

AGE, CULTURE AND GENES IN RISK TAKING

Jerry Dzugan, Alaska Marine Safety Education Association (AMSEA)

director@amsea.org

ABSTRACT

Commercial fishing in Alaska is infamous as having one of the highest fatality rates of any U.S. occupation. This paper will seek to explore why fishermen and other workers resist using safety equipment or take part in safety training and continue to take dangerous risks.

This paper will look at the relationship between risk perception and risk tolerance and how this influences behavior. Safety studies done on risk taking in the automobile and airline industry may shed light on why higher risks in commercial fishing are tolerated.

Three areas appear to affect decision making around risk. One is due to different stages of the brain's development that comes with age. Another appears to be the role of genetics in developing an individual's personality. Finally, one's environment and work culture can also have an influence on decision making involving risk in the workplace.

Several ways in which education can be designed to make workers more proactive in their risk assessment, while taking into consideration age, culture and genes will be presented.

BACKGROUND

The sea has always been a high-risk work place. In the early days of the Dutch East India Company most sailors did not return alive, yet more sailors were always eager to go out on the next ship. Mariners had an extremely hazardous life no matter where they worked. In 1876 in the Bering Sea, 30 whaling ships were lost in just one winter. Some ports such as Gloucester, Massachusetts, lost hundreds of fishermen in the 1800s. Conditions were so bad in Norwegian ports that the government forcibly moved whole communities because so many of their fishermen were being lost. Nothing seemed to discourage men from working in this dangerous environment.

For generations, commercial fishermen have accepted that they might be hurt or killed on the job. It was understood that the risks came with the work. But fishermen seemed to tolerate an inordinate amount of risk when compared to the average worker. Despite the high fatalities

historically evidenced in this industry, there was safety equipment available which would have saved thousands of mariners had they chosen to buy and learn how to use this equipment. Life rafts and cold water immersion suits have been available for decades, although they were not required for most fishing vessel until the early 1990's. Yet despite the high loss of fishing vessels and lives, most owners did not accept these proven lifesaving devices until they were forced to purchase them due to regulations.

Until recently, commercial fishing in the U.S. was the most hazardous major occupation in the United States. But over the last two decades, this has changed. In the year 2000, for instance, commercial fishing lost its dubious distinction of having the highest occupational fatality rate in the country. And during the last decade, the fishing fatality rate in the United States has fallen 30 percent. In Alaska, it has fallen 61 percent.

By examining how this industry—steeped in a tradition of accepting high risks—has evolved, it is hoped that we are beginning to understand some of the influences of culture, genetics and brain development, and how it affects the choices we make involving risk. This paper will seek to explore why fishermen or other workers may resist using safety equipment or take part in safety training and continue to engage in higher risk taking. And while fishing and fishermen might be used to make certain points, the same influences involving risk that affect this profession can ultimately affect any group of workers.

RISK TOLERANCE VERSUS RISK PERCEPTION: WHAT IS THE DIFFERENCE?

Risk perception is an individual's awareness of the likelihood of loss or injury. Risk perception is affected not only by the characteristics of a situation (i.e., some situations are more dangerous than others), but it is also influenced by a person's assessment of his or her own personal abilities. This self-assessment is influenced by one's age, personality (which is affected by genetics) and environment or culture. These influences can cause a person to over- or underestimate his capacity to deal with a situation. Problems are avoided when a person has good risk assessment skills and are able to realistically determine the probability of harm in a rational way. He or she can conduct an effective risk-benefit analysis and make an appropriate decision.

Risk tolerance, on the other hand, has to do one's threshold. Risk tolerance may be defined as the amount of risk an individual is willing to accept in the pursuit of a desired goal. Some goals may be judged as worthy of higher levels of risk than other goals. This threshold will ultimately help a person determine if or when the benefits outweigh the risks. Consequently, a person's risk tolerance will make a significant difference in that person's decision-making process. A fishermen with high-risk tolerance will be rewarded by fishing in bad weather with good fish catches while other boats sit in the dock and make no money. Thus riskier behavior will be reinforced for those with high-risk tolerance until the catastrophic incident occurs.

Though the two concepts—risk perception and risk tolerance—differ, they are integrally related. Each affects how and why people engage in risky behaviors. Several theories have been proposed to explain how people make choices involving risk.

The first proposition, which Gerald Wilde (1994) calls *Risk Homeostasis*, states that people in any given activity have a target level of risk which is considered acceptable. Wilde believes that people do not attempt to eliminate risk. Rather, they seek to maintain equilibrium, and they adjust their behaviors so that they are able to perform within the accepted level. People create technologies and even laws to “make people safe.” But Wilde postulates that for many, this just won’t work.

According to Wilde, when hazards or risks are reduced in one area, people will compensate by changing their behaviors in another area. For example, studies have shown that once safety features were added to cars—such as air bags and anti-lock brakes—people began driving faster, more carelessly, and closer to the cars in front of them. The people modified their behaviors to bring the risk back up to acceptable levels.

This same type of compensatory response can be found in the fishing industry. For example, larger vessels, overall, are considered “safer” than their smaller counterparts. But operators of larger vessels are usually more willing to work in bad weather; thus, they take greater risks because they are in the safer vessel. Further, when people fish or travel close to shore, especially in calm weather, they often feel little need to wear life vests or carry immersion suits, even though the water may be bitterly cold.

If risk homeostasis was the only factor affecting people’s view of risk, technological or regulatory “improvements” would likely be moot when it comes to changing behaviors. If some people have a high tolerance level for risk, one can conclude that they will engage in actions that unnecessarily expose them to dangers regardless of rules or safety features. In fact, if risk tolerance reflects a basic personality trait of an individual, then it would be exceptionally difficult to substantially change that trait by using simple intervention programs.

A second theory that attempts to explain behaviors is called the *Zero Risk Theory* (Naatanem & Summala, 1974). This theory assumes that decisions are based on motivation. It suggests that one’s assessment of a situation has to do with the perceived likelihood of a hazardous event. The risk perceived is influenced by the importance attached to the potential consequences—good or bad. According to this theory, as self-confidence increases (largely due one’s experience) perceived risk diminishes to the point of zero. In other words, people who are very experienced doing risky things feel that there is no real risk at all.

Consider the following examples. Research has found that the more experience a pilot has, the lower his risk perception score will be (Hunter, 2002). As the hazards become more familiar and as the pilot becomes more experienced in assessing and managing those hazards, the less he or she worries about them. In fact, a study (Lester & Bombaci, 1984) found that a significant number of experienced pilots indicated that they felt no risk when they were asked to assess a risky scenario.

This finding has led to an interesting debate among safety educators. People who abide by the Zero Risk Theory believe that the key to changing risky behaviors is through education and experience. If people can improve their risk recognition and assessment skills through exposure

to accident statistics and if they are able to see that the dangers apply to them then they will be equipped to avoid the risks around them.

A third theory that might help explain human behavior is the *Threat Avoidance Model* (Fuller, 1988;1984). This theory suggests that people learn to anticipate hazardous events and situations and will then simply avoid them. Because the potentially hazardous situations are never encountered, the individual rarely feels threatened.

To put this third theory in context, consider the following. Novice commercial fishermen may avoid areas of fog due to inexperience with using radar. Although this response might make sense at one level, it can lead to problems in the long run. Because these fishermen always stay away from fog, and because in their short careers they may have never experienced fog, they might be unable to deal with fog if it does arise. Consequently, they would be much more at risk in the reduced visibility conditions they have been seeking to avoid.

The truth is, all work is full of risks, especially if we work in the unpredictable environment of the ocean. So while Threat Avoidance Model might apply to the average citizen, it cannot fully explain why some people actually seek out risk. Commercial fishermen actively seek out risk for the opportunity of incredible wealth.

GENETICS

In the 1970s, psychologist Frank Farley came up with the idea that some people actually seek out risk due to an inheritable trait. These people, Farley suggested, thrive in intense environments. The men who applied to work on Shackleton's vessel would have likely fallen into this group.

Farley, who coined the trait as "Type T" (as in "Thrill" seeking) researches risk-taking and thrill-seeking personalities. From 1990 to 2003, 259 people have died commercial fishing in Alaska alone. Yet crewmembers can still be found to work and millions of dollars are invested every year in this industry in Alaska alone.

In evolutionary terms, the risk takers who survive may be the ones who advance a species. In commercial fishing, these are the people who fish the hardest, the most hours and in the worst weather. By bringing in the greatest haul, they get the greatest reward. In turn, they are able to afford bigger boats, which allow for even bigger catches. They are able to support the biggest families who then pass on those T cells to their offspring.

Farley's theory can be used to help explain why certain people tend to take more risks. But if risk-taking behaviors are genetically "hard wired," one might surmise that it would be difficult, if not impossible, to change their ways. The zero risk and threat avoidance risk theories, in fact, offer hope that behaviors can be changed. Even Farley acknowledges that, with guidance, people can learn to take risks in more socially acceptable ways. To understand how outside "guidance" and influences may affect behavior, it is important to recognize how forces outside of the individual influence the process. The fact that Type T fishermen have altered their perception of risk and have modified their behaviors over the past two decades suggests that there is more to the story than genetics.

THE EFFECT OF CULTURE ON RISK TAKING

In the context of this paper, *culture* is defined as the sum total of all knowledge, skills, attitudes, and behaviors that are passed down from one generation to the next. This definition is important since it demonstrates that major changes in risk perception and risk tolerance are passed on through family, coworkers and society at large.

Cultural differences are related to how people within a group collectively view the world. For example, countries built from immigration (e.g., Australia, New Zealand, and the United States) tend to have more of an individualistic culture than a collective one. In an individualistic culture, the efforts, or at least successes, of an individual tend to be more valued than those of a group. As such, individual risk taking is encouraged in that it can be used to differentiate the “best from the rest”. In commercial fishing in the U.S., the most productive fishermen are called “highliners” and are given much esteem and prestige and fishermen are proud of their individual accomplishments.

Psychologists also believe that an “organizational culture” can be established if and when people in a group see themselves as having unique qualities. When members are able to share myths, rituals, legends, and even a specialized language (as mariners and fishermen do), they develop a sense of identity that separates them from other groups. It establishes a commitment to something that is greater than an individual. And the values and beliefs that group (or organization or industry) has about safety is known simply as a “safety culture.”

Various cultures have demonstrated that they differ in their belief in the role of fate in their lives. What we cannot control we tend to mystify. These beliefs can influence a safety culture within a group. The concept of fate is especially strong in the participants of many mariners who often have to confront the forces of nature.

Fatalism is one of the reasons that mariners have had a long and strong history of superstition. Even today, leaving port on a Friday or bringing a black bag aboard is avoided by some of the most technologically advanced fishermen. Not that long ago some fishermen would not allow safety to even be discussed on the vessel; to discuss the topic was to tempt fate. So-called “customs of the sea” that developed were often based on the belief that “stuff happens.” For example, the desire to die quickly to avoid suffering has continued into modern times. Up until the 1980s leaded boots for fishermen (so you will quickly sink if overboard) were available in several American ports.

Fate based cultures can be especially challenging to change, even with training. At a maritime survival school in the United Kingdom, for example, a group of fundamentalist religious mariners refused to practice first aid skills. When asked why they did not practice life saving skills they responded, “If it is willed that one must die, why bother?”

Collective values garnered from one’s family, community, or colleagues, can and do influence an individual’s view of risk. We might be able to modify an individual’s behavior through rewards or punishment but to change a “safety culture,” one is tasked with changing the way an entire

industry or population thinks and reasons. It is no small task, and changes that occur usually happen incrementally. Safety culture trends, thus, are often more of an evolutionary, rather than revolutionary, process.

There is some evidence that in less individualistic cultures (such as in traditional Asian societies), there is more of a tendency to defer to a higher authority figure for decision making, as well as in decision making involving risks. The airline industry has noted that workers in an emergency from more hierarchical cultures tend to defer to the captain or even the computer in an emergency. A study of a Korean Airlines crash on Guam noted that the subordinate crewmembers did not challenge the captain when their instruments showed they were below altitude minimums. There is also a reluctance in the maritime industry to challenge or question a decision by the captain. Training courses in both the airline industry (Cockpit Resource Management) and maritime industry (Bridge Resource Management) courses, attempt to break down the traditional hierarchy in leadership in these industries, so that critical decisions in safety are made more collectively and thus wisely. These courses are attempting to change centuries long work place safety cultures and changes are slowly being made in both industries.

AGE

It has been known for years that young drivers under the age of 25 have a higher accident rate than older drivers. Insurance rates reflect the higher risk of younger drivers but why this higher rate among younger drivers exists, has not been well studied. Recently the National Highway Institute supported a study with neuroscientists from the University of Virginia to see if there was a neuroscientific reason for this.

Driving simulators were used to see what areas of the brain were activated in different aged people when they were given risky scenarios. Surprisingly, researchers discovered that there was little activity seen in the dorsal-lateral prefrontal lobe of drivers under the age of 25 (Giedd, 2005). This is the area of the brain where judgement, learning from experience and risk assessment take place. Previously, it was thought that the brain was fully developed by the time one was a teenager. This research also discovered that the more teens were present in the simulator, the greater the risk that was observed. This mirrors the accident rate on the highway for teens as well. As a result of this, more states are enacting legislation prohibiting new teenage drivers from the number of teens that can be in a car with them.

Age seems to be a factor in risk assessment. It is perhaps more than coincidental that the average age of crewmembers in the fishing fleet was much younger in the 1980's in Alaska when the fishing fatalities averaged 36 a year, compared to now when the average is 11 per year and research is demonstrating that the average age of a crewmember is much older.

So how can the knowledge of the role that genetics, culture and age in risk assessment and whether or not workers will use safety equipment be used to encourage the use of this equipment?

CONCLUSION

Education has long been a leading tool used in the quest to modify behavior. In fact, if one believes that improved risk perception will lead to less risky behaviors, education could be the means to the end. That is, if we can help people accurately assess the risks, the rest (safer behaviors) should follow. Unfortunately, behavior modification isn't quite this simple. While education is an important component in improving safety, education efforts must consider using methodologies that raise risk awareness, as opposed to those designed to change risk tolerance which may be genetically predisposed. Thus it would be more effective to make workers aware of the risks and benefits of safety gear by using statistics, case studies and other experiential means to increase risk perception than it would be to try to expect to change their personalities to lower their risk tolerance.

Younger workers may need to have the hazards of a workplace presented more abstractly through statistics, due to the "still under development" status of the dorsal-lateral prefrontal lobe. Experiential education methods might be of most value to this age group. Legislation and enforced workplace safety rules would also benefit this group. The use of videos showing actual casualties at sea with fishing vessels also has been a very valuable tool with young people to use during safety education classes. This methodology has affected people whose risk behavior is described under the zero risk theory. By watching a vessel capsize and sink quickly, viewers are able to improve their understanding of the hazard—as well as the immediacy of the situation. Commonly, viewers were heard to say, "I didn't know a boat could sink so fast!" The visual aid was particularly effective for new fisherman who had little at-sea experience. In fact, on at least two occasions, prospective fishermen were so impressed by the footage that they decided to go into a different profession.

Changing a culture's attitude and behavior takes place slowly and anecdotes and storytelling are still important means to change. A well known young couple, winter fishing in Alaska, had their boat sink in a storm. The only person who survived had on the only immersion suit on the vessel. The news that you did not have to drown if you had an immersion suits changed the attitude and safety culture of an industry and the news spread quickly through the fishing fleet. This resulted in fishermen buying these suits many years before they were required. This is an example of how story telling is still strong in many societies. The fishing industry, in fact, is rich with anecdotes. Because they were able to personalize the event, fishermen modified their own behaviors long before they were forced to do so.

Through the use of applicable case studies and close calls, fishermen and workers can become more educated regarding the real hazards of their respective industries. As one fishermen stated recently during a discussion on this topic in a harbor, "Look at the people we can see in the harbor right now. Three-quarters of the guys have lost boats and survived!" When reality is so close at hand, it becomes very difficult to maintain fatalism and the "it can't happen to me" attitude.

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