RISK PERCEPTION AND JUDGMENT

The activity entitled RISK requires students to rank 30 specified activities according to their perception of an individual's risk of dying in any given year from these activities.

In the table below these same 30 activities are ranked according to their actual contributions to the number of deaths in the United States as they have been determined by actuarial estimates. That information appears in the first column; the remaining columns record geometric mean information for other groups questioned in the 1976 research.

Fatality Estimates and Disaster Multipliers for 30 Activities and Technologies

	Activity or Technology	Technical Fatality Estimates	Geometric Mean Fatality Estimates Average Year: League of Women Voters	Geometric Mean Fatality Estimates Average Year: Students
1.	Smoking	150,000	6,900	2,400
2.	Alcoholic beverages	100,000	12,000	2,600
3.	Motor vehicles	50,000	28,000	10,500
4.	Handguns	17,000	3,000	1,900
5.	Electric Power	14,000	660	500
6.	Motorcycles	3,000	1,600	1,600
7.	Swimming	3,000	930	370
8.	Surgery	2,800	2,500	900
9.	X-rays	2,300	90	40
10.	Railroads	1,950	190	210
11.	General (private) aviation	1,300	550	650
12.	Large construction	1,000	400	370
13.	Bicycles	1,000	910	420
14.	Hunting	800	380	410
15.	Home appliances	200	200	240
16.	Fire fighting	195	220	390
17.	Police work	160	460	390
18.	Contraceptives	150	180	120
19.	Commerical aviation	130	280	650
20.	Nuclear power	100 [a]	20	27
21.	Mountain climbing	30	50	70
22.	Power mowers	24	40	33
23.	High school & college football	23	39	40
24.	Skiing	18	55	72
25.	Vaccinations	10	65	52
26.	Food coloring	___ [b]	38	33
27.	Food preservatives	___ [b]	61	63
28.	Pesticides	___ [b]	140	84
29.	Prescrition antibiotics	___ [b]	160	290
30.	Spray cans	___ [b]	56	38

[a] *Technical estimates for nuclear power were found to range between 16 and 600 annual fatalities. The geometric mean of these estimates was used here.*

[b] *Estimates were unavailable.*

THE DEBATE ABOUT RISK

Contributions to the debate about risk have increased dramatically over the past 10-15 years. Yet, a lack of agreement continues to exist in the academic community over how to define risk.

The concept *risk* is enormously complex. Our understanding of the complexity of the concept has increased as specialists from different disciplines have investigated what we mean when we say that a technology or activity is risky. Initially, engineering safety studies of nuclear reactors, which strongly influenced the emergence of modern-day risk analysis, defined risk in probabilistic terms. They defined risk as the product of the probability and consequences of an adverse event, and developed and compared quantitative estimates of the risk (i.e., probability) of dying from various technologies. This definition of risk began to change as new findings appeared.

Psychologists who subsequently studied the individual's response to risk discovered that the people whom they interviewed did not rate risk in the same way as experts in the field of probabilistic risk analysis. Experts' rating of various activities and technologies correlated highly with statistical frequencies of death; laypersons' judgments incorporated considerations other than annual fatalities. Factors such as whether the technology could have catastrophic consequences or whether the technology was unfamiliar appeared to influence the layperson's judgment of risk.

More recently, anthropologists and sociologists have pointed out that the issue of risk is more complex than studying people's responses. They emphasize that social factors affect the way we *select* risk and that these factors affect the judgment of both experts and members of the public. Thus, factors such as our educational, family, or occupational background affect our judgment of which dangers we are afraid of, which risks should be taken, and who should take them. These factors affect our judgment of what we need to examine in conducting risk analysis and our evaluation of the consequences.

As a result of these various studies, we are beginning to realize that making decisions about risk is much more complex than developing probabilistic estimates. The kinds of problems that we are facing are what Alvin Weinberg[1] has called *transscientific* problems—problems that cannot be answered by science because they involve questions of values as well as facts. A primary purpose of this classroom activity on risk is to facilitate students' awareness of the complexity of the risk concept and recognition that there is no one best *factual* answer to questions about risk. Hopefully, this unit will stimulate discussion of ways in which, in a democratic society, we can make decisions about risk.

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