WHAT’S NEXT?
Dispatches on the Future of Science

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THE VITAL IMPORTANCE OF IMAGINATION

DEENA SKOLNICK WEISBERG

An extraordinary fact about our cognitive abilities is that we are not stuck in reality. We can travel back into the past (our own through memory, or the world’s through history), forward into the future, and outward into the realm of fantasy, imagining possibilities we know are not real and may never be.

Even very young children are able to make this leap beyond reality into fantasy; the earliest examples of this ability are their games of “let’s pretend.” A child can have a tea party at which there is no tea, or move a pencil along a table while making car noises, knowing full well that the pencil is not a car. Indeed, researchers have found that children as young as two, novice pretenders, understand that pouring make-believe water on a stuffed bear drenches the bear, even though no water has actually been poured and the bear is not actually wet.¹

As children get older, their understanding of the differences between reality and fantasy deepens, and they begin to interact in a mature way both with their pretend games and with stories not of their own creation. By at least age four, and often earlier, children have a firm grasp of the differences between real life and fantasy. They report that such creatures as witches and fairies don't really exist, and they know that a picture of a bear cooking in a kitchen doesn't depict a real event, although bears and kitchens are real.4 They also understand the nature of the difference between reality and fantasy, knowing that they can eat a real cookie but not an imaginary one.

Children would still understand all those things if they knew about only two categories of objects: those that are real and those that are fictional. If so, they would correctly understand that all real objects and people belong in the real world, but they would also believe that all fictional objects and people belong in one and the same fictional world.

This is not what adults believe. Adults create separate fictional worlds for different stories and generally do not expect characters from different stories to interact. Crossover stories—for example, Shrek or The New Batman-Superman Adventures—are clever and interesting to us precisely because they're unexpected; they violate the implicit rule that different stories are isolated from each other. Under normal circumstances, characters stay in their own proper fictional worlds.

I designed a set of studies to find out whether children understand these divisions within the fantasy realm as adults do or whether they understand only the distinction between reality and fantasy. I asked four- and five-year-olds three types of questions about characters familiar to them, like Batman and SpongeBob SquarePants. First, I asked whether they understood that these characters are actually fictional. (“What do you think about Batman? Is he real or make-believe?”) Second, I asked whether they understood that fictional characters in the same story are real to each other. (“What does Batman think about Robin? Does Batman think Robin is real or make-believe?”) Finally, to test whether children organize stories into separate worlds, I asked whether characters from different stories could come into contact with each other. (“What does Batman think about SpongeBob? Does Batman think SpongeBob is real or make-believe?”)

Children's responses on all three sets of questions were no different from the responses of adults asked the same questions. Like adults, children believe that Batman is fictional, that Batman and Robin are real to each other, and that Batman and SpongeBob are fictional to each other.4 The remarkable thing about these responses is that children (and adults, too) probably never think explicitly about the relationships among various characters, but when I asked the children to categorize

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such relationships, they had no trouble doing so. Children and adults alike impose an organizational structure on the stories they know, even if they may not realize they do.

This result prompted me to wonder whether children would similarly separate their pretend games. Pretend games are like stories, in that both take place outside reality and involve characters and sequences of actions—but they are unlike stories in that children have had more experience with them and exert direct control over them. Which would determine whether children separate the worlds of their pretend games—the similarities or the differences?

To answer this question, a research assistant and I created two pretend games, setting up a situation analogous to the two stories I'd asked about in the previous study. We used a set of colored blocks as pretend objects in these two games. For example, the first game involved a teddy bear who needed to take a bath. The child might pretend that one of the blocks was a bar of soap and scrub the bear with it. The second game involved a doll who needed to take a nap, and the child might give the doll a second block to be a pillow for her nap.

The crucial question was whether children think about their pretend games as separate worlds, the way they think about two stories, or whether there can be crossovers between the games. In this case, I wanted to test whether the child would be willing to take an object from one game and move it to the other. So I pretended that the bear, who had taken its bath, now needed to go to sleep. I said that the bear needed a pillow to go to sleep and asked the child to get a pillow for the bear. There were two responses a child might make to this request: either take the pillow from the doll’s game or choose a new block to be a pillow for the bear. The former choice would indicate no separation between the two pretend games—that is, objects in one could be moved to another with no trouble. The latter choice would indicate a separation, by revealing the child's unwillingness to move an appropriate object from one game to another. The children in this study overwhelmingly preferred to use a new block rather than transfer objects between games, and they responded this way whether the two games were played in sequence or in parallel.

Thus it would seem that children treat their pretend games in the same way as the stories they hear; these two types of fictional scenarios share the same organizational structure. The existence of a common structure suggests that the ability to think about stories and pretend games is supported by the same cognitive mechanism, which I call the *what-if* mechanism (WIM). This mechanism, as its name suggests, is a cognitive apparatus that allows us to ask “What if . . . ?” to explore possibilities that do not currently exist in reality. We do this in our imaginations, setting up scenarios and letting them play out, and we also do it with the help of authors and filmmakers, as we follow their explorations of the possibilities they have set up. What if I could turn invisible? What if there existed a ring of power, and what if that ring were to fall into the hands of a hobbit? What if a proud young woman named Scarlett O'Hara had lived in the American South at the time of the Civil War? In these cases and many others, all we need to do in order to transport ourselves outside current sensory reality is to ask “What if?” engaging the WIM.

I believe that all our various forays outside reality are supported by this mechanism, whether we are listening to stories,
playing pretend games, daydreaming, imagining the future, or
trying to work out what could have happened in the past. In all
these cases, we need to create a representation of something
outside reality. Furthermore, we know we're moving outside
reality and we can report that these representations aren't real.
In reality, there is a pencil; in the pretend game, there's a car. In
reality, there is no such person as Bruce Wayne; in the story,
Bruce Wayne exists and leads a secret life as a crime-fighting
superhero. Exactly the same sort of reasoning is involved when
we think about an alternative past (counterfactual reasoning) or
when we plan for the future (hypothetical reasoning). In reality,
events unfolded one way; in my imagination, I work through
what might have happened if they had unfolded another way. In
reality, I can see only the present; in my imagination, I can set in
motion possible future scenarios to help me predict what will
happen and what my best course of action is. I call all these
types of representations fictional worlds, to capture their two
defining properties: they're not real, and we know they're not
real.

The main goal of my research is to discover the nature of
the what-if mechanism and how it allows us to create and com-
prehend fictional worlds. The two studies I conducted have
revealed at least one of its signatures: multiple fictional worlds
are kept separate from one another. Those studies found this
multiple-world structure both for stories and for pretend
games, and I am hopeful that my future studies will find it for
counterfactual and hypothetical scenarios.

Besides separating fictional worlds from each other, another
job of the WIM is to navigate the boundary between reality
and fiction. In some ways, this boundary is rigid. Characters like
Batman are fictional and shouldn't migrate into reality; a block
that one pretends is a cookie shouldn't be mistaken for a real
cookie. But in other ways the boundary is more fluid. For one
thing, we take many aspects of reality with us when we enter a
fictional world. Batman might exist as a crime-fighting super-
hero, or time travel might be possible, but two plus two still
equals four, water still turns to ice when it freezes, and it is still
impossible for something to be colored blue and not colored
blue at the same time. The laws of mathematics, science, and
logic still hold, even in what appears to be a radically different,
fictional world. The WIM must thus be able to project an ap-
propriate set of real-world facts and rules into a fictional realm.

Moreover, we take many aspects of a fictional world with us
when we move out of fiction and back into reality. This might
seem like a strange claim, but consider that we learn quite a lot
about reality by reading books and watching movies and TV
shows—including, importantly, things we would never other-
wise learn. When we read or see Othello, we learn about the
destructive power of jealousy, even if we've never been driven
mad by it and likely never will be. When we watch an episode of
CSI, we learn what collecting and analyzing DNA evidence is
like, even if we've never seen or used those techniques in real
life. And if someone told you he was going to find out what life
was like in nineteenth-century Russia by reading a Tolstoy
novel, you wouldn't bat an eyelash. Learning about reality from
fiction happens all the time, whether it's understanding emo-
tional truths, getting a feel for a country or an era, or picking up
some practical information.

This is precisely the property of fictional-world cognition
that makes it so useful to us—and so useful to children as they
develop. There's a lot of reality we can't explore directly, especially as children. But by using our imaginations, we can still learn about things we don't actually experience. In fact, some researchers speculate that this is what pretending is all about: giving children an opportunity to play other social roles or explore other aspects of their personalities in a safe, separate space. Children may not learn practical facts from a pretend game, as they can from a story, but they probably do learn social and emotional facts—like how to interact in certain scenarios, or how it feels to do certain things without experiencing the scenario for real.

Every day there are problems we need to solve, and we use the WIM to help us. Maybe the car won't start, and we need to find out why. We can run through fictional scenarios: What if the battery is dead? What if the transmission is broken? For each possibility we come up with, we use the WIM to set a scenario in motion to see what would follow if that possibility were true. We can then move back into reality to test those possibilities, using the information from our imagined scenarios to help us plan. If the battery is dead, I can get my car jump-started, but if the transmission is broken, jump-starting won't help. Even these simple calculations require imagination, require deploying the WIM, require moving outside reality. Reality offers no help; the car won't start, and that's all the information I have. I can get more information from reality alone by exhaustively performing a wide variety of actions to try to get the car started, but that's not a practical way to collect data: by temporarily sidestepping reality and creating an imagined scenario in which I know what's wrong, I make the best use of my time and resources to solve the problem facing me.

This function of the WIM is even more essential for children, who have so much more of reality to puzzle through. It would be impossible for them to perform every possible action they could take at any point. Like adults, they need to move outside reality and work through what might happen if they were to do a particular thing. If the result is favorable, they can go ahead and try it; if not, they can think of a different possible action and they won't have wasted time on something that isn't going to work.

Basically, the WIM is an engine for learning. Although its primary function is to get us outside reality, these fictional ventures provide us with a new window onto reality. It might be fun to play a pretend game or listen to a story, but in the background the WIM is doing its work of pulling useful information from these fictional worlds into reality, expanding our practical, emotional, and social knowledge. The trick is to make sure it's pulling the right information. This is a major question for my future research: how do we know what's appropriate to take from fiction into reality? Is this something we know automatically, the way we automatically know how to create fictional worlds? Or is it something that requires experience and learning?

I suspect the answer lies somewhere in between. Children probably know implicitly that they can get useful real-world information from a fictional scenario. This is what lets them perform productive actions in the world based on their ability to plan for the future, and it's what lets them work through real-world issues in their pretend games. But there are also nuances with respect to what adults take from a fictional world. For instance, Harry Potter isn't real, and we shouldn't bring the character himself from fiction into reality. Even children know
this much. But what about the house where he lives in England, no. 4 Privet Drive? Could this street exist in reality? What about his mentor, Professor Dumbledore? He doesn’t really exist, but could there be someone similar to him in reality? Perhaps, but similar to him in what ways? A real person wouldn’t have Dumbledore’s magical abilities, but which of his other physical or psychological traits are potentially real?

Adults have subtle intuitions about the answers to those questions that children likely don’t share. Children’s intuitions are probably more extreme than adults’; that is, they may take too much from fiction into reality—or too little. Children may see the boundaries between reality and fiction as more fluid than adults do; they may pull nearly everything from fiction into reality and hence believe in the existence of strange entities or in the operation of strange rules that don’t actually exist or operate. Conversely, they may see fiction as more separate from reality than adults do and not understand that even in stories, most of what is depicted about human interactions or physical phenomena could easily be real.

I hope to shed light on these issues. But what’s clear for now is just how important the WIM is to children. This basic imaginative skill, which lets us pop temporarily outside reality to work through various possibilities, is one of the primary tools children use to make sense of the world.