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Insights into the reception and acceptance of risk messages: nuclear emergency communication

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The objective of this paper is to test whether the effect of variables such as knowledge, attitudes, trust, risk perception, and psychometric risk characteristics changes in the different stages of risk-related information processing. To address this question, a distinction is made between two information-processing steps, *reception* (measured as a person's ability to retain the information communicated) and *acceptance* (measured as a person's level of agreement with the communicated information). An empirical study was conducted, using a radiological accident (2008) in Belgium as a communication case study. Face-to-face interviews were conducted on a large sample of Belgian population representative with respect to province, region, level of urbanization, gender, age, and professionally active status ($N = 1031$) and among the population living in vicinity of the accident ($N = 104$). All factors were measured on reliable scales (Cronbach's $\alpha > .75$). The reception–acceptance model was used to produce new insights into risk communication. The results demonstrate that knowledge was the driving factor only for the *reception* of risk messages, while heuristic predictors such as psychometric risk characteristics, attitudes, and trust were most influential for the *acceptance* of risk messages. It is discussed how the results will facilitate a more thorough understanding of information processing and how they could be used to design more focused risk communication strategies.

Keywords: risk communication; information processing; nuclear accident; RAS model

1. Introduction

Efficient communication about risks requires a good understanding of factors that influence people's attentiveness to information and, most importantly, their decisions to follow recommendations for public by emergency management. Public communication is of paramount importance in emergency situations (Abbott, Wallace, and Beck 2006; Covello 2011; IAEA 2012). For instance, one possible protective measure in case of a release of radioactive iodine is the intake of stable iodine pills. What happened in 2011 during the nuclear accident in Fukushima, Japan was that some people swallowed gargling agents containing povidone-iodine as a substitute for stable iodine tablets, an action which can actually be quite detrimental to someone's

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health (Kanda, Tsuji, and Yonehara 2012; NAIIC 2012). A study in France also revealed 'uncontrolled preventive behaviours resulting in potentially unjustifiable consumption of available drugs' after the Fukushima accident (Crépey, Pivette, and Bar-Hen 2013, 1). The nuclear accident emphasized once more the need to better understand how risk-related messages are processed and how the public receives and accepts messages related to protective actions in nuclear emergencies (Kanda, Tsuji, and Yonehara 2012; Ropeik 2011).

One of the theoretical models that describe information processing and distinguish between the different steps of information processing is Zaller's reception–acceptance-sample model (RAS) (2006), which originates from the field of political communication. According to the RAS model (2006), an opinion is formed in two stages of information processing: *reception* and *acceptance*. *Reception* of information refers to the extent to which an individual pays attention to, understands what he/she has encountered, and retains information. Reception of information is thus set apart from the decision-making part (Price and Zaller 1993b). The latter occurs in the so-called *acceptance* stage, which refers to 'resisting or accepting the information' (Zaller 2006, 44).

The objective of this paper is twofold. The first objective of our research is to identify at which stage of information processing do predictors such as risk perception, trust, knowledge, and other predictors traditionally used in risk research, start to influence opinion formation. Although the risk research literature has seen a growing interest in information processing (ter Huurne, Griffin, and Gutteling 2009; Jooyoung and Hye-Jin 2009; Petty and Cacioppo 1986; Trumbo 2002), it has not been evaluated to what extent these variables affect the different stages of risk-related information processing. The second objective of our research is to adapt and empirically test the reception–acceptance model in the context of nuclear risk communication. Although it has been rarely tested empirically, the model is a leading theory in political communication and opinion formation (e.g. Bützer and Marquis 2002; Dobrzynska and Blais 2007; Goren 2004; Krosnick and Brannon 1993; Kulakovski 2009; Liu 2005; Perko et al. 2013).

Why are Zaller's concepts and model taken as the backbone of this research? Although these concepts were originally designed for political communication, they make it possible to easily and empirically determine influential predictors for the *reception* and *acceptance* of risk-related information. Thus, the model highlights the stage of information processing, in which the different predictors start to influence opinion formation. Moreover, risk communication seems to be a critical context to test the model. Especially in areas affected by an accident risks (e.g. the consequences of a nuclear accident) are typically intensively communicated and the familiarity with the messages among the population is usually high, while both intensity and familiarity are substantially lower in non-affected areas. In addition, risk discussions frequently appear in the political agenda. Finally, public attention to a particular risk is often defined by politics (Beck 2006; Jones and Baumgartner 2005). In the present study, the model is applied to risk communication for the first time and subsequently tested empirically by means of a large-scale public opinion survey. However, the adaptation of the reception–acceptance model to risk communication requires the integration of two disciplines: political communication and risk research. Although in this study the basic model is taken from Zaller (2006), the operationalization of several concepts was driven by the risk research theory developed by Griffin, Dunwoody, and Neuwirth (1999), Slovic et al. (2004), Sjoberg (2006), Renn (2008), and others. The links between Zaller's model and other risk information-processing models developed by Griffin, Dunwoody, and Neuwirth (1999) and Petty and Cacioppo (1986) are discussed in a recent publication by Perko et al. (2013).

To provide a concrete framework to study the influence and the power of hypothetical predictors in risk-related information processing, we used the risk communication after a radiological accident as a case study. The accident in question occurred in 2008, in a nuclear installation located in the area of Fleurus, Belgium. The subsequent radioactive release to the environment was assumed to pose a potential health risk for the population living in this area. To examine the intensity of the campaign and its effect, two samples were studied. The first sample ($N = 1031$) is representative for the Belgian adult population; the second one ($N = 104$) is a sample of the population living in the area of the radiological accident. More details are given in Section 4.

2. Theoretical framework: the reception–acceptance model

Zaller formulated the RAS model in order to explain – in the context of political communication – the nature and origins of mass opinion. Using McGuire's theory (1973) as a starting point, it is feasible to identify predictors of information processing and to recognize the importance of political awareness and predispositions in opinion formation. Since his first publication in 1992, the RAS model has become the most prominent model of opinion formation (Bützer and Marquis 2002; Dobrzynska and Blais 2007; Goren 2004; Krosnick and Brannon 1993; Kulakovski 2009; Liu 2005).

The RAS model is constructed along four axioms: reception, resistance, accessibility, and sampling (Zaller 2006, 42–51). These four axioms comprise a conceptual framework explaining how individuals process the information related to political issues. The RAS model argues that an individual's judgment reflects considerations that have been received, accepted, and sampled. In our research, the first three axioms are addressed.

According to Zaller's model, an opinion is formed in two stages, named *reception* and *acceptance*. *Reception* entails a sequence of information-processing steps, attending to, comprehending, and retaining the information (Price and Zaller 1993b, 134). According to the model, in the *reception* stage, 'the greater a person's level of cognitive engagement (awareness) with an issue, the more likely she or he is to be exposed to and comprehend (i.e. receive) messages concerning that issue' (Zaller 2006, 42). The impact of awareness depends on the characteristics of the message. The weaker the intensity of the message and the person's familiarity with it, the stronger is the effect of awareness. If a message is intense and familiar, even the people who are least aware of it will receive it and be able to make the appropriate connections with their basic values (Zaller 2006, 154–155).

Acceptance may refer to a person resisting to the information or accepting it. As Zaller puts it, 'people tend to resist arguments that are inconsistent with their predispositions, but they do so only to the extent that they possess the contextual information necessary to perceive a relationship between the message and their predispositions' (Zaller 2006, 44). Accordingly, the acceptance of a message is conceived as a result of the interaction between political awareness and political predispositions (Dobrzynska and Blais 2007).

The *awareness* construct in Zaller's model suggests that people who are more aware will be exposed to, and thus 'receive,' more information, but they will also be more selective in deciding which information to internalize as considerations (Zaller 2006, 17–19). As a result, people that are more aware will be more likely to be able to voice their opinions, and these will generally be ideologically consistent with their *predispositions*. Awareness can be measured by several concepts: the level of participation, the level of interest, and the level of media use. However, awareness is usually measured by the specific knowledge (Zaller 2006, 333–339).

Predispositions are stable individual-level traits that regulate the acceptance or non-acceptance of the information a person receives. They are the critical intervening variables between the information that people encounter and their statements of issue preference. Predispositions are measured by values (Zaller 2006, 344, 22–28), life experiences, social and economic status or race and party attachment. As Zaller argues, 'Every opinion is a marriage of information and predisposition: information to form a mental picture of a given issue, and predisposition to motivate some conclusion about it' (Zaller 2006, 6).

3. Adaptation of the RAS model to risk communication

The adaptation of the independent variables of the RAS model to the context of risk communication required the redefinition of several concepts, among which *awareness* and *predisposition*. In the following paragraphs, the independent levels of this adapted RAS model are explained and the research hypotheses are formulated (see Figure 1).

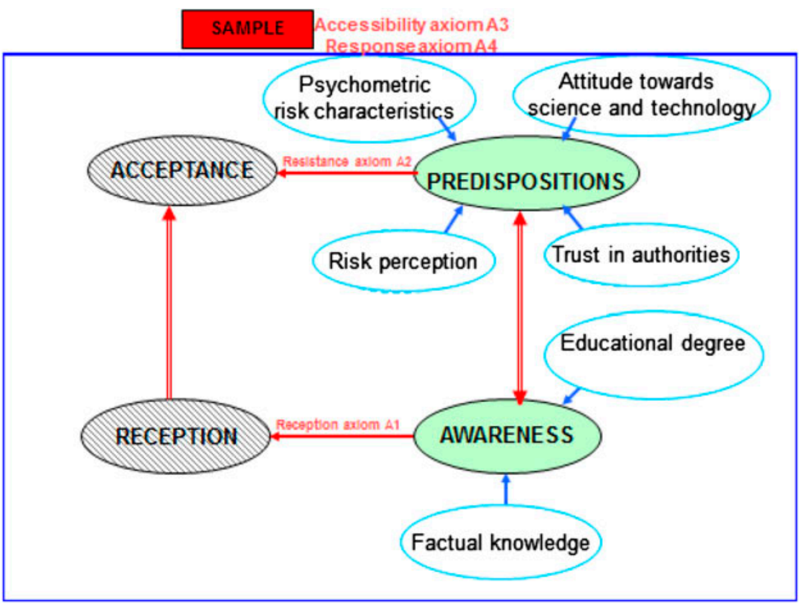

Figure 1. Hypothetical model; adaptation of political communication model to risk communication.

3.1. Awareness

From the original construct of the latent variable political awareness, we only retained the education level and specific knowledge, which we adapted to the domain of radiological risk.

3.1.1. Specific knowledge

> H1a: People with more specific knowledge about the nuclear field are more likely to receive messages about the radiological accident.

As recommended by Zaller (2006, 333) and confirmed by Dobrzynska and Blais (2007), we only retained specific knowledge as a measure for awareness. The participants' prior knowledge was determined by a simple test of factual information related to the specific risk involved: 'radioactivity.' The information used to measure knowledge was not included in the risk communication carried out after the accident, so that it was a good indicator of prior knowledge, independent from the risk communication.

The influence of specific knowledge on information processing is widely recognized by both political communication and risk communication scholars. Scholars in risk research, for example Griffin, Yang, and Huurne (2008), Kahlor et al. (2006), and ter Huurne, Griffin, and Gutteling (2009), have also found a positive direct relationship between knowledge and perceived information-gathering capacity. Political communication scholars such as Price and Zaller (1993b), Dobrzynska and Blais (2007) have recognized specific knowledge as the most powerful predictor for information *reception*. In other words, people who are well informed about a specific issue receive more information than people who are not as knowledgeable. However, Zaller observed that the impact of this knowledge depends significantly on the intensity and familiarity of the message (Zaller 2006, 154–155). Therefore, if a message is very intense and familiar, or if people are extremely motivated by some reasons, such as personal relevance (Petty and Cacioppo 1986), even the least knowledgeable would receive it. As a result, the following hypothesis could be formulated:

> H1b: Specific knowledge is, due to higher familiarity with and intensity of the message, less influential as a predictor of reception for the affected population than for the general population.

In order to investigate the importance of familiarity with and intensity of the messages, two different populations were selected. First, we examined the general population, in which the intensity and familiarity with the communicated messages were not strong, and second, we studied the affected population, in which both factors were very strong (see Section 4.1).

3.1.2. Education level

> H2b: People with a higher level of education are more likely to receive messages about the radiological accident, which either deal with protective actions or are reassuring messages of risk communication.

In a study by Griffin, Dunwoody, and Neuwirth (1999), education was indicated as an important predictor of an individual's ability to seek, process, and retain risk information. They found that people with a higher education are more likely to process the information and make a judgment afterward. However, for the *reception* of 'political' information, education is assumed to be a rather weak predictor (Price and Zaller 1993b; Zaller 2006). To examine this contradiction further, we tested education as a possible predictor for the *reception* of risk messages.

3.2. Predispositions

We adapted the concept of *predispositions* to radiation risks (in political communication expressed, e.g. as party orientation or political values). Based on the literature on risk research, we identified the following variables that may act as predispositions for information processing: (1) attitude toward science and technology, (2) trust in the authorities to protect the population, (3) risk perception of nuclear accidents, and (4) psychometric characteristics of the nuclear accident (i.e. disaster potential, tampering with nature, and unfamiliarity). We measured the influence of predispositions in both the reception and acceptance stage. The research hypotheses are summarized in the following paragraphs.

3.2.1. Attitude toward science and technology

An attitude is defined as a complex, multidimensional construct comprised of cognitive, affective, or behavioral components (Rosenberg and Hovland 1960). It is essentially a subjective judgment that one likes or dislikes an object, that it is good or bad, that one feels favorable or unfavorable toward it. Even if attitudes may play a limited role in predicting behavior, for certain individuals, and certain situations, they do come forward as important predictors of behavior. Fazio (1986), for example, showed that attitudes and behavior are correlated when (a) the attitude is based on direct experience with the attitude object and (b) to the extent that the attitude is cognitively accessible.

Attitudes are considered key mental states relevant to information processing because of a presumed relationship between attitudes and actions (O'Keefe 2002). Therefore, they are important determinants of persuasive communication, which risk communication often, but not always, aims to be (Krosnick and Petty 1995).

In the context of a radiological accident, we assumed that people's attitude toward science and technology would be related to their acceptance of protective actions and reassuring messages, since a radiological accident can be seen as a risk arising from the development of science and technology. We tested the following hypothesis:

> H3: People with a positive attitude toward science and technology will accept risk-related messages more.

3.2.2. Trust in authorities to protect the population against radiation risks

The variable 'trust' attracts a growing interest in decision-making among risk perception scholars (e.g. Chryssochoidis, Strada, and Krystallis 2009; Peters, Covello, and Mccallum 1997; Renn 2004; Sjoberg 2004). Trust is very often used as an explanation of risk perception and its acceptability. The components of trust are multidimensional: perceived competence, objectivity, fairness, consistency, sincerity, faith, and empathy. Earlier research has identified trust as one of the key indicators for the acceptance of nuclear risks (Ibitayo and Pijawka 1999; Sjoberg 2004; Slovic, Flynn, and Layman 1991). Several researchers, such as (Earle and Cvetkovich 1995; Slovic 1993), have also identified trust as a key mediating factor in circumstances that require actions and subsequent information processing. However, none of these studies have so far identified at what particular stage of information-processing trust actually becomes influential.

In our study, we have explored this question by studying the relation between trust in authorities and the *reception/acceptance* of risk messages. With the increasing complexity of technological innovations, people find themselves in a position of not knowing much about highly complex and potentially dangerous technologies (Freudenburg 1993; Gaskell et al. 2004). Therefore, they have to rely on their own judgment about whom or what to trust.

> H4: People with more trust in the authorities to protect the population against radiation risks will accept a greater number of messages than people with less trust will.

3.2.3. Risk perception of an accident in a nuclear installation

Risk perception is recognized as an essential social and psychological phenomenon, having an influence on decision-making (Beck 2006; Renn 2008; Sjoberg 2006). A considerable amount of research on risk perception has been published, and a variety of theoretical perspectives exist, including cultural (Dake 1992), sociological (Beck 2006), and psychological ones (Fischhoff et al. 1978). Previous research on risk information by Griffin, Yang, and Huurne (2008) has found that the response to a risk could be directly related to a person's information seeking. The research by Slovic and Weber (2002), Fischhoff, Bostrom, and Quadrel (1993), Renn (2008), and others have found that risk perception influences the response to risk information as well. In this research, the following hypotheses were tested:

> H5: People that have a higher risk perception of an accident in a nuclear installation oppose more risk messages and formulate more negative opinions about actions taken to protect the population, in comparison with people with a lower perception of this risk.

3.2.4. Psychometric risk characteristics

ter Huurne, Griffin, and Gutteling (2009, 231) found that 'emotional reactions to risk are among the strongest predictors of individuals' risk information seeking behavior.' These specific emotions related to risk have been evaluated by several psychometric scholars. Fischhoff et al. (1978), who were the first to conduct such research, found that the characteristics of the risk influence its acceptability. For example, the more dreaded a risk is, the less people will accept the risk (Gregory and Mendelsohn 1993). Slovic (1992) originally demonstrated 15 different risk characteristics, but most empirical research focuses on a limited number of characteristics, such as unfamiliarity, disaster potential (dread), the number of people exposed, and controllability. The risk characteristics 'unnatural and immoral,' as well 'tampering with nature,' added by Sjoberg, considerably improved the psychometric model, so that it could predict people's acceptance of risk better (Fischhoff et al. 1978; Sjoberg 2000; Sjoberg and Wahlberg 2002). Based on this, the following hypotheses were tested:

> H6: The acceptance of information is influenced by several risk characteristics, such as disaster potential (i.e. dread), the degree to which people perceive that nature has been tampered with, and the extent to which they are unfamiliar with the topic. People that are more afraid of nuclear accidents and are more inclined to think that these accidents are a result of scientists tampering with nature or that they pose unfamiliar risks will reject more risk messages and formulate more negative opinions about protective actions.

4. Method

4.1. Description of the communication case studied

In August 2008, radioactive iodine was accidentally released in a facility producing radioisotopes for medical use, located in Fleurus, Belgium. After the accident, the Belgian authorities implemented restrictions on the use of local farming produce within 5 km of the release point. Due to the deposition of radioactive material, the population in the neighborhood was advised not to consume vegetables from their gardens, for a period of two weeks.

The European Commission sent out a warning using the ECURIE-alert system (The European Community Urgent Radiological Information Exchange) on the 29th of August. The event was covered by all Belgian mass media, and it remained a daily news item for several weeks. The news items were mostly informative, based on the information provided by the Crisis Centre or interviews with important actors: crisis managers, experts, managers from the installation and local and national politicians (Carlé et al. 2010). The national media focused their attention on the accident and then placed it within the context of lack of radioisotopes for medical use, which were produced in a facility and used for healing cancer. This framing did not appear in the local media, however.

After reports of the incident in the press, the local population grew more concerned about possible health effects. As a consequence, the Belgian public health authorities organized a large-scale thyroid measurement campaign for the local population to check their thyroid uptake of radioactive iodine.

Public meetings with the local community were organized in a sports center, and the accident was discussed with all stakeholders involved. Table 1 summarizes the main messages communicated by the authorities during the risk communication.

4.2. Description of the data collection and samples

The survey method employed was computer assisted personal interviewing, which entailed face-to-face interviews at the home of the respondents. The interviewing was performed by a professional company and professional interviewers. The survey was conducted in July and August 2009, on a large sample of the Belgian population (N = 1031) in the language of their choice (French or Dutch). The sample was representative for the Belgian adult population with respect to the following variables: province, region, level of urbanization, gender, age, and professionally active status. In the present study, this sample will be referred to as the 'general population' (Table 2). Out of 1031 interviews representative of the Belgian population,

Table 1. The messages of risk communication that we analyzed in the research, aim, and tools.

Communicated message*	Basic information	Message about a protective action	Reassuring message	Main communication tool*
In the region of Fleurus, there has been an accidental radiation release	✓			Local, national media
Release occurred in a facility producing isotopes for medical use	✓			National media
The influence of the radioactive release is only local	✓		✓	Public meeting
The pollutant was radio-iodine	✓			Local media
Authorities advise not to consume vegetables from gardens for a period of 2 weeks		✓		Leaflets, public meeting
Radio-iodine can increase the risk of getting thyroid cancer	✓			Public meeting
The Belgian public health authorities organize a thyroid measurement campaign for the local population		✓		National media, leaflet
Evacuation of people is not needed			✓	Public meeting
Due to the accident, there is a lack of isotopes for curing cancer patients in the hospitals	✓			National media

*We collected the published media news and public communication by authorities, and we selected the most relevant ones to test the RAS model for risk communication.

Table 2. Socio-demographic characteristics of the populations.

Variable		Belgian population (%)	‘General population’ ($N = 1031$) (%)	‘Affected population’ ($N = 104$) %
Sex	Men	48.4	48.4	50
	Women	51.6	51.6	50
Age	18–34	26.9	26.3	26.9
	35–54	36.5	37.7	33.7
	55+	36.1	36.0	39.4
Education	Lower (primary and lower sec.)	21.9	20.2	16.3
	Intermediate (higher secondary)	50.6	49.9	56.7
	Higher	27.6	30.0	26.9
Region	Flanders	58.4	58.4	Not applied
	Brussels	9.6	9.5	
	Wallonia	32	32.1	

778 (75%) of the encounters were randomly selected, whereas 253 (25%) were meetings with subjects referred to by other people. Next to the general population, this survey was also conducted on a (stratified) sample of the population living in the area neighboring the radiological accident location ($N = 104$). This area was defined on the basis of the postal code of the municipality, in which the accident occurred. The respondents were selected by postal code and met on the street in the municipality of Fleurus. This sample will be referred to as the 'affected population.'[1]

4.3. Scales

4.3.1. *Measurement of reception (dependent variable)*

As suggested by Price and Zaller (1993a), the dependent variable *reception* reflects the respondent's ability to correctly recall the information. Two analyzes were carried out: one for the general population and a second for the affected population.

A first measurement of reception entailed remembering the place, year, and month of the accident correctly. The respondents from the general population ($N = 1031$) and the affected population ($N = 104$) were asked if they 'remembered an accident in a nuclear installation in Belgium involving a release of radioactivity.' If so, did they remember ' where and when it happened.'[2] This variable was used as a first measurement of reception.

Next, the respondents who received the information about the event were asked five additional questions (see Table A1 in Appendix 1). These additional questions allowed us to further analyze the reception of specific messages from the risk communication. A second variable measuring reception was constructed as the number of correct answers on the five items. The values thus ranged from 0 to a maximum of 5 and formed a scale for the reception of risk messages (second dependent variable).

4.3.2. *Acceptance scale (dependent variable)*

We restricted the study of acceptance to those respondents who had received information about the radiological accident. Acceptance was measured as the acknowledgment of the messages communicated and received during the incident. For example, if the item measuring reception was 'a large intake of radio-iodine can increase the risk of getting thyroid cancer,' the corresponding item measuring acceptance was 'even if the authorities responsible for the nuclear emergency management of the accident in IRE Fleurus reported differently, I believe that radio-iodine can also increase the risk of getting other cancers than thyroid cancer.' The respondents recalling the accident were asked to indicate their agreement on a 5-point scale, from strongly agreeing (1) to strongly disagreeing (5) with six statements regarding the information given during the crisis. These statements suggested that the situation was in reality more serious than the authorities claimed. The analysis of the two populations was based on the reactions of those who remembered the accident, who made up 15% of the general population and 91% of the affected population. An exploratory factor analysis using principal axis factoring and direct oblimin rotation was performed to examine the scale for the acceptance of risk messages. The factor loading indicated that for the general population, the item 'evacuation of people in the 3 km radius would have been better' had to be excluded from the scale. Finally, the confirmatory factor analysis verified the measurement model with Cronbach's α .78 for the general population and Cronbach's α .89 for the affected population as an estimate of the reliability of the scale. For the general population the factor with five items explained 54% of the total variance ($N = 110$ out of $N = 163$) and for the affected population, the factor with six items explained 65% of the variance ($N = 67$ out of $N = 95$). High scores on the factor scale suggested a high acceptance level of the communicated messages. The factor loadings are presented in Table A2 in Appendix 1. The number of respondents included in the factor analysis was relatively low, as we had to leave out the respondents who answered 'don't know.'

4.3.3. Scales for independent variables

All independent variables were calculated for both the general population ($N = 1031$) and the affected population ($N = 104$).[3]

4.3.4. Specific knowledge

Specific knowledge was operationalized as the number of correct answers given to a set of 19 exam-style questions about the protective actions in a nuclear/radiological emergency, the location of nuclear installations in Belgium, and nuclear technology in general. The items measuring specific knowledge referred to issues that were not mentioned during the risk communication. Since the purpose of the 'specific knowledge' variable was to comprise different levels of knowledge, it was not necessary for the items to measure the same latent construct. Responses were indexed and the resulting absolute scale ranged from 0 to a maximum of 19 correct answers. In the general population, specific knowledge was slightly lower than in the affected population (mean in affected pop. = 10.6 and mean in general pop. = 10.2), but the standard deviation was higher (std. in affected pop. = 3.4 and std. in general pop. = 4.1).

4.3.5. Attitude toward science and technology

First, the respondents' attitude toward science and technology was assessed through a series of four items: 'Please indicate to what extent you agree or disagree with the following statements: 'The development of science and technology brings more advantages than harm,' 'Science and technology makes our lives healthier, easier and more comfortable, 'Future generations will have more opportunities as a result of science and technology,' and'The risks of the development of science and technology outweigh the problems they solve.' Each item was measured on a 5-point Likert scale (ranging from strong disagreement to strong agreement. The answer 'don't know/no answer' was treated as a missing value.

For the general population, an analysis of the inter-item correlations reveals, however, that the last item could be excluded from the scale since it had low correlations (<.3) with the other three items. This was confirmed when the reliability of the scale was calculated, which showed that the reliability (Cronbach's α) increased from .72 to .79 when the fourth item was deleted. The factor extracted with the remaining three items explained 71% of the variance in the data. For the affected population, the four items revealed only one factor, explaining 68% of variances, the scale with four items having Cronbach's α .84 ($N = 96$).

4.3.6. Trust in the authorities to protect the population against radiation risks

Seven items were used to measure trust in the authorities. The respondents were asked to state how much confidence they had in the authorities 'for the actions they undertake to protect the population against risks for each of the following items': an accident in a nuclear installation, radioactive waste, radiation from mobile phones (cell phones), natural radiation (e.g. radon or radiation from space), medical X-rays, a terrorist attack with a radioactive source, and residues of radioactivity in food. The possible answers ranged from 'very low confidence' (1) to 'very high confidence' (5). For both populations, only one factor was extracted with all seven items, measuring trust in the authorities to protect the population against radiation risks. High scores on this scale indicated a strong confidence in the authorities. The scale attributes for the affected population were the following: 7 items, 67% of the total variance explained, α .92, $N = 99$. For the general population, they were: 7 items, 57% of total variance explained, α .86, $N = 845$.

4.3.7. Risk perception of an accident in a nuclear installation

Risk perception was directly measured with one item. The respondents were asked to 'evaluate the risks of an accident in a nuclear installation' with possible answers ranging from 'very low' (1) to 'very high' (5). In this respect, there were significant differences between the general population and the affected population. While only 15% of the respondents in the general population evaluated the risks of a nuclear accident as high or very high, in the affected population, this was the case for 41% of the respondents.

4.3.8. Psychometric risk characteristics: disaster potential, tampering with nature, unfamiliar

Nine items corresponding to the risk characteristics, measured according to the psychometric paradigm (Fischhoff et al. 1978; Slovic 1987) as extended and modified by Sjoberg (2000), were used to assess the latent constructs behind the risk perception of an accident in a nuclear installation. Respondents were asked to 'give their perception of an accident in a nuclear installation' (see Table A3 in Appendix 1). Statements were measured on a 5-point scale. High scores indicated a strong adherence to a psychometric characteristic of risk. The three main characteristics of risk were measured: 'Disaster potential (dread),' 'Unfamiliar risk,' and 'Tampering with nature,' by three items each. Even if the scales were shortened from the original 22 items to 9 items, the loadings were still high and the Cronbach's α coefficients were larger than .75, suggesting strong scale reliability for both populations. It is interesting to note that the factor loadings for 'Disaster potential' were negative for the affected population. After a close examination of the frequencies on the three items included in factor suggests that there were substantial differences between the answers of the general population and the affected one when it came to items involving 'large consequences of an accident.' Almost half of the affected population agreed that a nuclear accident had large consequences (49%), while in the general population less than 29% of the respondents agreed with this statement.

5. Analysis and results

5.1. Reception of the information

One hundred and sixty-seven persons from the general population remembered the exact location of the accident, and, from these, 163 (15%) remembered the exact month and year in which the accident took place. From the sample of the affected population, 95 respondents (91%) had heard about the event and also identified the place, year, and month of the accident correctly. A binary variable was constructed based on the answers, coded as 1 (remembering correctly place and year) or 0 (otherwise). The reception of these messages regarding the radiological accident was then first investigated for both the general and the affected population by bivariate logistic regression. This result confirms our hypothesis (H1b) that a high intensity and familiarity of the message overrules the importance or specific knowledge as a predictor for reception.

In the regression models, all potential predictor variables were included: specific knowledge, attitude toward science and technology, trust, risk perception, and psychometric risk characteristics. Socio-demographic variables gender, age, and language were included as control variables. From the results (see Table 3), we can

Table 3. Model summary; predictors of accident reception.

Reception of radiological accident				
	General population		Affected population (all speak Fr.)	
	β	SE	*β*	SE
Language	−1.427***	.227	NA	NA
Gender	.424*	.209	−.945	1.054
Education				
Primary	−2.197***	.583	1.508	1.898
Secondary	−.753***	.216	.233	1.333
Higher and university	Ref. cat.	Ref. cat.	Ref. cat.	Ref. cat.
Age	.020**	.007	−.013	.036
Specific knowledge	.105***	.030	.310*	.202
Attitude toward science and technology	−.131	.112	.431	.649
Trust in authorities	−.073	.115	−.996	.629
Risk perception of an accident	−.152	.104	1.188	.654
Disaster potential	.426*	.183	.135	.852
Tampering with nature	−.118	.160	−.121	.700
Unfamiliar	−.201	.140	−.032	.739
Constant	−2.273***	.557	−3.179	4.160
	$N = 763$		$N = 80$	
	Nagelkerke pseudo $R^2 = .21$		Nagelkerke pseudo $R^2 = .34$	
	Percentage correctly classified 82.0		Percentage correctly classified 91.3	

Note: Logistic regression analysis, dependent variable: reception of radiological accident: Yes = 1 and No = 0; Independent variables: language (Ref.cat.: French), gender (Ref.cat.: female), education (Ref.cat: high and university degree), specific knowledge, attitude toward science and technology, trust in authorities, risk perception of a nuclear accident, disaster potential, tampering with nature, and unfamiliar.
***$p < .001$.
**$p < .01$.
*$p < .05$.

Table 4. Model summary; reception of communicated messages.

Reception of communicated messages – index	General population		Affected population	
	β	SE	β	SE
Language	.003	.240	NA	NA
Gender	.125	.205	.254	.181
Education				
Primary	.990	.618	−.066	.337
Secondary	.002	.209	−.241	.223
Higher and university	Ref. cat.	Ref. cat.	Ref. cat.	Ref. cat.
Age	−.014	.008	.004	.006
Specific knowledge	.075*	.033	.165***	.038
Attitude toward science and technology	.135	.112	.115	.119
Trust in authorities	−.086	.115	.014	.112
Risk perception of an accident	.236*	.115	.047	.100
Disaster potential	−.286	.195	−.207	.142
Tampering with nature	.107	.163	.099	.129
Unfamiliar	−.065	.131	−.146	.129
Constant	1.383	.849	.288	.775
	$N = 135$ R^2(adj) (full model) = .10		$N = 72$ R^2(adj) (full model) = .41	

Note: Linear regression analysis, dependent variable: reception of risk communication messages; independent variables: language (Ref.cat.: French), gender (Ref.cat.: female), education (Ref.cat: high and university degree), specific knowledge, attitude toward science and technology, trust in authorities, risk perception of nuclear accident, disaster, nature, unfamiliar, and socio-demographic variables.
***$p < .001$.
**$p < .01$.
*$p < .05$.

conclude that specific knowledge was the most significant predictor for the reception of information concerning the place and time of the accident. In the affected population, specific knowledge was the only significant predictor of reception. In the general population, also the variable disaster potential and socio-demographic variables appeared to be statistically significant predictors. Therefore, our hypothesis (H1b) that 'people with a higher level of education are more likely to receive risk communication' can be accepted for the general population. However, the pseudo-R^2 value of the model was weaker for the general population ($R^2 = .21$) than for the affected population ($R^2 = .34$).

We continued by investigating the ability to recall specific messages from the risk communication. In this analysis, only the respondents remembering the accident were included. The results showed that one-third of the general population (33%) who remembered the radiological accident was able to recall three specific messages out of five from the communication, and only 1% could recall all messages. More than 7% of the people who stated that they remembered the accident (and indicated the place and date correctly) were not able to recall any risk communication message.

More than half of the respondents from the affected population that remembered the accident were able to recall three messages from the communication (60%), and only 1% was able to recall all messages. Three percent of the affected population stated that they remembered the accident, but were not able to recall any message.

To get more insight in the reception, the index of received messages was regressed with all hypothetical predictors. The dependent variable (index) was in this case assumed to satisfy an interval level of measurement.

The linear regression analysis of the full model is presented in Table 4 and confirms the previous results: The reception of the communicated messages is mainly driven by specific knowledge. Risk perception of an accident in a nuclear installation is also revealed as a statistically significant predictor for reception in the general population. The explanatory value of the full model is very different in the two populations: 10% of the variation in reception was explained by the model for the general population and 41% for the affected population. Specific knowledge was

Table 5. Model summary; acceptance of communicated messages.

Acceptance of communicated messages – factor scores				
	General population (enter method)		Affected population (stepwise method)	
	β	SE	β	SE
Language	.075	.183	NA	NA
Gender	.296*	.148	−.131	−1.316
Education				
Primary	1.553**	.540	.033	.319
Secondary	.201	.152	.116	1.170
Higher and university	Ref. cat.	Ref. cat.	Ref. cat.	Ref. cat.
Age	−.007	.005	.092	.894
Specific knowledge	−.077	.072		
Attitude toward science and technology	−.129	.294	−1.077*	.402
Trust in authorities	.187	.366	.021*	.043
Risk perception of an accident in a nuclear installation	−.468	.345	−.241	−1.900
Disaster potential of nuclear accidents****	−1.656**	.540	.456***	.108
Tampering with nature	−.121	.628	.093	.661
Unfamiliar risks	.040	.299	.022	.181
Attitude toward science and technology × specific knowledge	.028	.024	.130**	.035
Trust in authorities × specific knowledge	.002	.027	.029**	.009
Risk perception of an accident in a nuclear installation × specific knowledge	.037	.026	−.119	−.881
Disaster potential of nuclear accidents × specific knowledge	.130**	.042	−.336	−1.146
Tampering with nature × specific knowledge	−.016	.047	.135	1.073
Unfamiliar risks × specific knowledge	−.006	.025	.026	.221
Constant	.775	1.090	.120	.097
	$N = 95$ R^2 (adj) (full model) = .49		$N = 50$ R^2 (adj) (full model) = .54	

Note: Linear regression analysis, dependent variable: acceptance of risk communication messages; reference categories: language (French), gender (female), and education (high and university degree). ****Remember the different sign in factor loadings populations.

***$p < .001$.

**$p < .01$.

*$p < .05$.

thus recognized as a significant predictor of reception in both populations, while other hypothetical predictors (except the risk perception in general population) were, not significant for the reception of information.

5.1.1. *Conclusions on the reception of information*

From the results of the logistic regression analysis (Table 5) and the linear regression analysis (Table 5), we can conclude that *specific knowledge* was most strongly related to the reception of risk communication. This confirms our expectations that (H1a) 'people with more specific knowledge about the nuclear field are more likely to receive messages about the radiological accident, which either deal with protective actions or are reassuring messages of risk communication.' The following hypothetical predictors did not come out as significant predictors for reception in any of the two populations: attitude toward science and technology, trust in authorities to protect the population, and psychometric characteristics of risks related to the nuclear accident. Education was significant only at the level of basic information – knowing for the accident. Risk perception of an accident in a nuclear installation was statistically significant as a predictor only for the model with the general population.

5.2. Acceptance of information

We expected the acceptance of protective actions and reassuring messages to be mainly influenced by predispositions. In order to test this, we studied the respondents who were aware of the accident (in other words, they received the message) and who had an opinion on the protective actions and reassuring messages (i.e. they either accepted or rejected them). The respondents who answered 'don't know' were coded as 'no opinion' and were excluded from this part of the analysis (similar to the study of Dobrzynska and Blais 2007). We investigated the relationship between the potential predictors and the acceptance of messages in the two population samples. To this end, we estimated the linear regression model, with acceptance as the dependent variable and the following hypothetical predictors as independent variables: (i) specific knowledge, (ii) attitude toward science and technology, (iii) trust in authorities to protect the population, (iv) risk perception of nuclear accidents, (v) psychometric risk characteristics of a nuclear accident (disaster potential, tampering with nature and unfamiliarity), and (vi) socio-demographic variables. To analzse the joint effect of the specific knowledge and predispositions on acceptance, we also included the interaction variables (multiplicative terms) in the regression model. Socio-demographic variables gender, age, and language were included as control variables. Finally, for the affected population, a stepwise selection method was used, due to the low number of respondents and high number of hypothetical predictors. A summary of the results is presented in Table 5.

5.2.1. *Conclusions on the acceptance of information*

As expected, some predispositions were revealed as important predictors for the acceptance of communicated risk messages. It was confirmed that there was a significant relationship between acceptance and psychometric risk characteristic disaster potential for both the affected population ($\beta = .46$) and the general population ($\beta = -1.66$). These results show the same tendency in both populations. Respondents who believed that an accident in a nuclear installation has a high disaster potential accepted the communicated messages less than people who assumed a low disaster potential.

Specific knowledge was not significant to predict the acceptance of information. However, taking specific knowledge as a facilitating variable for acceptance, we noticed that the joint effect of disaster potential and specific knowledge was a significant predictor in the general population ($\beta = .13$). Taking into account the interaction effect between specific knowledge on the one hand and perceiving an accident in a nuclear installation as having a high disaster potential on the other hand, we observed that the negative effect of 'disaster potential' on acceptance was smaller among respondents with more specific knowledge. Other psychometric risk characteristics were not significant. Trust was a significant predictor for the acceptance of messages by the affected population. As expected, people with low confidence in the authorities to protect the population from radiation risks were more opposed to the communicated messages than people with a lot of confidence in the authorities (β in affected population $N = .02$). The higher acceptance of messages among the people with a lot of trust in the authorities was even more significant and consistent among the people with more specific knowledge ($\beta = .03$), as *H4* was partly confirmed (i.e. only in the affected population).

Risk perception of an accident in a nuclear installation was not significant as a predictor for the acceptance of the communicated messages. The respondents' attitudes toward science and technology were only significant for the acceptance of information in the affected population ($\beta = -1.1$). People with a more positive attitude toward science and technology were more inclined to oppose the communicated messages. However, the people in this group who had with more specific knowledge about the nuclear domain were more inclined to accept the communicated messages. Thus, hypothesis (H3) 'People with a positive attitude toward science and technology will accept the communicated messages more' can partly be rejected, since it is only confirmed for people with more specific knowledge.

The explanatory value of the full model for the general population was 49% of the variation in acceptance. This value was 54% for the affected population.

For the general population, some background variables were also revealed as significant in the general population: The female population accepted the communicated messages more than the male population ($\beta = .30$). In addition, respondents with primary education accepted the communicated messages more. However, these relationships were not significant in the affected population.

6. Discussion

The objective of this paper was twofold. First, we aimed to investigate exactly at which stage of information processing do predictors traditionally used in risk research enter the information processing and start to influence opinion formation. We analyzed the following predictors: education level, specific knowledge, attitude toward science and technology, trust in the authorities, risk perception, and psychometric risk characteristics (disaster potential, tampering with nature, and unfamiliarity). The second objective was to adapt and empirically test the reception–acceptance model in the context of risk communication. In the next paragraphs, the findings for each hypothetical predictor will be discussed separately.

People with profound *specific knowledge* were identified as especially able to receive risk communication messages, but their knowledge did not influence the acceptance of information directly (H1). This is in accordance with Perko et al. (2013) who showed that more specific knowledge about the field relates to a higher *reception* of information related to pre-crisis communication. It also confirms a recent theory that recognizes specific knowledge as a filter for information processing (Dobrzynska and Blais 2007; Price and Zaller 1993b; Zaller 2006). The existing research on information-gathering capacity by Griffin, Yang, and Huurne (2008) confirms that the amount of knowledge people hold about a risk affects their capacity to gain new information about it. Moreover, our results suggest that people who are well informed about the risk environment receive more information than people who do not know much about the risk. In other words, if individuals have been able to understand risk information in the past, they should also be more capable of attending, comprehending, and retaining risk information in the future. However, in our research, specific knowledge did not directly influence the '(dis)agreeing' with the communicated message. We can conclude that providing people with adequate information will not automatically ensure more agreement with risk communication. We obtained empirical evidence that the relationship between respondents' specific knowledge and their acceptance of communicated messages is not that significant.

According to Zaller (2006), the impact of specific knowledge depends significantly on the characteristics of the message, namely its intensity and people's familiarity with it. After comparing the reception levels in the affected and the general population and after examining the influence of knowledge, we can confirm that if the message is very intense and familiar, even the least aware people will receive it (H1b).

The presumption that there are correlations between people's *attitude toward science and technology* and their acceptance of risk messages was partly confirmed (H3). We demonstrated that this attitude impacts on the interpretation and evaluation of information and that this interpretation and evaluation serves as the basis for the subsequent judgment. In particular, the acceptance levels of the affected population were shown to be influenced by their attitude toward science and technology. People with more knowledge about the nuclear domain were found to be more consistent with their attitudes toward science and technology than people with less knowledge. People with a positive attitude and more specific knowledge accepted the communicated messages more. However, people with a positive attitude and less knowledge opposed the communicated messages more. This result is consistent with Zaller's theory that more aware persons will be exposed to, and thus 'receive,' more information, but they will also be more selective in deciding which information to internalize as considerations (Zaller 2006, 17–19). Or, to put it the other words, people who do not know a lot about the risk will often be unaware of the implications of the risk communication they encounter and will therefore often end up 'mistakenly' opposing them.

Numerous researchers have already demonstrated that *trust* is an influential predictor of information processing, especially for risk tolerance or acceptability (Earle and Cvetkovich 1995; Renn 2008; Slovic 1993). However, there are still no empirical studies on the exact stage of information processing, in which trust becomes influential. In the current study, we have explored this question by studying the relationship between trust and the *reception and acceptance* of radiological emergency messages. With the empirical results for the affected population, we can confirm that people's opinion about protective actions and reassuring messages (i.e. their acceptance) is influenced both by specific knowledge and trust in the authorities to protect the population (H1 and H4). People with more knowledge will receive more messages, and those with more trust will accept more of them than people with lower knowledge and lower trust. Since trust was an influential predictor in the acceptance part of the model (but not in the reception part) for the affected population, we suggest using trust as a predisposition for the adaptation of the reception–acceptance model to risk communication.

The perception of risk is usually studied in the literature as a dependent variable, to provide insight into how people respond to specific characteristics of various risks (Kasperson et al. 1988). In our research, risk perception is used as an independent variable, as a potential predictor of *reception and acceptance* of information related to a radiological accident. In empirical results of the research, we observed large differences in the evaluation of 'the risks of an accident in a nuclear installation for you' between the general population and the affected population. The affected population evaluated this risk much higher. As expected, the relationship between risk perception and *reception* was not statistically significant. Still, the relationship between the perception of an accident in a nuclear installation and the *acceptance* of messages communicated after the radiological accident was not statistically significant either. A significant relationship was expected at least for the affected population, where this risk was evaluated as high or very high by 41% of the respondents (in comparison with 15% of the respondents in the general population). A previous study on risk information processing by Griffin, Yang, and Huurne (2008) found that the response to a risk could directly relate to a person's information processing. Our results do not confirm that being directly involved or affected by a radiological accident is likely to trigger such a response. We can conclude that the perception level of risk cannot be used as a predisposition for the reception or acceptance stage of information processing. Instead, we suggest using psychometric risk characteristics to this end.

As expected, our results confirmed that *psychometric risk characteristics* were influential predictors in the acceptance stage of information processing but not in the reception stage. This finding contradicts the results of ter Huurne, Griffin, and Gutteling (2009, 231), who found that 'emotional reactions to risk are among the set of strongest predictors of individuals' risk information seeking behavior.' In our study, the respondents who perceive an accident in a nuclear installation as having a high disaster potential accepted the communicated messages less than people who assume a low disaster potential. Taking into account the interaction effect between perceiving an accident in a nuclear installation as having a high disaster potential and having specific knowledge, we observed that the negative effect of 'disaster potential' on acceptance was smaller among respondents with higher specific knowledge. The importance of disaster potential has been explored and confirmed by many risk perception scholars. Researchers working in the psychometric risk paradigm, for example, Slovic (1987) and Fischhoff, Bostrom, and Quadrel (1993), have repeatedly shown that the disaster potential factor ('dread') explained most of the overall risk assessment (see Boholm (1998) for a review).

Even if the risk characteristic 'tampering by nature' improved the psychometric risk perception model considerably and was a better predictor of peoples' assessment of the risks related to a nuclear accident (Fischhoff et al. 1978; Sjoberg 2000; Sjoberg and Wahlberg 2002), this risk characteristic still did not improve the acceptance model. This may also be due to the significant correlation between factor disaster potential and tampering with nature (Pearson corr. = .5). From this result, we could assume that the psychometric risk characteristic *tampering with nature* could also be used to explain the acceptance stage of information processing, only the measures of this factor should be more elaborated, as suggested by Sjoberg (2000). Based on these findings, we can state that some psychometric risk characteristics are influential predispositions for the *acceptance* part of the information processing, but that they are not influential for the *reception* of risk-related information.

In our research, we noted some differences among the *general and affected populations*. From the extreme differences between the general population and the affected population in remembering the accident, as well as from the different significant levels (*p*-value) in logistic regression models, we can assume that (H1b) specific knowledge is, due to a higher familiarity with and intensity of the message, less influential as a predictor of the reception for the affected population than for the general population.

In the general population, other predictors were also influential, namely *gender, education, and age*. The same variables were influential for the acceptance stage for the general population. In risk research, *education* is commonly recognized as a predisposition for seeking out risk information and as an influencing factor for the extent to which a person will spend time and effort analyzing the risk information critically. Griffin, Dunwoody, and Neuwirth (1999), for example, found that people with a higher level of education are more likely to process the information and make a judgment afterward. This can be confirmed only for the general population in our study. Based on our findings, we can conclude that the more involved in risk communication one is (for example, if one is affected by risk), the less important classical socio-demographic dimensions such as gender or education are for the information-processing stages.

The study has some limitations that could be addressed in future research. First, the measurement of trust could not distinguish between trust in the protection against different radiological risks from trust in the information itself. Another limitation of our investigation is that the acceptance construct was expressed as the attitude or opinion about protective actions. The measurement of actual or planned behavior would certainly provide useful information for nuclear emergency communicators, as well. Last, the number of participants included in the analysis from the affected population is limited; it would be useful to repeat the study on a larger sample.

7. Conclusions

To conclude, the results of this study clearly demonstrate that specific knowledge is only dominant at the level of the reception of risk messages, while predictors such as psychometric risk characteristics, trust in risk management by the authorities, and attitudes toward science and technologies are most influential at the level of the acceptance of risk messages. For instance, people who were more knowledgeable about nuclear issues in general were more likely to know when and where the accident did happen and what kind of protective actions were taken by the authorities; however, they did not necessarily agree with these actions. Several differences were identified among information processing in the general population and the affected population. The more one is affected by the risk, the less important factors such as gender, age, or education will be for information processing. The study has shown that the application of the reception–acceptance model from political communication to risk communication can provide a better insight into the processing of risk information, by highlighting which predictors are related to the different stages of the process. This finding is useful for risk communicators in general and to design more focused risk communication strategies for nuclear emergency communication in particular.

Notes

1. A pilot study ($N = 32$) was performed and, based on the results, the questionnaire was modified in order to improve its quality.
2. In the area of Fleurus another incident involving radioactive release in the environment had happened just two months before the interviews were carried out. The additional filter questions were necessary to be sure that we were discussing the same accident.
3. The correlation between specific knowledge and predispositions was calculated. No significance relationship was identified except for specific knowledge and psychometric risk characteristics (Pearson corr. < .2).

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Appendix 1

Table A1. Reception of communicated messages: items, frequencies and comparison of general and affected populations.

Reception of risk communication; Radiological accident	Correct answer	General population % of correct answers (N = 163)	Affected population % of correct answers (N = 95)
Which was the main radioactive pollutant?	Radio-iodine	19	68
For what purpose is the radioactive element in Fleurus produced?	Medical purposes	58	34
What is the risk related to a large intake of radio-iodine? Can it increase the risk of getting...	Thyroid cancer	68	83
After the accident at IRE-Fleurus, the authorities decided on countermeasures. Do you remember what they advised the residents of some areas in Fleurus	Not to eat fresh vegetables and fruit from the gardens	67	76
There was also a campaign to measure radioactivity in the children. Do you remember what was done?	A measurement of radioiodine in the thyroid was set up	19	3

Table A2. Acceptance scale; factor loadings, principal axis factoring.

Items	General population factor loadings α = .78 N = 110	Affected population factor loadings α = .89 N = 67
The influence of the radioactive release was not only local	.599	.641
Besides radio-iodine there could also be other dangerous elements in the release.	.780	.886
All season vegetables and dairy products (e.g. milk) produced in the affected area could be polluted with radioactive elements	.681	.785
The results from detectors used for the measurements of presence of radio-iodine in the thyroid are not completely trustworthy	.405	.706
Evacuation of people in the 3 km radius would have been better.	NA	.681
Radio-iodine can increase the risk of also getting other cancers than thyroid cancer	.769	.848

Table A3. Risk characteristics; scales attributes.

Risk perception of an accident in a nuclear installation	General population Factor Loading Principal axis	Affected population factor loading principal axis	General population α, N (out of 1031)	Affected population α, N (out of 104)
Disaster potential				
An accident in a nuclear installation has large consequences	.79	−.87	.82 (N = 974)	.86 (N = 95)
An accident in a nuclear installation has effects that cannot be reversed	.72	−.72		
An accident in a nuclear installation is fatal	.81	−.82		
Tampering with nature				
An accident in a nuclear installation shows that human tampering with nature has harmful consequences	.95	.87	.88 (N = 980)	.87 (N = 95)
An accident in a nuclear installation shows that accidents may result if humans try to influence the basic processes and structures of nature	.89	.87		
An accident in a nuclear installation is the result of humans disturbing the order of nature	.68	.63		
Unfamiliar risk				
An accident in a nuclear installation is hard to understand for those who are exposed	.86	.75	.75 N = 955	.84 (N = 93)
An accident in a nuclear installation is unfamiliar for those exposed	.71	.91		
An accident in a nuclear installation is hard to understand for science	.55	.68		