

# A THINKER'S BOOK OF DANGEROUS KNOWLEDGE

A Humorous and Practical  
Guide to Critical Thinking



**CAUTION**  
MAY CAUSE ORIGINAL THOUGHT

Peter Rogers

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First Edition

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# 6 Common Errors in Thinking

These six cognitive errors were originally identified by Thomas Kida in his book, *Don't Believe Everything You Think: The 6 Basic Mistakes We Make in Thinking*.<sup>8</sup>

## Error #1 We prefer stories to stats.



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<sup>8</sup> Thomas Kida, *Don't Believe Everything You Think: The 6 Basic Mistakes We Make in Thinking* (New York: Prometheus Books, 2006).

Let's face it; data analysis is not as much fun as, say, *Animal Crackers*. It's part of how we're wired. We tend to gravitate toward amusement and stories, rather than toward statistical information. Let's go back to that example I mentioned earlier: car shopping.

Let's say that *Consumer Reports* rates the car you are thinking of buying as being very reliable. Fairly high marks, across the board.

But then your Uncle John tells you that he has had that very same model of a car, and he complains all the time that it has been nothing but trouble. He goes on to tell you the horrific story of how the engine caught fire while he was driving his friends to the premiere of *The Adventures of Pluto Nash*.

Now, despite the fact that the unfortunate incident in question most likely saved Uncle John and a carload of people from certain mental atrophy from having to sit through such a tepid movie, would you still buy the car?

Generally speaking, we tend to trust unique personal experiences over "impersonal" data, even though the statistics actually represent the aggregated experiences of many, many people.

Why? Because, basically, we *like* stories. Zarch, who doesn't? Stories can sometimes help convey important lessons about our world, and the world around us. And the worlds around the distant planet, Valholla in the distant collection of star systems known as the Bumqnqurah Amalgamated League of Life-forms. But that's another story. When

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we process information, it's easier for our tiny little minds to associate information with an anecdote. It makes remembering things a lot easier.

However, when exercising our abilities to think, we shouldn't place inordinate importance on stories. We should actually trust carefully reviewed statistical data.

All right, all right, I know it's not as much fun, but your decisions will be *way* better. Isn't that the point?

Now, if you can find a way to associate carefully reviewed statistical data with a neat story, then you're golden! So the next time you're faced with a decision-making situation, maybe try this: go over the data, and make up a story to make the data relevant to you. That might help. Because even though data is nice, we still prefer stories to statistics.



So here's a story.

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### **The Watering Can**

Once upon a time, there was a happy little bunny named Marie. Marie wanted to buy a new watering can so she could have a healthier, happier vegetable garden full of nice, orange carrots.

Marie's friend, Squirrel told Marie about her experience with the watering can she just bought last week: the WaterPro VII. Squirrel said that the WaterPro VII was terrible. The day Squirrel bought it, the WaterPro VII worked fine. But the next day, Squirrel tried to use it, and it was completely clogged up with oak leaves. The WaterPro VII didn't work at all! Squirrel told Marie not to buy the WaterPro VII, because it was a piece of garbage!

Marie went to her local library and did some research on watering cans. She found that there were two watering cans that were the highest rated: the SprinkleStar Max, and the WaterPro VII. The SprinkleStar Max was twice the price of the WaterPro VII...but her good friend, Squirrel had told Marie not to get it.

What should she do?

Well, being a smart bunny, Marie went and bought the WaterPro VII, anyway!



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And do you know what happened?

The WaterPro VII worked perfectly for years and years, and years. Marie's garden grew healthy and happy, and her carrots were the biggest, juiciest carrots in the whole meadow.

So the moral of the story is: check with your friends to see what they recommend. And then check the facts. Your friends may be nice, but they may also be wrong.

(Especially if they live in an oak tree, like Squirrel, and their oak leaves get just *everywhere*, regardless of the type of watering can they have.)

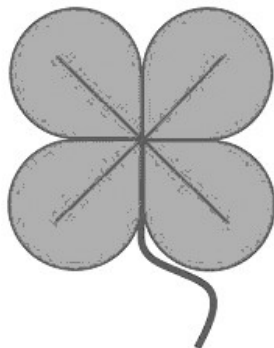
And everyone lived happily ever after.

The end.



## **Error #2**

**We have a confirmation bias.**



This is also known as “myside bias.” Basically, it means that we are more likely to look for, find, interpret, and subsequently remember evidence that supports our beliefs, rather than evidence that does not. Because really, who wants to be wrong? About anything?

In fact, oftentimes, we completely ignore or rationalize away evidence that does fit in with our current belief structure. This “confirmation bias” can lead to all sorts of mischief including stereotypes and prejudices as well as lead to pseudoscientific thinking. And fuddyus grumpyus, a rather common ailment that affects one’s ability to try that new taco place down the street.

So how do you recognize “confirmation bias?” Here’s an example: if you believe that if you walk under a ladder you will have bad luck, you will notice all the unlucky things that happen to you after you walk under a ladder.

If you believe finding a four-leaf clover is good luck, you will notice all the lucky things that happen to you after finding a four-leaf clover.

If you believe that, after doing something unlucky, spitting three times over your left shoulder will remove any specter of back luck from you, then you’ll probably notice bad things that happen until you spit, then good things after you’ve done so. Besides the fact that anyone standing behind your left shoulder will be a wee bit miffed that you just expectorated bits of your lunch all over them because of a superstition. If that does happen, just explain to the recently drenched individual that you’re suffering from a severe case of confirmation bias.

Beliefs like this are self-fulfilling prophecies.

If you believe that having blonde hair makes people dumb, you will notice the stupid behavior of the *occasional* blonde person, without noticing *all* the other blonde people who are of normal intelligence. Or those of us with at least a D+ intelligence.

If you believe in flying saucers, you will remember that article you read one time from a credible navy pilot who claimed to have seen a flying saucer, without remembering the other, dozen or so articles written by equally credible

sources who say that the navy pilot from the first article was mistaken.

If you believe Sandra Bullock is a bad actress (perhaps based on her performance in *All About Steve*), you won't think she deserved the Oscar for best actress that year for her role in *The Blind Side*.

We humans have a tendency to first only see, and then really emphasize what fits our preconceptions. And then we just ignore what doesn't fit.

Everyone does this.

Lawyers, surgeons, priests, mechanics, football players, secretaries, scientists, authors, Lebanese street food therapists, etc., etc. We all like to think of ourselves as "objective," and not prone to those biases. But we are. We're human, which means that our views of the world are affected by culture, upbringing, socioeconomic status, training, genetic makeup, genetic cologne, genetic deodorant, genetic after-shave, and so on. It doesn't matter how "objective" we try to be, we're all subject to a wide variety of expectations that dis-tort and alter our perceptions and interpretations.

Swell. So what do we do? How do we overcome this?

Well, maybe we can't totally conquer this one, like we've conquered smallpox, and the Beta format for video tapes, but we *can* do something about it.

**We become aware that we do it.**

With this knowledge, with this awareness, with this perspective, with this *power*, we can watch out for this confirmation bias that creeps into everything we perceive. We can recognize our tendency toward bias, and recognizing it, we can mitigate its effect on our perceptions.

We can kick confirmation bias' ass!

Yeah!

The big problem with this common error in thinking has to do with learning. The way we learn, process, and understand concepts are functions of how new knowledge fits in with our preexisting knowledge and beliefs. So when we alter information to fit our preconceived ideas about a particular subject, we give birth to misconceptions.

We actually *teach* ourselves untruths.

We do it all the freaking time! Can you believe that?!  
What are we, crazy or something!?!?

Hmf.

Maybe, huh?

## **Error #3**

**Gut feelings usually beat statistics.**



We have a general misunderstanding of the role of chance and coincidence in shaping events. Sometimes stuff just happens.

Being a bear of very little brain, I never studied statistics, so I don't really know how to calculate the probabilities of events. As a result, I tend to rely on intuitions I've developed from personal experience. Most of us do. I get a gut feeling about stuff. And not just from eating fast food.

The trouble with this error in thinking is that this can lead to cognitive errors. Intuitions are not always based on

sound reasoning. Sometimes intuitions are right, and sometimes they're wrong. (How often? See that bit about "confirmation bias," above.)

For example: the "**gambler's fallacy**," in which people believe that tails is "due" after a run of heads.

Or the "**hot-hand fallacy**," in which people believe that, when Michael Jordan makes several baskets in a row during a basketball game, that he will likely continue to make shots as the game goes on.

Neither belief is true.

In fact, these beliefs are logically contradictory.

The odds of a coin landing tails side up are essentially the same from one coin toss to the next.

The odds of Michael Jordan making a basket were essentially the same from one shot to the next. Sure, ole' M.J. might have been "in the groove," and really on his game one night, but the odds of him making a basket from one shot to the next, were essentially the same, allowing for extraneous factors like opposing team members, his position on the court, and the number of crazy fans flashing cameras, waving t-shirts, and throwing underwear and things at him at the time. The math gets very complicated at that level. But the odds are still the same. There is still the element of chance involved.

In fact, if you count X number of shots, M.J. will have some hits and some misses, the percentage of each being based on his level of skill, physical/emotional/psychological well-being, energy level at the time, etc. In there, you will



see some chunks of misses, and some chunks of hits. Looking at this, you might say that he's shooting in a series of streaks.

In actuality, he isn't. His overall shooting percentage is exactly the same as it always was, regardless of how many hits he's had recently.<sup>9</sup> This "hot-hand fallacy" has no effect on the percentage of shots M.J. will make, and has nothing to do with whether or not he will make any successive shots. The only thing this "hot-hand fallacy" does in basketball is to give players with higher overall shooting percentages more shots. Which means more hits. Which means more points. Which means more people believing in the "hot-hand fallacy."

Yay for "gut feeling" winning out over statistics!  
Because who likes statistics, anyway?

So we have people believing in both the "gambler's fallacy" and the "hot-hand fallacy." And sometimes they believe both things *at the same time*.

Pure, dumb luck happens all the zarching time. But we are pattern-seeking animals. We look for the reasons behind things. Which is good. We *should* be looking for the rea-

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<sup>9</sup> See Jonathan Koehler, "The 'Hot Hand' Myth in Professional Basketball," *Journal of Sport Psychology* 2 (25) (2003): 253–259.

Or

Bruce D. Burns, "The Hot Hand in Basketball: Fallacy or Adaptive Thinking?" which can be found online at <http://conferences.inf.ed.ac.uk/cogsci2001/pdf-files/0152.pdf>.

sons behind things. It's one of the many things that separate us from monkeys. That, and car keys.

But we don't realize that what's really behind a lot of things is a good deal of math, statistics, and probability theory that most of us just can't quite wrap our tiny little minds around. So we stop thinking at the point where we see a pattern.

Without looking for the pattern underneath that one.

Or without looking for the pattern underneath that one.

Or without realizing that underneath that one, there's just no pattern at all, and it's just zarching chaos theory, man! Or that there's actually a pattern underneath the chaos theory, but again, it's all statistical probability equations that we just can't solve on our fingers and toes, so we give up. And completely miss the pattern under that one. And the missing left argyle sock under that one.

But dumb luck just keeps happening. And sometimes, there's just no pattern. Sometimes it's just blind chance.

And we just don't get it.

Because patterns are more interesting to us.

Lucky us, huh?

## **Error #4**

**We trust the reliability of our senses.**



“I know what I saw.”

We all say it. We all believe it. After all, we all saw it!

I think there are a few reasons why this is actually a common error in thinking. As an example, think about how many doors there are in your home.

Are you silently counting to yourself?

What’s wrong with you? Don’t you know, right off the top of your head how many zarching doors there are in your home? Don’t you walk past them every single day? Haven’t you been living in your home for a while now, and shouldn’t you know something basic like that? Why are you mentally walking through your home, counting doors? What are you, blind?

Most people don’t store information like “number of doors” in their brains. This is because we see normal things like doors and stop signs and rocks and trees and convenience stores and carpets and things and we just don’t think

much about them. We've already built up a model in our minds of these things, and we don't need to fully analyze each thing every time we see it.

I just don't need to know how many doors there are in my home. It's not a relevant piece of data that I need every day, like my phone number, or where I put my keys, or what ship made the Kessel Run in less than twelve parsecs. Relevant information like that, I have handy at all times.

I don't need to know that when I look at a glass on my desk, I see a drinking glass that's exactly 6.2" high, 2.76" across at the mouth, tapered 0.3" in at each side, made of tempered clear glass, weighing just over 5.7 oz.

I just perceive "it's a drinking glass" in the back of my mind, and pretty much forget about it. I've seen drinking glasses before, and my vast, forty-plus years of experience have given me enough time to finally get the idea of "A Glass from Which You Drink Stuff." I may be slow, but I do eventually pick up on things.



Until the glass becomes a focus of my attention, for some reason.

Which is why things like joke dribble glasses are kind of funny. We don't look at a glass and wonder if it will do its job. We've used enough glasses in our lives to not worry about such things.

So when I pick up a joke dribble glass and the water runs down my chin and spills all over my recently dry cleaned shirt, it's rather amusing to the practical joker.

"Ha," they think to themselves. "That person made an assumption about an object in their environment! That's amusing!"

To them, anyway.

And we humans do that all the time.

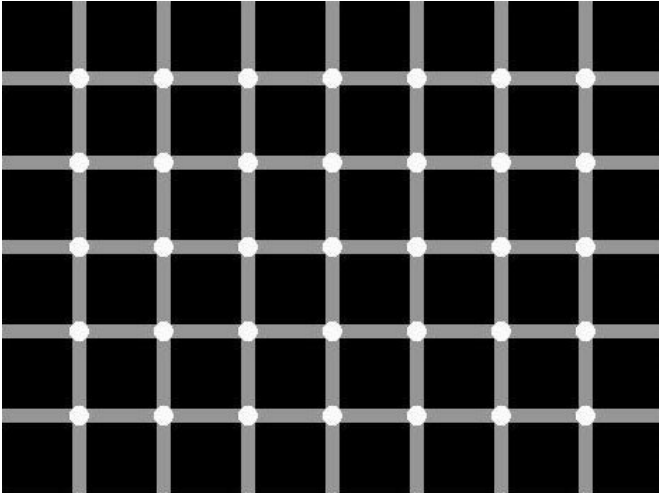
No, not that we think, "Ha! That person made an assumption about an object in their environment!" I don't think any-one actually thinks like that. (It's probably more along the lines of: "Ha! Funny! Wet shirt! Surprise, Eric!") No, the thing we do all the time is to not fully analyze each thing every time we see it. Frankly that would take up a zarching lot of time, and probably lead to some rather unhealthy cognitive patterns. And we'd be no fun at parties.

The other reason that trusting the reliability of our senses is a common error in thinking is that our senses are not the finely tuned scientific instruments we'd like them to be.

Our senses sometimes make mistakes.

Look at any optical illusion. There are hundreds of them out there. Here are a few:

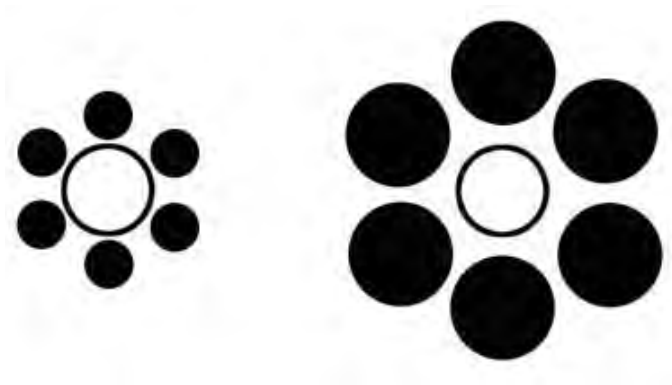
*Peter Rogers*



How many black dots are there?

This illusion was discovered by Elke Lingelbach of the Institut für Augenoptik Aalen in Germany. It's based on an illusion called the "Hermann Grid," which dates back to 1870.

Why are your eyes not working properly?



Which circle in the middle is larger?

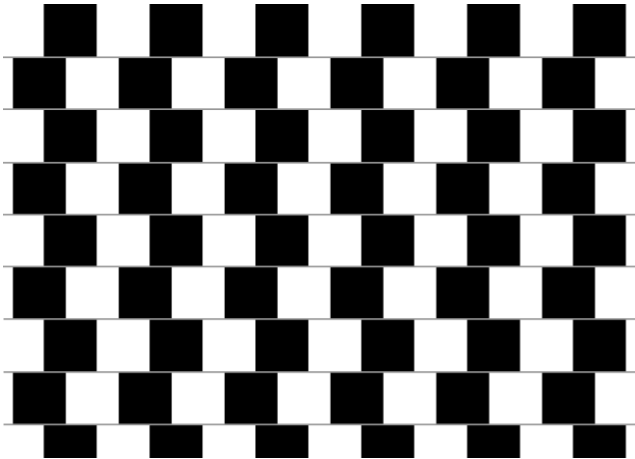
What do your eyes tell you?

What does a ruler tell you?

Which do you believe?

Which do you *want* to believe? Stupid ruler!

So, if teachers rap your knuckles with a ruler to teach you a lesson, what do you rap a ruler with to teach *it* a lesson? Knuckles, maybe?



Are these horizontal lines parallel, or do they slope?

What do your eyes tell you?

What does a straight edge tell you?

Which do you believe?

You should really show that straight edge who's boss!



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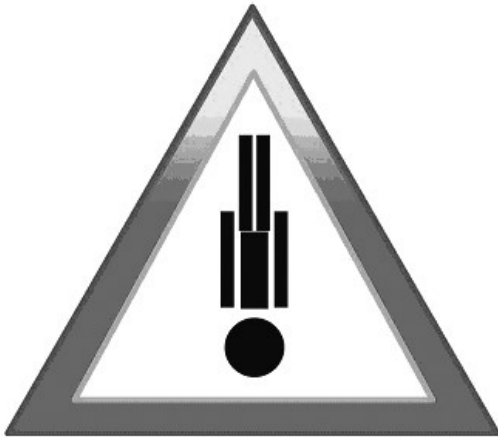
Here's a famous optical illusion, published in 1915 by cartoonist W.E. Hill.

Do you see an old woman or a young lady? There are only so many lines in the drawing, so which is it? Which is true? What do your eyes tell you?

Bonus question: how would a Freudian psychologist interpret your perception of these lines on the paper?

These optical tricks work because our eyes can be tricked. Our eyes, ears, noses, fingers, and tongues aren't always that accurate.

This is because perception itself is a reconstruction by the brain of the external world around us, based on limited sensory inputs, and colored by our expectations. We don't experience visual data like a camera. We experience visual data as a fully analyzed *opinion* of reality.<sup>10</sup> Not surprisingly, such a system sometimes makes mistakes.



To err is human.

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<sup>10</sup> John Medina, *Brain Rules*. (Seattle: Pear Press, 2009).

And not only are our perceptions influenced by our expectations, but hallucinations are far more common than most people think. Hallucinations happen all the time, and not just when you're groggy, drunk, stoned, or seriously shagged out from jet lag.<sup>11</sup> Studies have found that around 10% of the population have experienced one or more spontaneous hallucination.

In his 2012 book *Hallucinations*, Dr. Oliver Sacks notes that even migraine headaches also produce hallucinations, including a bright "shimmering light." Dr. Sacks described the phenomenon, saying that the light expanded into an enormous arc with "sharp, glittering, zigzagging borders and brilliant blue and orange colors." Dr. Sacks explains that the reason hallucinations seem so real "is that they deploy the very same systems in the brain that actual perceptions do. When one hallucinates voices, the auditory pathways are activated; when one hallucinates a face, the fusiform face area, normally used to perceive and identify faces in the environment, is stimulated."<sup>12</sup>

And that's ignoring dreams, lucid dreams, and false awakenings. And street magicians. Ever see someone do a good card trick? Illusion!

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<sup>11</sup> P.D. Slade, and R. P. Bentall, *Sensory Deception: a scientific analysis of hallucination*. (London: Croom Helm, 1988).

<sup>12</sup> Oliver Sacks, M.D., *Hallucinations*. (New York: Random House, Inc., 2012).

Add to that the fact that we see optical illusions all the time. You just saw three or four of them when you looked at the previous pages. Are you high right now? (If you are, you might want to be watching TV instead. That, and perhaps contemplating your life choices.)

And that's to say nothing of the fact that our senses aren't all that good to begin with. How many people do you know who need glasses to see properly? People need hearing aids, and eye glasses, and their senses of taste and smell change over the course of a lifetime, and people's sense of touch gets less refined over time. Our senses just aren't that good.

Our senses allow us to form opinions of reality, but they don't always show us what's *really* there.

You should definitely look up the *sensed-presence effect*, dualism, the effects of dopamine on perception, sleep deprivation, and animism false positives (patternicity). (I'll talk more about this last one later.)

The point is that we can never know for sure if our senses are accurately reporting what is really going on around us.

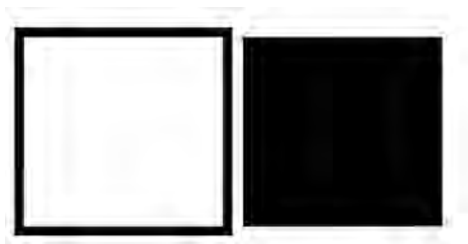
But we almost always think they do.

I mean, really. What other means do we have of perceiving the world?

Besides Facebook, of course.

## **Error #5**

**We tend to oversimplify stuff.**



The learning aids (a.k.a. heuristics) we use to guide our thought processes help us avoid information overload and let us make decisions in a timely manner.

Because sometimes it actually helps to boil things down to one or two alternatives.

“To have an opinion one must overlook something.”

~Charles Fort

However, these mental shortcuts can also lead us widely astray. Worse than that, by shortcutting our problem-solving guides, we can potentially leave ourselves vulnerable to deception by those who want to totally mess with us, or manipulate us, or who want to sell us a Marianas Trench timeshare condo.

A common example of this oversimplification you might hear is: “You’re either for us, or you’re against us.”

Really? Is life really so black and white?

Here’s another one: You’re either alive or you’re dead.

But what about when you’re in a coma? Or when you’ve suffered a horrible accident, and your brain has ceased functioning, but the hospital is keeping your body alive with machines? Some people would say, “they’re still alive.” But what if the brain is mush, or even removed? Are they still alive? What if you’re stuck in line at the DMV? Is that life? What is life? Death occurs over a period of time, as various bodily functions shut down. Maybe it’s not so clear, after all. Unless you explode.

You either love vanilla or you hate it.

Really? What if you’ve ambivalent toward that flavor? What if you just sort of like it a little bit? Aren’t there degrees of love and hate? Aren’t there degrees of “for” and “against”? Aren’t there degrees of being and not being? Aren’t there degrees of avocado and not avocado? Are there? Prove it.

This “either-or” mistake in reasoning is often referred to as a “false dilemma.” It’s basically a fallacious argument by elimination. In a false dilemma, you ignore other likely possibilities and frame issues as “either-or.”

We do it all the time. We humans prefer to think of things as either black or white. It’s easy. It’s convenient. And it saves time. And really, with basketball practice and

piano lessons coming up on Tuesday, who has time to analyze every-thing these days, anyway?

It's perfectly natural to simplify complex problems. Heck, it probably helped our ancestors to avoid things like saber tooth tigers and enemy tribes and door-to-door fire salesmen and things.

The problem is that we humans tend to *oversimplify* things.

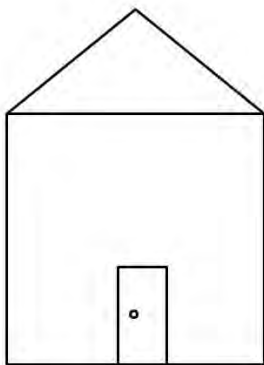
“For every complex problem there is an answer that is clear, simple, and wrong.”

~H. L. Mencken

Here's another example:

Say you're standing in front of a house, and it's painted white. What color is the house?

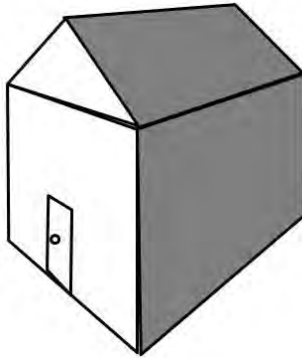
You'd say: “It's a white house.”



Walk around to the other sides, and you might see that the other three sides have been painted gunmetal gray.

What color is the house?

Whups.



Another example of this oversimplification in our thinking is conspiracy theories. Author Phil Molé in an article called: “9/11 Conspiracy Theories: The 9/11 Truth Movement in Perspective,” says:

“Chaotic, threatening events are difficult to comprehend, and the steps we might take to protect ourselves are unclear. With a conspiracy theory that focuses on a single human cause, the terrible



randomness of life assumes an understandable order.”<sup>13</sup>

Isn't it easier to blame someone or something for our fears? We humans love a good scapegoat. It's actually rather comforting to be able to point to someone or something and say, "They're to blame!" We can deal with that. We can wrap our tiny little minds around a good scapegoat. And then we can do something about it.

We can git 'em!

But without a good scapegoat...I feel powerless.

And that feeling sucks.

Anger is way more fun than impotence.

Besides, we love love love looking for patterns.

And simplifying things.

There are only TWO types of people in this world:

1. Those who categorize things into two groups.
2. Those who don't.
3. And those who can perceive alternatives.

I think my favorite quote somewhat related this oversimplification error is from comedian Steven Wright:

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<sup>13</sup> Phil Molé, "9/11 Conspiracy Theories: The 9/11 Truth Movement in Perspective," (*e-Skeptics Newsletter*, September 11, 2006).

*Peter Rogers*

“A conclusion is the place where you got tired of thinking.”

## **Error #6**

### **Our memories are faulty.**



Let's face it: sometimes we forget. Sometimes we misremember things. It happens. We all know this. We've all forgotten something at some point. We've all misremembered where something was. Now where did I leave that article about memory? Shoot.

The strange thing is that we also generally assume that what we *do* remember is an accurate representation of past events.

“I know what I did.”

Really?

“Well, I've forgotten a lot of stuff in my life, but I remember *that* one thing.”

Oh, suuuure...

A vast program of memory research has shown that human memory is exceedingly unreliable.<sup>14</sup>

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<sup>14</sup> Just as an example, read Elizabeth F. Loftus, “Creating False Memories,” (*Scientific American*, September 1997, vol 277, #3),

I've always thought of memory as sort of video recording. I can play back past events in my mind and watch them over again. Some parts I've re-watched dozens, if not hundreds of times. They're the fun ones, like when my wife and I went to the fair and had a chocolate-dipped ice cream bar with nuts *and* caramel crunch topping, and then played Whac-a-Mole until we'd beaten them senseless!

The problem with this perception is that memory isn't a video tape. It's not even a Blu-ray disc. Memory is a reconstruction based on my current beliefs and expectations as well as the suggestions of others.<sup>15</sup>

I've remembered that trip to the fair at least a hundred times, but I have no idea what color my Whac-a-Mole stick was. I don't even remember what shoes I was wearing. And I walked all *over* that fair in those things.

Still don't believe that our memories are faulty?

Without looking, what were the first five common errors in thinking?

What was the first word at the top of the last page?

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70-75. You can also find it online at <http://faculty.washington.edu/eloftus/Articles/sciam.htm>.

Or read David C. Rubin, ed., *Remembering Our Past: Studies in Autobiographical Memory*, (Cambridge University Press, 1996).

<sup>15</sup> Elizabeth Loftus has identified four major reasons why people forget: retrieval failure, interference, failure to store, and motivated forgetting.

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What shirt were you wearing on September 11, 2001?

What did you have for breakfast on August 14<sup>th</sup>, 2010?

What did you have for lunch two Thursdays ago?

How many guests were there at your 7<sup>th</sup> birthday party?

What was that thingy you left somewhere, that one time?

Sometimes we remember, but sometimes we forget.

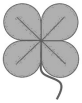
We can't make everything important.

O.k., so let's test our memories: what were the 6 most common errors in thinking?

**The 6 most common errors in thinking:**



We prefer stories to stats.



We have a confirmation bias.



Gut feelings usually beat statistics.



We trust the reliability of our senses.



We tend to oversimplify stuff.



Our memories are faulty.

*A Thinker's Book of Dangerous Knowledge*

Wait, what was that last one again?