CHAPTER 26: OUR BRAINS INTRINSICALLY MISLEAD US

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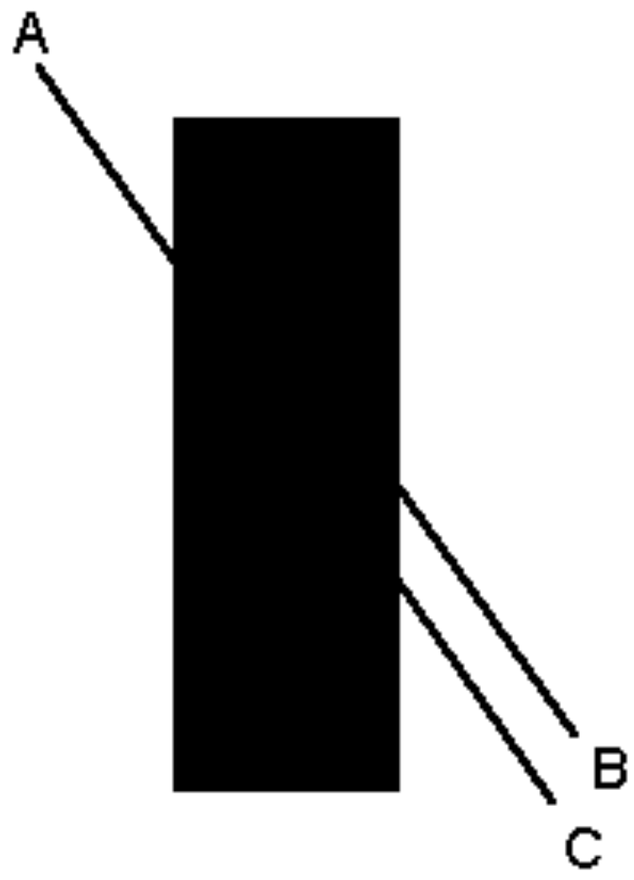
IMPEDIMENTS TO SCIENTIFIC PROGRESS

Our intuition and instincts can mislead us in some important ways unless we are alert to avoiding them.

Introduction

Our brains are very useful organs in solving problems. Merely relying on intuition to solve a problem or make the right choice has some well-known limitations, however. Optical illusions and magic tricks are examples familiar to all of us in which appearances are deceiving. Consider the following picture:



The straight line appears to be AB, but it is really AC. There are many such optical illusions, and magic tricks often take advantage of them.

Magic tricks and optical illusions are examples in which we know our brains are fooled by appearances. Other ways in which we are deceived are more subtle. The following list offers some flaws in our natural instincts, which are discussed in turn.

Behaviors That Can Lead Us Astray

1. We observe a correlation or association and automatically think causation
2. We respond unconsciously to many emotional, personal and environmental factors
3. We search for and remember confirmatory evidence of our beliefs rather than a test
4. Our memories are reconstructed over time
5. We prefer simplicity and certainty

(1) The power of association:

This point goes back to the message of the correlation chapter, that correlation does not imply causation. Unfortunately, our minds are very easily influenced by the associations we observe. In an experiment done by psychologists approximately a decade ago, students were shown an item of clothing (e.g., jacket or sweater) and told to imagine that it had been owned and worn by someone famous or infamous. They were then asked to rank the desirability of wearing that item. The imagined previous ownership had a powerful effect. Items whose imagined previous owner was infamous were regarded as highly undesirable, whereas items imagined to be from the noble or famous were regarded as desirable. Of course, we know well that people collect items previously owned by the rich and famous. The fact that the desirability of an item is based on its history of previous ownership reflects just how strongly we respond to associations.

Advertisers use this principle effectively. Endorsements of a product by someone famous is now routine and begets the personality high dollars (e.g., Michael Jordan endorsing shoes, football players endorsing beer, Elizabeth Taylor endorsing her perfumes; the movie "Attack of the Killer Tomatoes" portrayed an ad in which Jesus Christ endorsed an electronics company). The practice works because of the association people make between the product and the personality, which may have nothing whatsoever to do with the quality of the product. Another advertising strategy which makes use of this principle is to advertise a product in an appealing setting - Coca Cola being consumed by exuberant, happy people, cars being driven on scenic roads or featured with people in remote settings. In the "old" days, cigarette commercials were allowed on television, and the Salem brand was typically advertised in a "springtime" setting with a young man and woman; Marlboro was portrayed in a remote Western setting by a man on horseback. In neither case did the commercial make any reference to the quality of the product. It was just a gimmick to build an association between the product and a situation that the viewer was likely to enjoy.

The fact that we are respond to associations means simply that we need to be aware of this limitation and to separate our analysis of a phenomenon from the setting in which it is observed.

(2) Innate Responses:

Closely related to the point above is the fact that we have many built-in behaviors. Situations that evoke fear and greed are very powerful at getting our attention. Sex (sex appeal) is another factor generating a strong response. Advertisers commonly use sex appeal to build an association with their product, as per (1) above. Greed is evoked by some ads as well, but fear is used much less, perhaps because fear is not a good emotion to associate with a product you want to sell. However, American Express travelers checks used the fear of vacationers being victimized by theft as a way to promote their product. Fear and greed are also two of the main driving forces behind most cons and scams. Most scams succeed because of greed, but once people get sucked in, the fear of exposure (or of notification to the IRS of illegal activities) is used to sustain the con. Many chain letters evoke both fear and greed in offering vast rewards for sustaining the chain (i.e., for sending money) while warning of the extraordinary bad luck that has befallen those who broke the chain.

Ideas that evoke these strong emotions can develop a contagious, social momentum that can have unfortunate consequences. Michael Shermer (1997, Why people believe weird things, W.H. Freeman and Co., NY) describes two instances of epidemics of false accusations: Medieval English Witch crazes (1560-1620), and much more recently, the "recovered memory" accounts of sexual abuse by parents (1992-1994). In the witch craze, the number of accusations arose from nothing to hundreds over a couple decades. The recovered memory epidemic was much more precipitous, accelerating from none to over 10,000 accusations in under 2 1/2 years. Then, as evidence to support the wild claims failed to surface, the accusations died out. Harmless examples of these epidemics of emotion-invoking tales nowadays are often described as "urban legends," because they evoke such strong emotions that people spread the story rapidly and aggressively. (One urban legend tells of a businessman who went into a hotel bar one night and awoke the next day in a bathtub, with both his kidneys surgically removed.) The point is that stories which evoke strong enough emotions and are told to enough people can create a hysteria that interferes with a careful evaluation of the evidence.

Control is another feature that is important to us. A situation that denies a person control over an outcome that affects them is more likely to be avoided than one that allows control. It is well known, for example, that people are willing to accept much higher levels of risk when they are given the choice than when not. For example, people are much more inclined to fear flying than driving, even though driving is much more dangerous. And people are very intolerant of low levels of pesticide residue in food, even though many people freely accept the risks associated with smoking and with drinking.

Built-in responses go far beyond these few cases just mentioned. People have favorite colors, they find certain shapes more appealing than others, and a person's "body language" and dress has a big influence on the responses of others. These factors can be very important when persuasion is an integral part of the goal. Lawyers and business people in particular must heed these factors, highlighting the simple fact that many people make decisions and choices in non-scientific ways.

3) Wanting to know we are right:

One of the most damaging tendencies of ours is the search for confirmation rather than truth. If we just paid a large sum to purchase a car, we look for ways to convince ourselves that we made a good choice. We do not want to find out that it could have been purchased for less at another dealer, nor that some flaw in its design has just been discovered. Instead, we want to feel that we made the right choice.

This behavior can spill over and affect our ability to make good choices. We typically approach a situation with some initial preference, and we subconsciously bias our evaluation in favor of that preference. This problem is common even among scientists, because most scientists have strong preferences among the different models and theories they are testing. It is extremely easy to unconsciously bias a test by seeing only what they want to see. This human weakness motivates the use of double-blind designs.

4) Rewriting the past:

We all forget things, and we are aware that we can't remember some things. But for those things of which we have a clear memory, it seems that our memory should be trusted. Not so. Our memories of even recent events can be faulty, as demonstrated by the different responses of people who witnessed the same recent events. (This point was visited with experimental tests of eyewitness identifications of people.) But as the event falls further into our past, our memory of it becomes increasingly rebuilt. Psychologists have been very successful recently in showing how suggestible people are, by describing wholly fictitious "memories" to a person and then later discovering that the person now remembers the incident as if it were true. We thus need to be careful to document events when they happen.

5) Skip the details:

Much of how we respond to new information depends on our "world view" of things. Each of us has a mental model of how society, nature, and the universe works, and each new fact or observation is either accommodated into that view (perhaps changing it slightly) or discarded as unimportant or wrong. As we noted in the first chapter of this book and in the class response to the first-day questionnaire, people have very different world views about some things (e.g., the paranormal). However, some features are common to most people: they by-and-large prefer simple explanations of things and prefer apparent certainty. Observations and other models with both of these features are easier to accommodate in a world view than are those incorporating complexity and uncertainty. Even science operates this way, because simple models are preferred over complicated ones until the simple ones must be rejected. Thus, people and science are more accepting of explanations that appear simple and unambiguous.

Conclusions:

This list of inherent limitations of the human mind is certainly (!) incomplete. The simple point of this chapter is to remind us that we each have many behaviors that interfere with our ability to objectively and rationally evaluate evidence. We can train ourselves to understand and avoid these pitfalls, but identifying them is the first step. Understanding these pitfalls also enables us to understand how other people will make mistakes in objective thinking. Con artists and magicians are masters of exploiting these weaknesses in people, but even aside from those extreme cases, we need to be alert to our tendencies to make poor choices.