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Radiation Safety Counseling News

How Do We Make Decisions for Radiation Safety?

Dear Reader,

How Do We Make Decisions for Radiation Safety?

The answers to this question are very complex. Despite my studies for 25 years with the Myers-Briggs Type Indicator (MBTI) trying to understand how people acquire information and make decisions, I still have much to learn. While the MBTI provides helpful insights on dominant data gathering preferences using our five senses or intuition and dominant decision making preferences using either logical thinking or feeling, decisions for safety involve all of these preferences at the same time. Our brains are programmed to protect us in many different ways.



Ray Johnson

In this monthly Newsletter I would like to share some observations drawn from a recent book by David Ropeik, "How Risky is it, Really? Why Our Fears Don't Always Match the Facts." (The McGraw Hill Companies, Inc. 2010: Amazon - \$13.60). These observations will also build on materials presented in earlier Newsletters on [September 19: The Power of the Subconscious Mind](#) and on [October 27: Radiation - to Fear or Not to Fear?](#)

As always, your questions or feedback are welcomed. Feel free to contact us through email, our blog, or our Facebook page.

Regards,

[Ray Johnson](#)

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How Do We Make Decisions for Radiation Safety?

People make decisions for radiation safety based on how much they fear radiation. There is nothing wrong with fear which is a natural response of our minds for our safety. We have survived as a species by paying attention to our fears and reacting as needed for protection. While we may take time to think about dangers, most of our fears originate at a subconscious or instinctive level which reacts very rapidly as appropriate for protecting us from imminent danger, such as a striking snake. People have commonly believed that there are two separate systems involved in safety decisions: 1) reason and rational analysis of facts and 2) emotion, instinct, and gut reactions. Ropeik says these are not separate systems. We are not perfectly rational or completely emotional and instinctive. System 1 seems to be favored by technical specialists and may lead to more intelligent judgments, however, this approach is very slow and takes more effort. Also, we often do not have all the facts for making a good decision, the time for gathering the facts, or the knowledge to understand what the facts mean. On the other hand, the system often favored by non-technical people based on gut instincts and feelings is much faster and does not need all the facts before sounding an alarm for safety. Ropeik says we actually use both systems all the time and he says we are *Affective*. This means we make decisions using both our minds and heart. We decide based on facts and how we feel about the facts, as well as instincts, values, cultural views, personal experience, and life circumstances.

We are Programmed to Fear First and Think Second

Our first reactions to danger happen subconsciously in the part of our brain close to the top of the spinal cord called the amygdala. Sensory information speeds from our five senses through our spinal cord to a group of cells in the center of our brain called the thalamus. These cells act as a relay station between the midbrain which sits directly on top of the spinal cord (sensory pathway) and the larger cerebral cortex (where thinking occurs). The thalamus also shares a signal with the amygdala which resides closer than the cerebral cortex, so it responds quicker. The amygdala recognizes signals of danger and immediately mobilizes automatic responses for protection. Ropeik calls these Fight, Flight, and Freeze responses. Before you are even consciously aware of danger, your body has already reacted without benefit of a slow rational analysis. If a snake is about to strike you, you do not want to take time to process the degree of danger. Somewhat later processing of information by the cerebral cortex may modify the fear response.

While the amygdala responds immediately to external indications of danger, it may also respond to memories of previous signs of danger. These memories of danger are implicit, meaning that you cannot consciously recall them, but the amygdala, whose goal is to protect us, will remember. As the amygdala responds it also enhances our ability to consciously recall explicit memories of danger. Thus, recall and reaction are speeded up when the same danger is encountered again.

Programmed Fears and Flaws for Dealing with Radiation

Some fears seem natural or common to most everyone, such as fear of the dark, snakes, spiders, heights, closed spaces, and being underwater. Other fears include public speaking, fear of intimacy, and fear of failure or social rejection. These fears are also about survival because we have learned to rely on others to protect us. Our sensory system and amygdala are constantly scanning for signs of danger and quickly leap to action at the first hint. The amygdala takes control immediately with a fear response which overrides conscious processes. While this may be appropriate for response to a striking snake, this process does

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not do well when considering issues such as safety of radiation. Our programmed fear response does not know what to do with radiation which is not programmed into our alert system. However, other parts of our subconscious brain have evolved to allow us to process information and make quick judgments for our protection.

Bounded Rationality

Ropeik describes *Bounded Rationality* as our approach to making decisions when we do not have all the data, time to acquire more data, or the intellectual ability to process the data. Ropeik shows that we are constantly making judgments without perfect knowledge, but doing the best that we can at the time. We process, sort, compare, categorize, and analyze information in relation to our immediate circumstances, experiences, and life factors, such as health, wealth, traditions, and lifestyles. With all these inputs we can come up with instant judgments. Such quick judgments are crucial to our survival. However, because they are based on limited information, these decisions may not always be best for us in the long run.

Mental Shortcuts

Some of the tools described by Ropeik for mental shortcuts to quick decision making include: the framing effect, categorization, loss aversion, anchoring and adjustment, awareness and recall, and optimism bias. Much of how we see a certain risk has to do with how it is framed or presented (in Washington, DC this is called spin). We also tend to categorize perceived risks that seem similar and this could lead us to jump to conclusions based on small samples. This shortcut may also lead to problems with probabilities where we see patterns that seem suspicious (perceived cancer clusters lead to questions of causation when the clusters may be purely random chance). Because we are inclined to avert losses, we tend to hold onto stocks longer than we should when the value is going down. For our survival we are also very sensitive to factors which may cause a loss of health. The media is especially vocal on losses (dangers) that may affect our health or that of our children. Anchoring is a process which influences the starting point or anchor for a decision. People tend to be more influenced by the first data presented. Recall has to do with whether the danger comes readily to mind. The greater our recall and awareness of a certain risk, the more concerned we become. Vivid, dramatic, or frightening events are recalled more quickly (where were you on 9/11/01?). The media plays a big part on our recall abilities according to how they report stories. For example, many people fear nuclear power plants because they believe the plants might blow up like an atomic bomb. Even after learning that this can't happen, images of Hiroshima, Nagasaki, Chernobyl, and Fukushima come so readily to mind that these images may override any rational judgment about risks from nuclear power.

Numeracy may also be an issue when people try to comprehend risks from radiation. Because many people have trouble with numbers, difficulties with trying to understand the data may lead people to rely on their affective mental shortcuts. People are also often optimistically biased that certain risks will not happen to them (such as health risks of being overweight, heart disease, stroke, diabetes, etc.). Certain ways of dying get more attention, such as cancer (the predominant fear for radiation). As people associate radiation with cancer, fears of radiation risks escalate far beyond the fears of much greater health risks listed above. The fact that "we are actually very resistant to harmful effects of radiation" gets lost.

Ropeik says that risks have personality traits that help us instinctively judge their character, even before we consciously process the facts. The media have done a great job conditioning people's minds with the words "deadly radiation." Thus, today the word "radiation" alone takes on the personality trait of great risk independent of any actual facts.

The Role of Trust

Another factor in decisions for radiation safety is trust. Our survival may depend on knowing who to trust for our safety. Promises of absolute safety may lead to mistrust if something happens. Lack of trust increases fears. Organizations perceived as creating risks are not likely to be seen as trustworthy. The appearance of withholding information is a cause for mistrust and increased fears. Failing to take fears seriously, failing to be open, and failing to share the decision making process with affected people all lead to mistrust.

If any of the above discussion attracts your interest, you are encouraged to get the book by Ropeik who provides much more elegant perspectives than I could offer in this Newsletter.



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