagination and pretend, and the significance of supporting this developmental process. Imagination relies on a solid foundation of real-life experiences, accompanied by ample opportunity for exploration and experimentation; this *includes* exploration and experimentation through pretending or imagining alternative outcomes.

An education supporting the developing imagination will recognize that this self-construction requires child-directed experiences. Research confirms that imagination is a biological process as innate as walking or talking. Imagination is not something that can be taught through adult-directed activities, any more than adults can “teach” babies to walk or talk. However, adults can support imagination by granting children the liberty to express the workings of their imagination. The ideal learning environment for young children supports the development of imagination by providing exploration of real-life experiences enhanced by constructive, spontaneous imaginative thinking, including pretend.<sup>17</sup> The capacity to imagine, stretching the limits of reality, is at the very heart of humanity, and pretend play offers a universal expression - a window - into this fascinatingly human endeavor.

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<sup>17</sup> See Andrews (2010), “Montessori and Imagination: The Development of Imagination in the First Plane,” for an examination of how the Montessori prepared environment supports the development of imagination.

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