

**PERCEPTION AND EVALUATION
OF RISKS: *Findings for
New Zealand and
Cross-Cultural Comparisons***

Bernd Rohrmann

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Contact Address of Author:

Prof Dr B Rohrmann
c/o School of Behavioral Sciences
University of Melbourne
Parkville, VIC 3052
Australia

Phone: ++61 3 93446350
Fax: 93476618
Email: U1715328@UCSVC.UCS.UNIMELB.EDU.AU

ABSTRACT

In a socio-psychological field study, perceptions and subjective evaluations of risky activities and environmental conditions were investigated in three countries: Germany, New Zealand and Australia. The aim of this cross-cultural project is to analyse the cognitive structure of judgments about the magnitude and acceptability of risks to which individuals are exposed, and to compare risk judgments across countries in which risk issues in general as well as particular risk sources (eg, industrial facilities or natural hazards) have different salience.

Data comparisons for countries, for societal groups (eg, ecologists, engineers, feminists) and for types of risks demonstrate manifold differences. However, the considerable influence of psychological aspects on judging risks can be shown in all settings.

Altogether the findings confirm the significance of the cultural context of risk evaluations. They are relevant for a better understanding of conflicts about risk and for improving risk communication among the various involved parties.

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1.1 Risk as an Issue of Social Scientific Research

Over the last decade, "risk" has become a prominent issue of political/societal discourse as well as of social-scientific research. At work or in their private lives humans seem to be exposed to different, to more, and to greater risks than in earlier times (eg. car accidents, smoking, drugs, AIDS, nuclear energy, climatic changes), and the assessment of these risks has become very complex. Some disasters, such as the accidents in Bophal or Chernobyl, the earthquakes in San Francisco or Armenia, or the recent oil catastrophe in Kuwait, have further increased the awareness of risks.

Risk is also a controversial issue. In many societies, severe conflicts about the evaluation of risks have emerged, particularly with respect to large-scale technologies such as chemical industries, nuclear energy and genetic engineering (Beck, 1992; Johnson & Covello, 1987; Jungermann & Slovic, 1993; Jungermann *et al.*, 1991; Luhmann, 1990; Sjoeborg, 1987; Waterstone, 1991). Deep concern about environmental impacts of human activities plays an important role to this situation.

Furthermore, there is a considerable gap between how experts think about risks and how non-professional people judge and evaluate risks. Depending on the underlying definitions and criteria, very heterogeneous risk assessments are given by different groups (Edwards & von Winterfeldt, 1987; Fischhoff *et al.*, 1981; Lichtenstein *et al.*, 1978; Slovic *et al.*, 1985; von Winterfeldt *et al.*, 1981; Renn, 1992). Many of the risks most prominent in the view of the public are not those which - according to statistical data - have the highest accident figures, mortality rates, health impacts, and so on. Apparently many more aspects influence risk perception, risk behaviour and risk management, including a variety of social, psychological and ethical aspects.

Thus political decision-making about risk issues became more and more complicated. Under these conditions it seemed necessary to complement 'technical' risk research (as done in natural sciences or economics) by social-scientific approaches in order to expand the risk concept and to understand the "psychology of risk".

1.2 The Psychometric Approach

Within this context, psychologists have dealt with the meaning of risk, the subjective understanding and evaluation of risk sources and the determinants of risk acceptance (see, eg. Brehmer, 1987; Guerin, 1991; Jungermann & Slovic, 1992; Slovic, 1992; Vlek & Stallen, 1980; Yates & Stone, 1992). Risk perception has been intensively studied, using predominantly psychometric methods. The so-called *psychometric approach* is based on four intentions:

- To establish "risk" as a subjective, rather than an objective concept;
- To include technical/physical *and* social/psychological aspects as risk criteria;
- To accept opinions of "the public" (ie, laypeople, not experts) as the matter of interest;
- To analyse the cognitive structure of risk judgments, using multivariate statistical procedures such as factor analysis, multi-dimensional scaling or multiple regression.

This line of research was originated by B Fischhoff, S Lichtenstein and P Slovic (see Fischhoff *et al.*, 1978; Lichtenstein *et al.*, 1978; Slovic *et al.*, 1980). Quite a number of studies followed, mainly in the USA, Germany and the Netherlands (eg, von Winterfeldt *et al.*, 1981; Vlek & Stallen, 1981; Johnson & Tversky, 1984; Tiemann & Tiemann, 1985; Borcharding *et al.*, 1986; Gould *et al.*, 1988; Lappe *et al.*, 1990; Burgemeister & Weber, 1992).

1.3 Cross-Cultural Risk Perception Studies

Risk research is (still) mainly characterised by an international (or 'non-cultural') perspective. However, the technical or natural disasters mentioned above made it obvious how diverse both the public and the government react to those risks in different countries. Thus some social scientists have also dealt with cross-cultural comparisons. Cultural differences can be studied from two perspectives. In *cross-national* studies, data from different nations (eg, Germany versus USA) or types of countries (eg, industrialised vs developing ones) are compared. In *intra-national* comparisons, differences in risk evaluation between societal groups (defined according to social/political perspectives or membership in interest groups etc) are analysed.

Empirical comparisons of risk perception across nations have been reported for USA vs Germany (von Winterfeldt *et al.*, 1981; Borcherdig & von Winterfeldt, 1983), Hungary vs USA (Englander *et al.*, 1986), Norway vs USA (Teigen *et al.*, 1988), France vs USA (Höfer & Raju, 1989), Hong Kong vs USA (Keown, 1989), Russia vs USA (Mechitov & Rebrik, 1990), Poland vs USA (Goszczyńska *et al.*, 1991), and USA vs Japan (Kleinhesselink & Rosa, 1991; Hinman *et al.*, 1993). See Table 1 for an overview (this table also includes the present study).

Usually a sample of risks was presented to the respondents and rated according to a set of risk aspects. Other cross-national studies have dealt with one risk source only (eg, Eiser *et al.*, 1990 or Swaton & Renn, 1984). For a documentation and review of risk perception studies see Rohrmann (1991), for a framework of cross-cultural risk research see McDaniels & Gregory (1991).

Most of these comparisons were not planned as synchronous studies but resulted from full or partial replications of earlier work (using research such as the 'path-leading' studies of Fischhoff *et al.* as reference). The samples are rather small and usually not representative of the population. Nevertheless the results indicate considerable cross-cultural differences.

Table 1: Cross-cultural risk perception studies

| STUDY | Countries | Sample Size(s) | Subgroups | Risk Sources | Risk Aspects |
|---|--------------------------|-------------------|-----------|--------------|--------------|
| WINTERFELDT <i>et al.</i> 1984 | USA+Germany | 57+68 | - | 14 | 4 |
| ENGLANDER <i>et al.</i> '86 | Hungary | 30/29 (USA) | - | 90/30 | 1/9 |
| TEIGEN <i>et al.</i> '88 | Norway | 37/35/64 (USA) | - | 30/90/35 | 9/1/9 |
| HOEFER/RAJU '89 | France/USA | 50+26 | - | 6 | 10/1 |
| KEOWN '89 | HongKong | 85 (USA) | - | 30/15 | 2/6 |
| MECHITOV/REBRIK '90 | Russia | 24/24 (USA) | 2 | 13/9/75 | 4/7/1 |
| KLEINHESSELINK/ROSA '91 | USA/Japan | 62+69 | - | 70 | 7 |
| HINMAN <i>et al.</i> '93 | Japan/USA | 290/747 | - | 30 | 4 |
| GOSZCZYNSKA <i>et al.</i> '91 | Poland | 140 (USA) | 4 | 40 | 1/15 |
| ROHRMANN '89/93 + BORCHERD. & R. '86 | Germany+NZ+ Australia | 217+278+263 | 4/8 | 24 | 11 |

Notes:
 "(USA)" refers to American data published by Fischhoff *et al.* 78.
 "#/#" indicates sub-samples within a study. - Except for the last two studies, all respondents were students.

1.4 Objectives

The project "Cross-cultural Comparison of Risk Evaluations (CRE)" was started in Germany by K Borchering and B Rohrmann, and then continued by the present author in New Zealand and Australia. The objectives of the investigation are:

- To analyse the cognitive structure of judgments about the magnitude and the acceptability of risks to which individuals are exposed;
- To specify the relevance of risk characteristics and of societal orientations for subjective risk evaluations; and
- To compare risk judgments across countries in which particular risk sources (related both to individual activities and to environmental/residential conditions) have different salience.

The final goal is achieving a better understanding of conflicts about risks and to gain findings which are useful for improving risk communication between the various parties involved.

The purpose of the present paper is to analyse risk perception based on the data collected in New Zealand and to compare the results with findings from homologous samples surveyed in Germany.

In the first section, the theoretical background and the methodological approach of this study will be described, followed by a description of the data collection in three countries. In Part 3, selected results on mean ratings and correlational analyses (including structural models) will be presented and compared across countries and societal subgroups. Finally, conclusions about the significance of risk perception research and its potential for applied objectives (such as risk communication) will be discussed.

