RISK PERCEPTION IN POLAND: A COMPARISON WITH THREE OTHER COUNTRIES

Maryla Goszczynska
Department of Psychology
University of Warsaw

Tadeusz Tyszka
Department of Psychology
Polish Academy of Sciences

Paul Slovic
Decision Research
and
University of Oregon

Extra Cover Page

RISK PERCEPTION IN POLAND: A COMPARISON WITH THREE OTHER COUNTRIES

Maryla Goszczynska
Department of Psychology
University of Warsaw

Tadeusz Tyszka
Department of Psychology
Polish Academy of Sciences

Paul Slovic
Decision Research
and
University of Oregon

Behavioral Decision Making, in press.

November 14, 1990

RISK PERCEPTION IN POLAND: A COMPARISON WITH THREE OTHER COUNTRIES

Abstract

The present study is a cross-cultural comparison of risk perception. A psychometric approach has been followed in order to examine quantitative risk judgments of different hazards and the ratings of these same hazards on various risk-characteristic scales. A list of hazards was used that is comparable with other samples (American, Hungarian, Norwegian), but a certain number of hazards of an entirely different kind were added (e.g., social tensions, shortages of consumer goods) because these are important today for Polish society. In spite of the different list of hazards, the basic factor structure of risk perception turned out to be essentially the same as the structure found in other studies. There was considerable agreement in risk perceptions in the Polish and American samples. We also discovered a number of idiosyncratic qualities of risk perception in Poland, generally indicating the importance of the availability heuristic.

Key words: Risk perception, Poland, cross-cultural comparison, availability heuristic.

In attempting to discover how people perceive risks and hazards, Slovic and his associates developed what has been called "the psychometric paradigm" (see Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, Fischhoff, & Lichtenstein, 1984, 1985). This paradigm elicits quantitative judgments of riskiness for diverse hazards, in a way similar to certain kinds of psychophysical scaling. These judgments are then compared with judgments of the same hazards on different scales reflecting risk characteristics such as: voluntariness, controllability, newness, and so on. Some of these characteristics have been found to be highly correlated with each other. Factor analysis has revealed that these diverse characteristics are reducible to two or three factors. Studies of various groups and studies employing a different range of hazards (different activities, technologies, substances) have revealed the same set of factors: Factor 1 -- called "unknown risk" -- has been composed of scales such as: unknown to those exposed, unknown to science, unfamiliar, and involuntary. Factor 2 -- called "dread risk" -- has included the characteristics: severity of consequences, dread, and catastrophic potential. This two-dimensional solution has been found to account for about 75% of the total variance in the measures. Later replications of the 1978 study, in which a larger set of hazards (90) and a great number of risk characteristics for evaluating these hazards (18) were used, revealed the general stability of the factor structure for American samples (Slovic, Fischhoff, & Lichtenstein, 1980). However, the order of these two factors was reversed; that is, the factor explaining the greatest amount of variance was the "dread risk" factor, while the second factor was

"unknown risk." These studies also indicated a third factor, pertaining to the number of persons exposed to the hazard.

Several intercultural comparative studies of risk perception using the same paradigm have been undertaken. One of these studies was conducted in Hungary (Englander, Farago, Slovic, & Fischhoff, 1986), and another in Norway (Teigen, Brun, & Slovic, 1988). These studies compared risk ratings for the same set of 90 hazards (with minor additions in the Norwegian study) and also compared the hazards on the same set of nine risk characteristics. The main findings can be summed up as follows:

1. Factor analysis of thirty hazards evaluated on nine risk characteristics showed a rather similar, though not identical, factor structure in Hungary, Norway, and the United States. More precisely, in the Hungarian sample a two-factor solution accounted for about 58% of variance, with factors interpreted in the same way as in the American sample, though in some cases with different factor loadings. In the Norwegian sample, the two basic factors (accounting for about 74% of variance) were interpreted as "certain to be fatal" and "involuntary and uncontrolled hazards." Owing to the loading of individual scales, the first factor was similar to the "dread risk" factor in the American and Hungarian samples. The second Norwegian factor corresponded more closely to the "unknown risk" factor. In this case as well, the location of hazards in the factor space also agreed with their location in the American sample. (One difference was the characteristic "certain to be fatal," which was associated with high scores on the "dread risk" factor in the American space but which became associated with "known risks" in the Hungarian space).

2. The general level of riskiness (the overall means for evaluated hazards) turned out to be highest in the United States, clearly lower in Norway, and still lower in Hungary.

3. Specific risk perceptions and concerns were found to be characteristic of individual countries: Norwegians, more than people in the other two countries, were concerned about narcotics and psychoactive drugs; Hungarians, about road accidents, alcohol, cigarette smoking, and other "every day" hazards; Americans, about new technologies, chemical substances, and so on.

While the first of the above results is rather clear and indicates a generally similar, though not identical, structure of risk factors in different countries, the other two results are not easy to explain. These three countries differ in many ways: geographical, socioeconomic, political, demographic, and others. One or more of these differences may have contributed to the observed differences in risk perception.

For instance, the concern of Americans about new technologies and chemical substances may be explained by a higher degree of risk from these sources in the United States, in comparison with Hungary and Norway. However, this line of reasoning cannot explain the greater concern of Hungarians about road accidents or alcohol (though perhaps it can for cigarette smoking). Nor can it explain the greater concerns of Norwegians about narcotics. Englander, Farago, Slovic, and Fischhoff (1986) conjectured that the lower risk ratings in Hungary (compared to the U.S.) may stem from the fact that the Hungarian press gives more coverage to dangerous accidents outside the country than to accidents within Hungary. (Besides the fact that this may reflect a certain propaganda style, it is quite

obvious that a small country cannot have a large number of accidents in an absolute sense.) Is the availability heuristic (Tversky & Kahneman, 1973) in operation here?

One objective of the present study was to further explore the relationships between the factors that differentiate perceptions of risk in various countries. What can be contributed by comparing Poland to the three other countries? Providing a description of the country may be important for interpreting the comparisons. Poland is much smaller than the United States, but also much larger than Hungary and Norway. Is this simple factor -- the size of a country (and the absolute number of accidents connected to size) -- reflected in the general level of perceived riskiness? On the other hand, Poland seems similar to Hungary on quite a number of aspects: sociopolitical system, culture, customs, and so on. Do these factors produce similar profiles of risk perception in these two countries?

There is still another factor, media information policy, that may differentiate these countries with respect to risk perception. In communist countries, information on risks and accidents has been strictly censored (one reason for this censorship was to show that life under the communist system is safer than that under a capitalist system!). As Englander et al. (1986) stated, the Hungarian press provided much more information on misfortunes (catastrophes, cataclysms, crimes, etc.) taking place outside the country than about events of this kind within the country. Although, when the present study was conducted, both Poland and Hungary were communist countries, the accessibility of information was higher in Poland than in Hungary. This was due to the existence in Poland of an independent

Catholic press, as well as to the numerous uncensored underground newspapers. Because of these sources, the awareness of various hazards has increased considerably in Poland society. Media coverage of hazards has centered around the negative consequences of developing various branches of industry.

We can determine whether the level of perceived riskiness and the profiles of risk characteristics in Poland are closer to those in the United States or to those in Hungary. If the similarity between Poland and the United States is higher than that between either Poland and Hungary or Poland and Norway, it suggests that the size of the country is more significant for risk perception than the socioeconomic system and other cultural differences. If the similarity between Poland and Hungary is higher than that between Poland and the United States, it suggests that social, economic, and cultural differences are more important in this context than the size of the country. Finally, if Hungary appears to be the most dissimilar to the three other countries with respect to risk perception, it suggests that the media information policy plays an important role in this context.

A second objective of this research was to test the extent to which the representation of risk perception is influenced by the specific hazards used in the study. More specifically, we wished to determine whether introducing some atypical hazards would change the factor structure of risk perception. Actually, in one of our previous studies (Goszczynska & Tyszka, 1986) subjects were asked to describe scenarios of the most probable hazard events in Poland. A considerable number of the hazards that were mentioned concerned neither technologies nor activities but what may be called undesirable states of the country:

shortages of basic consumer goods, political tensions, repressions, and so on. When the present study was being done, these were adverse conditions that attracted the attention of the majority of the Polish population. Are these kinds of hazards perceived in the same way as hazardous activities, technologies, and substances studied previously? Can these hazards be represented by multidimensional models having the same factor structure?

Finally, in the present study we decided to control for two characteristics of the sample: occupation and place of residence of the respondents. Specifically, technical and nontechnical occupations were distinguished. We assumed that technicians would be better informed about hazardous activities. For the second variable two regions were selected for study: the highly industrialized region of Silesia (southwest Poland) and the much less industrial region of Radom (central Poland). Two contrasting hypotheses related to these variables may be stated. According to the availability heuristic, people living in an industrialized area and people involved in hazardous activities (technicians) should be more aware of risks and dangers, and thus their assessments of riskiness should be higher. On the other hand, one might expect (cf. Vlek & Stallen, 1981) that people living in an industrialized area and people involved in hazardous activities would be more familiar with and more adapted to the consequences of these activities, and thus their assessment of riskiness should be lower.

Method

Subjects were recruited from two regions of Poland differing in the level of industrialization. Eighty subjects represented the highly industrial region of Silesia and 60

the moderately industrial region of Radom. Each of these groups was divided into two subgroups with respect to occupation. Thus there was a "technical group," which included engineers and technicians employed in industrial plants and a "social group," which consisted of teachers, journalists, physicians, etc. Subjects were between the ages of 28 and 50 (mean age = 35.6).

Magnitude of Risk

A diverse set of hazards was used in the study: activities, technologies, and societal conditions belonging to several different categories connected with:

- industrial technologies (e.g., coal mines, nuclear power plants),
- transportation (e.g., airplanes, motor vehicles),
- recreation (e.g., skiing, swimming),
- social pathology (e.g., drug addiction, alcoholism)
- shortages of basic goods (e.g., shortage of medicines and medical equipment).

The list of 40 hazards presented to the respondents (see Table 5, left-most column) contained 27 items from the original American list and 13 "typically Polish" items, chiefly hazards connected with economic crisis and social tensions. We decided to include these social issues items in our study for two reasons. First, when our study was taking place, they were of the utmost importance in the Polish society. Secondly, we wanted to broaden the range of hazards studied.

All hazards were rated according to how risky they were perceived to be for the Polish society as a whole (not limited to those individuals actually exposed to the hazard).

Specifically, the subjects were asked to rate the risk of dying from a particular activity, substance, or technology in a given year. They separately evaluated the riskiness of each of the 40 hazards on a 100-point scale ranging from 0 -- "not risky" to 100 -- "extremely risky."

Dimensions of Risk

After a break of one to two weeks the subjects addressed the second task. This time they were asked to score these same 40 hazards on fifteen bipolar, 7-point scales covering important characteristics of the risk such as voluntariness, controllability, catastrophic potential, or fatal consequences. The set of risk characteristics used in our study to evaluate the 40 different hazards is presented in Table 1.

Insert Table 1 about here

Results

Factor Structure of Risk Perception

Our questionnaires -- as we emphasized -- differed in two important ways from the three studies with which we make comparisons here. First, the list of risk characteristics was extended (15 compared to 9 in those studies), and second, in addition to activities, technologies, and risky substances, the present questionnaire also contained hazards pertaining to social conditions (shortages of various goods, social tensions). Do these changes (especially the second one) lead to a different factor structure of risk perception?

The correlations among the 15 risk dimensions, which were the basis of factor analysis, produced two main factors explaining 72% of the total variance of the measures. The correlations among the risk dimensions and the results of the factor analysis (after varimax rotation) are presented in Tables 2 and 3.

Insert Tables 2 and 3 about here

Factor 1 (46% of the variance) is most closely associated with the following scales: dread, uncontrollability, catastrophic potential, severity of consequences (also for future generations), involuntariness, and personal exposure to risk. We have named this factor "dread risk." Factor 2 (26% of the variance) is chiefly associated with the following characteristics: risk unknown to those who are exposed to it, unobservable consequences, and unknown to science. The most suitable name for this factor is "unknown risk." Factor 3 (about 10% of the variance) is characterized by two scales, namely "newness" of risk and the number of persons in Poland exposed to it.

In spite of the greater number of risk characteristics and the extended set of hazards, the factors found are in close agreement (though factors one and two are reversed) with those found in the American and Hungarian studies. A separate factor analysis was made for 27 hazards in common with American, Hungarian, and Norwegian samples. The same set of factors was obtained as for the total of 40 hazards (the small differences concerned the size of specific scale loadings on a given factor). This result confirms the validity of the

factors we identified. They appear to be relatively independent of the set of hazards evaluated.

Cross-National Differences in Perceived Risk

In order to determine the agreement between the average riskiness scores of hazards in the Polish sample and the other three countries, rank and product moment correlations were calculated for the 27 common hazards in the different studies. These correlations are presented in Table 4.

Insert Table 4 about here

Average estimates of riskiness made by Poles correlate most highly with the American estimates, and lowest with the Hungarian ones. Considering all of the pairs compared, it turns out that the Hungarian scores have the lowest correlations with the other countries.[1] Hungary has its highest correlation with Poland.

The average risk ratings for the 40 hazards used in the Polish study are presented in Table 5. These scores have been arranged from the highest to the lowest. Besides the average scores of the 27 common kinds of hazards, we list the average differences between

[1] This isolated position of Hungarians in the estimation of the riskiness of hazards appeared also in the comparisons made by Teigen et al. (1986). Correlations calculated on the basis of riskiness scores for as many as 86 hazards were almost identical with the ones we obtained with only 27 hazards.

the scores given by Poles and the scores given by Americans, Hungarians, and Norwegians.[2] A plus sign (+) means that Poles rate the riskiness of a given hazard higher, and a minus sign (-) that they rate it lower than the countries compared with them.

Insert Table 5 about here

From the bottom line of Table 5 we see that the average scores of Americans are 8 points higher than the scores of Poles, while the scores of Hungarians and Norwegians are lower than the Polish scores by 10.4 and 5.7 points, respectively. Poles rated the following four hazards as more risky than subjects from all three other countries: warfare, nuclear weapons, alcoholic beverages, and railroads. On the other hand, Poles rated the risk of smoking lower than the other three countries (though a considerable part of Polish society is exposed to this hazard).

In addition to this, Table 5 shows that Poles rated 11 hazards higher than Hungarians and Norwegians, with the greatest differences concerning chemical fertilizers, herbicides, antibiotics, and crime. Poles rated only 6 hazards higher than Americans, but 20 higher than Norwegians and as many as 21 higher than Hungarians (out of 27 hazards compared).

[2] We neglect here small differences in terminology, such as the use in the Polish studies of the general category "narcotics," while in the other studies the separate names "heroin" and "barbiturates" were used. There were differences in names in a few other hazards.

Idiosyncratic Aspects of Risk Perception in Poland

As Table 5 shows, warfare and nuclear weapons occupy the highest ranks on the overall perceived risk scale in the Polish sample. The next categories of hazards with high scores in this table are stimulants, economic hazards (shortages of basic goods), and social hazards (crime, social tensions, domestic turmoil, etc.). Many of the hazards rated as highly risky in the other three countries were "pushed down" to lower ranks in the Polish sample by economic and social hazards. It is significant that these economic and social hazards were rated as more risky than technologies typical for Poland: coal mines, steel mills, petrochemical plants.

Insert Figure 1 about here

Figure 1 shows the location of 40 hazards in the two-factor space. Nuclear weapons and warfare were rated highest on the "dread risk" dimension. Hazards connected with the use of chemicals in agriculture (chemical fertilizers, pesticides, herbicides) were rated as the most unknown risks. Among the well-known and nondreaded hazards are recreational activities (skiing, sailing, etc.). Nuclear power plants, which in all of the earlier studies occupied an extreme position on both dimensions, are less extreme in the Polish sample. Economic and social hazards, on the other hand, occupy a relatively extreme position on both of these dimensions.

Regional and Occupational Differences in Perceived Risk

Insert Figure 2 about here

The average risk scores of the 40 hazards for each of the four groups are presented in Figure 2. A two (Region: Industrialized vs. Moderately Industrialized) by two (Occupation: Technical vs. Nontechnical) ANOVA was carried out on perceived risk scores averaged over 40 hazards. This analysis yielded a significant main effect of region ($F=3.78$, $p < .05$), meaning that, by and large, residents of the highly industrialized area exhibited a higher level of perceived riskiness than residents of a moderately industrialized area. It also revealed a Region x Occupation interaction ($F=3.49$, $p < .07$): the industrialization effect tended to be higher for the nontechnical group than for the technical respondents. Subsequent individual comparisons showed a significant effect of degree of industrialization on the two non-technical groups ($p < .05$). In general, the above analysis suggests that only assessments of non-technical residents were influenced by their place of residence: those living in a highly industrialized area displayed a higher level of perceived riskiness than did residents of a moderately industrialized area. There was no such difference for the group of technical respondents.

In order to determine the similarities of the mean risk estimates for the 40 hazards among the four Polish groups, the product moment correlations were calculated across hazards. All of these correlations were very high (from .94 to .97), indicating that risk estimates were similar both for the regions compared and for the occupations compared.

We next performed an analysis of variance on the risk scores of individual hazards in the four groups. These analyses enabled us to determine which of the two sources of variance (regional or occupational membership) had a significant effect on the differentiation of risk scores for individual hazards. The results of these two-factor analyses of variance are presented in Table 6.

Insert Table 6 about here

As we see from Table 6 the "regional membership" of the subjects has a significant effect on risk scores for 13 kinds of hazards. The group of respondents from the highly industrial region of Silesia evaluated as significantly more risky (at the $p < .01$ level) such technological hazards as electric power plants, coal mines and steel mills, motorcycles, and airplanes. The second group of hazards which the subjects from Silesia judged significantly riskier than the subjects from Radom were recreational activities such as swimming, mountain climbing, and skiing. To understand these findings, one must bear in mind that the Silesian region is the most industrialized region in Poland and at the same time more developed in tourism (because of the proximity of mountainous areas) than the Radom region. The "occupational membership" of the respondents rarely had any significant influence on the risk ratings.

Discussion

The main purpose of this study was to ascertain whether the factor structure of risk perception remains unchanged when it is examined (a) in different countries and (b) in reference to different sets of hazards. The answer is rather clear: in the Polish sample we found a pattern of basic risk-perception factors surprisingly similar to that in the American sample. Secondly, this pattern remained essentially unchanged regardless of whether it was based on the "traditional" set of hazards (activities, technologies, substances) or an on expanded set of hazards including hazards of undesirable states of affairs (social tensions, shortages of basic consumer goods). The first invariance had already been confirmed in previous studies (Englander et al., 1986). The second one provides new evidence that the observed factor structure reflects how people perceive the riskiness of various hazards.

This result cannot be interpreted too generally, however. As Johnson and Tversky (1984) have shown, a factor model (or, more generally, a spatial model) is not the only possibility for the representation of risk perception. These authors suggest, as an alternative, a tree model that is based on the assumption that risk is perceived in terms of common and unique discrete features for the hazards being compared, and not in terms of comparing various hazards on a number of common dimensions. They showed (see also Goszczynska & Tyszka, in press) that some types of judgmental tasks -- those involving similarity judgments -- appear to be represented better by these tree models. This may suggest that the invariance of risk representation obtained in our study for different sets of hazards is valid only for and perhaps is enforced by our dimensional evaluation task.

Let us look next at the degree of perceived risk in the Polish sample in comparison with the three other countries. The overall mean evaluations of risk shows that Poland (38.1) is closest to the United States (46.1), Norway is third (32.4), and Hungary has the lowest average (27.7). Thus, again, the answer to the question posed at the beginning of this paper appears clear: It is the size of the country and not its social, economic, and cultural background that seems most to influence the degree of perceived riskiness. This influence could be caused by the availability heuristic: the bigger the country, the more accidents and negative events occur and are reported there. When rating riskiness, people recall these instances, and thus their ratings reflect those frequencies.

However, this simple rule of conditioning the level of perceived riskiness upon the size of the country should not be overgeneralized. After all, it does not fit the Hungary-Norway comparison: the average level of perceived riskiness in the Norwegian sample is higher than in the Hungarian, despite the fact that Hungary has a larger population than Norway. We think that this reversal of order may be attributable to the media information policy in Hungary. As we already noted (Englander et al., 1986), the Hungarian press used to report relatively few risks and accidents taking place within the country. Thus Hungarians may have been able to recall a smaller number of hazardous events than Norwegians. On the other hand, due to the accessibility of the relevant information in Poland (as discussed earlier), the awareness of various hazards has increased considerably in Polish society. Because of this, Poland, in contrast to Hungary, appears to be subjected

to a simple law of dependence of the degree of perceived risk upon the size of the country.[3]

Perhaps the same information policy is responsible for the dissimilarity of Hungary and the three other countries in the ordering of various hazards with respect to their riskiness. As we have seen, Hungary had the lowest correlation coefficients with the three other countries. Given the restricted information policy in Hungary, it is not surprising that Hungarians see as relatively more risky such "common" hazards as smoking, alcohol, and traffic accidents. These are hazards about which one can learn by one's own experiences or the experiences of one's family and friends.

Finally, let us turn to the question of differences in the perception of risk among various Polish groups. Neither of the two opposing hypotheses posed in the introduction to this paper turned out to be entirely true. Generally, the hypothesis that people living in an industrialized area would display a higher level of perceived riskiness than would residents of a moderately industrialized area was supported. However, this relationship held only for nontechnical groups: there was no difference between the two regions (industrialized vs. moderately industrialized) for the group of technicians. Perhaps the simplest explanation

---

[3] Recently, Mechitov and Rebrik (1990) conducted still another replication of the Slovic et al. study, using the same paradigm. Their main finding was that the average level of perceived riskiness in the Soviet Union appears to be exceptionally low. For the list of 56 hazards compared with American, Norwegian, and Hungarian samples, the Soviet mean perceived risk score was equal to 16.4, and this result was even lower than in the Hungarian sample (where the mean was 22.8). Taking into account the Soviet information policy, which used to provide as little information as possible on misfortunes taking place within the Soviet Union, this result is not expected, and is in line with what is said here about Hungary.

of this result is as follows: technicians in both regions have some knowledge and experience concerning various technological hazards. The two groups may also share a common, technocratic worldview regarding risk. Their assessments of risk may have been based on their knowledge or on their technocratic worldview. On the other hand, the nontechnical groups lack this common knowledge, experience, and culture. As a result, they were more sensitive to external cues of risks and dangers. The residents of the Silesian region -- definitely more industrialized, and more developed in tourism as well, than the Radom region -- evidently have more opportunities to observe the negative consequences of both technologies and recreational activities than subjects from the other region. Consequently, the non-technical group from the Silesian region evaluated the risk of technologies and recreational activities considerably more highly than did the nontechnical group from the Radom region.

References

Englander, T., Farago, K., Slovic, P., & Fischhoff, B. (1986). A comparative analysis of risk perception in Hungary and the United States. *Social Behavior*, **1**, 55-66.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, **9**, 127-152.

Goszczynska, M., & Tyszka, T. (1986). Jak spostrzegamy zagrozenie? (How do we perceive hazards?) *Przeglad Psychologiczny*, **1**, 39-64.

Johnson, E. J., & Tversky, A. (1984). Representations of perceptions of risk. *Journal of Experimental Psychology*, **113**, 55-70.

Mechitov, A. I., & Rebrik, S. B. (1990). Studies of risk and safety perception in the USSR. In K. Borcherding, O. I. Larichev, & D. M. Messick (Eds.), *Contemporary issues in decision making* (pp. 261-270). Amsterdam: Elsevier.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1980). Facts and fears: Understanding perceived risk. In R. Schwing & W. A. Albers, Jr. (Eds.), *Societal risk assessment: How safe is safe enough?* (pp. 181-214). New York: Plenum.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1984). Behavioral decision theory perspectives on risk and safety. *Acta Psychologica*, **56**, 183-203.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1985). Characterizing perceived risk. In R. W. Kates, C. Hohenemser, & J. X. Kasperson (Eds.), *Perilous progress: Technology as hazard* (pp. 91-123). Boulder, CO: Westview.

Teigen, K. H., Brun, W., & Slovic, P. (1988). Societal risks as seen by a Norwegian public. *Journal of Behavioral Decision Making*, **1**, 111-130.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, **5**, 207-232.

Tyszka, T., & Goszczynska, M. (In press). What verbal reports say about risk perception? *Acta Psychologica.*

Vlek, C., & Stallen, P. J. (1981). Judging risks and benefits in the small and in the large. *Organizational Behavior and Human Performance*, **28**, 235-271.

Table 1

Risk characteristic used by Poles to rate 40 hazardous activities, substances and technologies.

Voluntariness of risk*

Do people face this risk voluntarily? If some risks are voluntarily undertaken and some are not, mark an appropriate spot towards the center of the scale.

risk assumed voluntarily	1	2	3	4	5	6	7	risk assumed involuntarily

Immediacy of effect*

To what extent is the risk of death immediate - or is death likely to occur at some later time?

effect immediate	1	2	3	4	5	6	7	effect delayed

Knowledge about risk*

To what extent are the risks known precisely by the persons who are exposed to those risks?

risk level known precisely	1	2	3	4	5	6	7	risk level not known

To what extent are risks known to science?

risk level known precisely	1	2	3	4	5	6	7	risk level not known

Personal control over risk*

If you are exposed to the risk, to what extent can you, by personal skill or diligence avoid death?

personal risk can be controlled	1	2	3	4	5	6	7	personal risk can't be controlled

Severity control

To what extent can proper action reduce the likelihood or number of fatalities (i.e., the severity(?

severity can be controlled	1	2	3	4	5	6	7	severity can't be controlled

Table 1 continued

Newness*

Is this risk new and novel or old and familiar?

new 1 2 3 4 5 6 7 old

Chronic-catastrophic*

It this a risk that kills people one at a time (chronic risk(or a risk that kills large numbers of people at once (catastrophic risk(?

chronic 1 2 3 4 5 6 7 catastrophic

Common-dread*

It this a risk that people have learned to live with and can think about reasonably calmly or is it one that people have great dread for - on the level of a gut reaction?

common 1 2 3 4 5 6 7 dread

Severity of consequences*

When the risk from the activity is realized in the form of a mishap or illness, how likely is it that the consequence will be fatal?

certain not to be fatal 1 2 3 4 5 6 7 certain to be fatal

Collective exposure

How many people are exposed to this risk in Poland?

few 1 2 3 4 5 6 7 many

Personal exposure

To what extent do you believe that you are personally at risk from this activity, substance or technology?

I am not at risk 1 2 3 4 5 6 7 I am very much at risk

Future generations

To what extent does present pursuit of this activity or technology pose risks to future generations?

very little threat 1 2 3 4 5 6 7 very great threat

Observability

When something bad is in the process of happening because of this activity, substance or technology, to what extent is the damage observable?

observable 1 2 3 4 5 6 7 not observable

Table 1 continued

Risks vs. benefits

To what extent do the benefits from this activity, substance or technology outweigh the risks?

benefits outweigh risks	1	2	3	4	5	6	7	risks outweigh benefits

Characteristics marked with asterisks were also used in the three previous studies.

Table

~~Exhibit~~ 2. Intercorrelations between 15 risk characteristics. Four Polish samples taken together /N = 140/

Characteristic	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Voluntariness	-														
2. Immediacy	.14	-													
3. Known to exposed	.43	.78	-												
4. Known to science	.51	.49	.74	-											
5. Newness	-.21	-.09	-.37	-.26	-										
6. Chronic	.84	-.01	.22	.22	-.18	-									
7. Dread	.78	-.23	-.01	.25	-.07	.83	-								
8. Severity	.38	-.61	-.46	-.34	-.01	.63	.77	-							
9. Personal control	.71	-.39	-.12	.01	-.12	.86	.89	.87	-						
10. Severity control	.56	-.46	-.25	-.13	-.17	.79	.84	.91	.94	-					
11. Exposure	.45	.34	.24	.10	.16	.52	.41	.32	.32	.35	-				
12. Future generations	.72	.19	.24	.17	-.16	.82	.79	.60	.70	.68	.75	-			
13. Personal exposure	.72	.03	.22	.29	-.03	.73	.67	.49	.62	.56	.72	.74	-		
14. Observability	.29	.72	.81	.42	-.47	.21	-.01	-.26	-.07	-.09	.31	.37	.20	-	
15. Benefits/risks	.46	-.02	-.04	.19	.12	.47	.78	.54	.50	.54	.50	.71	.49	.02	-

Table 3.

Rotated loadings for 15 risk characteristics on 3 factors.

Characteristics	Factor 1	Factor 2	Factor 3
Dread	.95	-.03	.01
Personal lack of control	.94	-.19	-.16
Catastrophic	.91	.18	-.05
Severity uncontrollable	.91	-.29	-.14
Future generations	.87	.29	.24
Certain fatal	.82	-.50	-.02
Involuntary	.80	.41	-.06
Personal exposure	.77	.24	.27
Risk outweighs benefits	.68	.01	.40
Unknown to exposed	.02	.96	-.09
Delayed effect	-.21	.87	.29
Unobservability	.08	.85	-.09
Unknown to science	.14	.74	-.12
Oldness	-.16	-.38	.77
Collective exposure	.54	.32	.65
% variance explained	46.4	26.1	9.8

Table ~~Exhibit~~ 4.

Cross-national correlations for average perceived risk of 27 activities, substances and technologies[1]/.

Comparison correlations	Product-moment correlation	Rank correlation
Norway/USA	0.802	0.752
Norway/Hungary	0.559	0.598
USA/Hungary	0.608	0.610
USA/Poland	0.871	0.871
Poland/Norway	0.853	0.827
Poland/Hungary	0.710	0.788

[1]/ The calculations are based on data from Teigen, Brun, and Slovic, (1988).

Table ~~Exhibit~~ 5.

Magnitude of Polish perceived risk of 40 hazards and differences in ratings between Poland and other countries (USA, Hungary, Norway).

	Poland	Poland-USA	Poland-Hungary	Poland-Norway
Warfare	86.5	+ 8.7	+ 43.6	+ 21.6
Nuclear weapons	85.4	+ 7.6	+ 44.3	+ 22.9
Shortage of food	66.2	-	-	-
Narcotics	64.4	+ 1.7	+ 38.8	- 13.2
Crime	63.4	-10.0	+ 9.6	+ 9.5
Alcoholic beverages	59.6	+ 2.9	+ 5.7	+ 27.7
Shortage of medicines	59.4	-	-	-
Economic crisis	58.9	-	-	-
Social tension	56.3	-	-	-
Domestic turmoil	53.1	-	-	-
Terrorism	52.0	-13.7	+ 19.4	- 3.6
Smoking	51.6	-16.5	- 9.1	- 0.7
Shortage of medical equipment	50.5	-	-	-
Nuclear power	49.3	-22.2	+ 17.7	+ 2.5
Repression	48.2	-	-	-
Coal mines	46.6	-	-	-
Motor vehicles	43.1	-11.7	- 4.8	+ 7.6
Pesticides	40.0	-30.5	+ 17.3	+ 4.2
Chemical fertilizers	39.8	-15.2	+ 22.1	+ 23.9
Petrochemistry	39.7	-	-	-
Iron works	39.6	-	-	-
Herbicides	38.4	- -30.5	+ 19.7	+ 11.7
Shortage of dwellings	37.1	-	-	-

Table 5, continued

Cement mills	36.2	-	-	-
Motorcycles	35.3	- 8.0	+ 3.3	- 6.7
Electric power (non-nuclear)	31.9	+ 6.0	- 3.5	+ 13.5
Railroads	29.7	+ 0.4	+ 3.8	+ 12.7
Shortage of home equipment	29.2	-	-	-
Valium	29.1	-19.3	+ 14.2	- 13.3
Antibiotics	28.8	- 0.9	+ 12.1	+ 8.6
Commercial aviation	28.5	- 2.5	+ 5.8	+ 7.2
Mountain climbing	22.9	- 4.6	+ 8.2	- 9.5
Swimming	22.5	- 3.3	+ 4.9	+ 11.4
Hydroelectric power	20.5	- 9.5	- 7.3	+ 8.4
Sailing (recreational boating)	20.2	- 2.1	- 1.5	+ 0.9
Tractors	19.4	- 9.5	+ 5.9	+ 4.3
Skiing	19.1	- 6.6	+ 4.9	- 1.7
Bicycles	17.9	- 6.5	- 4.4	+ 1.7
Sunbathing	16.2	- 3.5	+ 5.2	+ 0.5
Football	14.1	-15.9	+ 5.6	+ 2.1
Average perceived riskiness	38.1	46.1	27.7	32.4

Table 6

~~Exhibit 0.~~

Mean perceived risk scores of individual hazards for two occupational groups in two different regions of Poland.

	Moderate industrial region		High industrial region		
	Non-technical group (N=30)	Technical group (N=30)	Non-technical group (N=40)	Technical group (N=40)	
Hazards					
Electric power (non-nuclear)	25.0	32.2	37.1	31.5	
Bicycles	10.2	12.8	19.0	26.4	R***
Chemical fertilizers	35.5	41.5	37.1	44.4	
Swimming	12.7	18.8	25.7	29.5	R***
Alcoholic beverages	55.7	61.0	60.9	60.4	
Crime	52.3	63.8	71.2	63.4	R*
Warfare	89.7	85.7	91.0	80.1	
Economic crisis	53.8	61.8	62.2	57.1	
Social tension	52.2	58.5	59.9	54.1	
Hydroelectric power	17.2	19.8	25.0	18.9	
Motorcycles	24.0	33.5	38.1	42.2	R**
Herbicides	32.2	39.3	37.0	43.9	
Sailing	10.5	22.2	23.5	22.7	R*
Narcotics	53.5	66.0	73.7	61.9	
Terrorism	39.8	54.5	61.1	50.1	
Nuclear weapons	88.0	84.5	90.1	79.5	
Shortage of food	59.8	72.3	70.1	62.4	
Internal disturbances	53.3	54.0	57.4	48.0	

Table 6 continued

Nuclear power	48.2	44.7	62.1	40.9	P*
Motor vehicles	43.3	40.8	43.7	44.0	
Pesticides	33.2	42.2	45.1	38.5	
Skiing	10.3	18.2	26.1	19.5	R**
Smoking	52.3	54.5	53.7	46.9	
Shortage of medicines	57.7	66.0	58.4	56.7	
Coal mines	32.3	42.8	53.6	52.0	R***
Railroads	21.3	30.0	32.6	32.9	R*
Mountain climbing	9.5	19.8	28.9	29.1	R***
Antibiotics	22.7	31.0	31.4	29.1	
Shortage of medical equipment	43.3	51.3	51.4	54.4	
Repressions	44.8	50.8	51.7	45.2	
Iron works	29.3	38.3	43.2	44.6	R**
Commercial aviation	16.2	38.3	34.2	31.4	R**
Sunbathing	7.3	20.3	18.6	17.5	P*
Valium	20.2	31.5	35.4	27.9	
Shortage of dwellings	33.2	33.7	37.0	42.6	
Petrochemistry	41.8	43.0	42.6	40.4	
Tractors	16.8	15.3	18.5	25.1	R*
Football	8.7	17.5	12.6	17.0	P*
Shortage of home equipment	25.2	34.7	28.2	29.2	
Cement mills	29.3	32.5	42.5	37.9	R*

R - difference between regions

P - difference between occupations

x - $p < 0.05$

xx - $p < 0.01$

xxx - $p < 0.001$

Figure 1

~~Exhibit 6~~. The location of 40 hazards in two-factor space

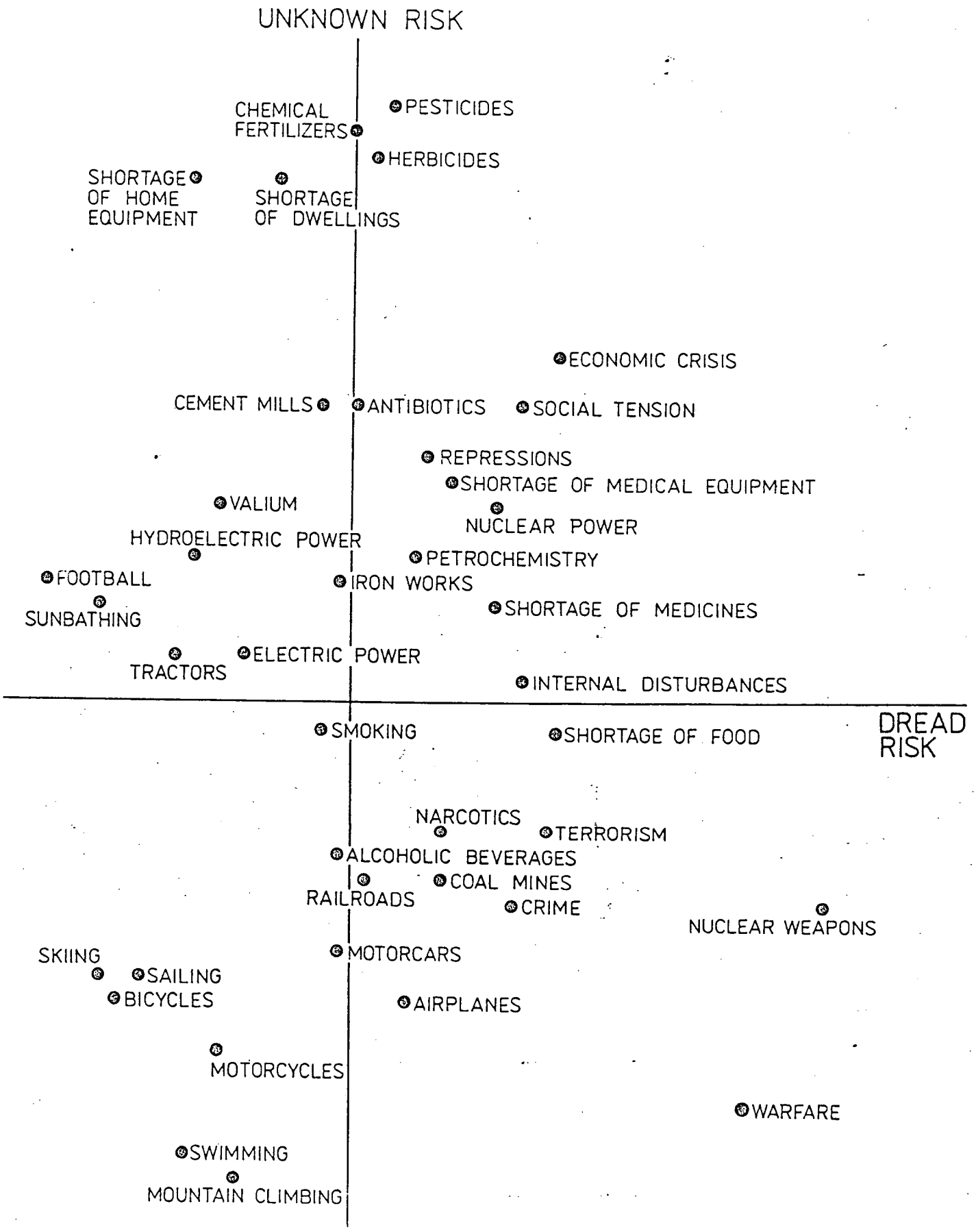

Figure 2

~~Exhibit 7~~

Mean perceived risk scores for two occupational groups in two different regions of Poland.