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Lemyre, L., Beaudry, M., & Yong, A.G. (2017). Chapter 4. Psychosocial Aspects of Risk Perception and Communication. Dans B. Motulsky, J. B. Guindon and F. Tanguay-Hébert. *Weather and Climate Risk Communication*. Montréal : Presses de l'Université du Québec.

Weather and Climate Risk Communication

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 **Presses
de l'Université
du Québec**

CHAPTER

4

PSYCHOSOCIAL ASPECTS
OF RISK PERCEPTION
AND COMMUNICATION

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This chapter aims to demystify risk perception. The notion of perception based solely on subjective biases and emotions shifts to an in-depth understanding of the phenomenon of perception. This is done by looking at the experiential development of risk – from uncertainty to control. In particular, the technical assessment of risk is to be differentiated from the psychosocial evaluation of risk. True risk communication cannot exist without understanding the perception of risks. Examples related to meteorology supports this with many particularly informative illustrations. This chapter reviews and critically analyzes various concepts discussed in other chapters (hazard, risk, vulnerability, resilience, etc.) – acting as a reference to help understand the content.

In meteorological risks, as with natural or accidental disasters, risk management has become a professional field replete with experts and specialists of the hazard domains. While the value of their knowledge and technological tools are recognized and required, it should be noted that those on the real front line are individuals and communities. Those who are mainly affected and the “zero-responders” are members of the public. The objective of professional risk management is to protect these individuals and to help them help themselves and each other, either by prevention or mitigation, through actions intended to directly or indirectly improve their adaptive capacity. Risk communication is the means to mobilize prevention and response efforts, among both professionals and affected populations.

The goal of risk communication is to prepare members of the public as well as public service organizations. Fostering preparedness requires mobilization (wanting to act) and empowerment (knowing what to do). To be effective, communication must include information on the hazard (risk source), its likely consequences, and possible protective actions that are realistic and useful. Moreover, communication should preferably occur well before the incident. However, the further away in time, the more uncertainties there are. Risk communication should therefore convey these uncertainties in a way that will not create fault and blame, but will encourage preparedness.

For risk communication to be effective, it is important to recognize how certain aspects of risk and their consequences are understood – and appraised – by the stakeholder. This will be presented in three parts: 1) unpacking the key components of risk; 2) examining how these components affect the representation and perception of risks, and act as vectors of influence on individual behaviours or collective actions; 3) laying the foundation for a “responsible” risk communication paradigm, i.e. effective and empowering.

4.1 UNPACKING THE CONCEPT OF RISK: UNPACKING THE COMPONENTS

A risk is the possibility of a negative outcome from a hazard (source). Traditionally, risk is expressed as the probability of an event. For physicians and epidemiologists, the main consequence of risk is death. And it stems from pathogenic exposure. For engineers and financial experts, risk is measured by financial losses and damages. For the average citizen, risk means the loss of a loved one, of one's job, or one's home...

From a pedagogical standpoint, risk is discussed using the key technical terms of experts, engineers, meteorologists, and physicians: cause and effect, hazards and consequences. However, to truly describe risk, the phenomenological experience of risk needs to be broken down into its stages; that is, the process and timeline of the "experience" of risk. It starts with a lack of knowledge, moves on to the unknowns and uncertainty, then shock of occurrence, and finally recovery. It is important to note that for the communicator, managing risk should mean managing a sequence of uncertainties, unknowns and probabilities.

4.1.1 HAZARDS AND CONSEQUENCES

The formal definition of risk is the probability that a hazard may occur multiplied by the probability of its damage.

$$R = \text{prob (hazard)} \times \text{prob (consequence)}$$

However, in both everyday language and specialized usage, one of the two components is often not considered: either the probability of the hazard or the probability of loss/damage. By failing to recognize either the hazard or the consequence, we confuse the risk of a thunderstorm with the risk of flooding; the risk of extreme cold versus frostbite; risk of strong winds versus risk of a car accident. There is a certain discrepancy in the discourse related to the concept of risk both for the expert and the layperson. Risk does not mean the same thing to the meteorologist, insurer, emergency physician and to the public, i.e. respectively a category 3 hurricane, claims amount, death toll, or lost family photos.

In fact, for each hazard, there are various consequences. Beyond physical damages and costs, one must consider loss of life, injuries, destroyed homes and neighbourhoods, and also loss of jobs, loss of routine, loss of tranquility, loss of trust, etc.

In fact, risks are calculated as follows, as the sum of all consequences:

$$\text{Risk} = \text{prob (hazard)} \times \Sigma \text{ prob (consequences)}.$$

On the other hand, for a particular individual, a large range of hazards may involve similar negative consequences. The risk of losing one's house is the (integral) sum of weather, seismic, and financial causes:

$$\text{Risk} = \int \text{prob (hazard)} \times \text{prob (consequences)}.$$

INSERT 4.1

The Consequences Mobilize More than the Hazards

In risk communication, it is important to distinguish between hazards and consequences. People are more inclined to mobilize if they hear of the consequences rather than the hazards (source). For example, we are more motivated if we are told about the potential consequences (electrocution) of the hazard (lightening) rather than simply about the hazard. In risk communication, it is worth explicitly shifting focus from the hazards to the consequences, and to the protection measures so that the public is better prepared.

In fact, each hazard that materializes will involve multiple consequences. In addition to damages and costs, there will be fatalities, injuries and loss of homes, neighbourhoods, jobs, loss of routine, of peace of mind, of confidence... In short, there are cumulative consequences:

$$\text{Risk} = \text{prob (hazard)} \times \Sigma \text{ prob (consequences)}.$$

On the other hand, for a specific individual, a series of hazards may involve negative consequences. The risk of losing one's home is the (integral) sum of weather, seismic and financial risks:

$$\text{Risk} = \int \text{prob (hazard)} \times \text{prob (consequences)}.$$

4.1.2 VULNERABILITY: SUSCEPTIBILITY, SENSITIVITY, ACCESSIBILITY

Risks are not distributed evenly, nor equitably, among people. Some people are more at risk of negative consequences either because they a) are more exposed to hazards – i.e. increased susceptibility (living close to a river bank); b) experience greater effects – increased sensitivity (sloped terrain); or c) have less access to mitigation or response measures – less accessibility (distance). These vulnerability factors that increase

either the probability of occurrence or the severity of the consequences relate to context (environmental characteristics). In fact, risk is relative to both the hazard and the severity of the consequences, as well as to vulnerability factors such as susceptibility, sensitivity and mitigation.

$$\text{Risk} = f(\text{hazard}) \times f(\text{vulnerability}) \times f(\text{consequences}).$$

$$\text{Risk} = f(\text{hazard}) \times f(\text{susceptibility}) \times f(\text{sensitivity}) \times f(\text{mitigation}) \times f(\text{consequences}).$$

By extension of language, these vulnerability concepts are attributed to individuals since hazards do not have the same impact for everyone. Some individuals are more likely to be exposed to a hazard or have less access to mitigation or preparedness measures, and can be accurately described as being "at higher risk". However, to characterize them as "vulnerable populations" is ill-advised and understates their resilience capacity. It gives them an intrinsic fragility, deficit or fault which tends to victimize and demobilize them, and undermine their adaptive capacity. The importance of creating a communication that positively empowers people will be discussed further on.

INSERT 4.2

Vulnerability and Groups at Higher Risk

In risk communication, it is more appropriate to characterize vulnerabilities in terms of context (increased susceptibility or sensitivity), and to avoid attributing intrinsic fragilities to geographical groups or socio-demographic sub-groups who are at higher risk of exposure or have less access to resources. To describe one as "vulnerable" is not empowering and does not promote action: "groups at higher risk" is a more appropriate expression.

The most obvious situations of disempowerment include Aboriginal peoples or vulnerable immigrant groups. They certainly are more likely to be exposed to hazards and have less access to palliative resources; however in light of their past resilience, it is inappropriate to label them as vulnerable. Similarly, women are often assimilated into a vulnerable group, which attributes a negative connotation of weakness. Further on, we will explore how the objective of risk communication, namely to mobilize people to take a protective response, is not well served by the "vulnerable" label despite the good intention of including marginalized groups.

Vulnerability is associated with either the context of the hazard (such as frost or clay in a landslide), or with the context of the response (time frame, inadequate access to services, etc.) Vulnerability is a factor that heightens the consequences.

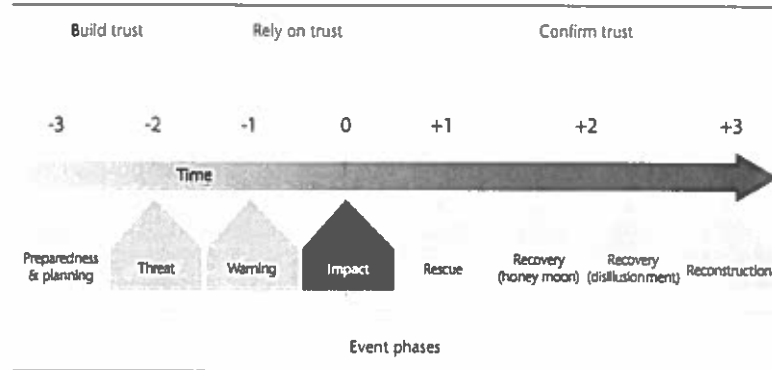
4.1.3 TIMELINE OF ACTION: COMMUNICATION AS PREVENTION

For first responders and emergency workers, risk is often closely associated with the onset of a disaster and it is referred to as T_0 (Time Zero), the moment of occurrence. Likewise, for meteorologists, the focal moment is the occurrence of a weather event. They aim to describe risk at T_0 . Communication is, however, more effective in advance – that is, at $T-x$.

A timeline going from T_{-3} to T_{+3} can be used to represent the temporal field of an event (figure 4.1). In general, T_0 represents the occurrence of the event (or time of impact); T_{+1} corresponds to the emergency response (or rescue); T_{+2} is the recovery period; and T_{+3} refers to the time it takes to get back to normalcy. Upstream in terms of time, an alert occurs at T_{-1} . T_{-2} is the threat or pre-warning phase. T_{-3} refers to the baseline level with its possible theoretical risks, but without any sense of imminent danger. The period preceding the event is the most sensitive for risk management and risk communication: this time should be used to prepare interventions and mitigation. However, similar to the fact that medicine focuses more on curing illnesses than on promoting good health and prevention, risk management is currently more focused on emergency response and response coordination on the ground than in preparedness and planning. The field is evolving however and the role of risk communication upstream of the incident is becoming more important. Its function is evolving to better prepare and mobilize people ahead of the developing risks.

The concept of risk, in terms of uncertainty or probability, exists throughout the timeline. The content of the risk communication message should be adapted according to the targeted time point. On one hand, communication at $-t$ can express the probability and severity expected at T_0 , with the aim to prepare for T_0 . On the other hand, communication at $T-t$ can also express the probability, severity and uncertainty at $T-t$ in view of better conveying the uncertainty about the pending occurrence. As in public health, it is worth identifying various objectives of risk communication according to the timeline, since earlier communication may be more useful, albeit less precise.

FIGURE 4.1
Timeline



Source: Lemyre *et al.*, 2016.

Fundamentally, the concept of risk should serve prevention. Being aware of risks, their likelihood, severity, characterization, consequences and vulnerability factors such as increased susceptibility and sensitivity should help identify the best-suited prevention behaviours. The objective for both professionals and members of the public is to control either consequences or the hazard, or to prevent the consequences of a hazard. In terms of mitigating complications from a hazard for which direct consequences have already occurred, *tertiary* prevention seeks to reduce those consequences: For example, not getting electrocuted after flooding, not drinking contaminated water, or staying cool during a heat wave.

Secondary prevention aims to minimize the impact of a risk (consequence): such as by not storing valuable documents or valued photographs in the basement, or getting snow tires in December, and so on. *Primary* prevention consists of avoiding exposure to risk: building one's house outside the flood plain, increasing tree foliage canopy around one's home to create shade and avoiding excessive indoor heat in the summer. It is useful to list various types of prevention across the timeline and to identify early mitigation measures. Of course, depending on whether risks are described by the hazard or by the consequences, it is sometimes possible to identify what constitutes primary, secondary or tertiary prevention. However, the core principle remains: to identify appropriate interventions and behaviours that can facilitate adaptation and minimize problems.

The integral components of risk analysis, risk management, and risk communication are: 1) identifying the characterization of both the hazard and its consequences across the timeline and across the various types of stakeholder groups; 2) listing prevention, mitigation and recovery behaviours across the timeline and across the affected groups. Often this risk-analysis mapping will require consultation and collaboration between – experts of various sectors.

Specialists and experts tend to focus on timeline points close to the occurrence or shortly after – at the rescue or in the “post” period. For the public, however, it is before, in the “pre” period (T₂), when the threat of a hazard is already seen as a risk and leads to fear-related consequences. This temporal experience of risk depending on the type of stakeholder must be considered for relevant and effective risk communication and successful collaboration in risk management.

4.1.4 SOCIAL ECOLOGY OF RISK: INDIVIDUAL AND COLLECTIVE CONTEXTS

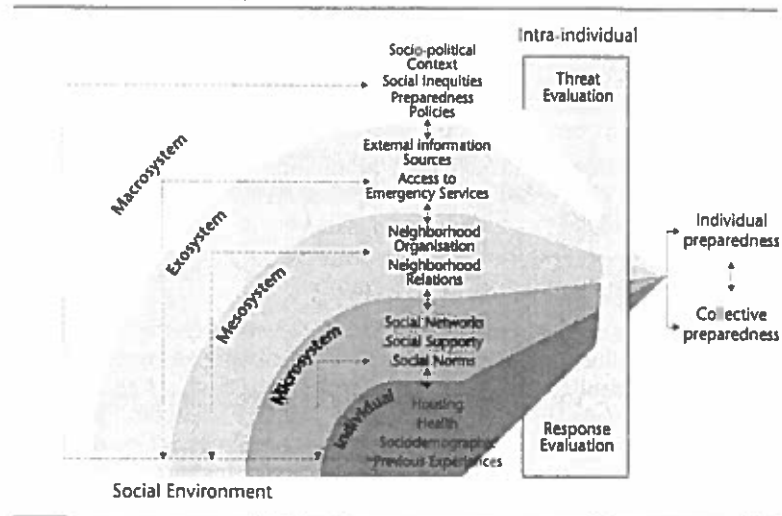
The risk timeline (from hazard to consequences) – equally relevant for understanding risk perception and risk communication – must be understood in its social ecology (figure 4.2). Bronfenbrenner (1978) defined a social ecology model that places human activities and dynamics in a system of social interactions and reciprocal influence.

A social environment is made up of various systems. The individual's thoughts (cognition), affective reactions (emotions) and behaviours develop and evolve in a **microsystem** of core proximity composed of family and loved ones, which influences ideas, reactions and behaviours. This core interfaces with the **mesosystem**. This **mesosystem** comprises, on the one hand, the community context: neighbourhood, associations; and the professional network: work, school, public services, and businesses. These are all nested in the **macrosystem** which corresponds to the values, policies, laws, norms, and institutions of a society.

Risk and risk management operate on both the individual and collective level, through the family microsystem and the community and organizational mesosystems. Hazards involve consequences for individuals directly, physically or financially, which has a ripple effect on their families, employment or housing. Hazards also have collective consequences on the community and public services. Risk perception plays at each level through system interdependencies. Risk communication is more efficient if it targets those levels specifically: individual, community, organizational and inter-organizational. Aspects and

parameters of risk perception and mobilization toward action will vary according to the targeted levels. The next chapters will illustrate some examples.

FIGURE 4.2
The Social Ecology Model



Source: Lemyre *et al.*, 2016 (based on Bronfenbrenner, 1977).

Risk communication should therefore target 1) the individual and 2) the collective – differently, but always within the context of mobilization and empowerment. Organizational communication is aimed at first responders and emergency experts; it should also promote inter-organizational collaboration through roundtables and coordination alliances. Community risk communication, on the other hand, should attempt to create a network of information and support to mobilize the “zero-responders”, the lay volunteers who are on the ground, as neighbours, observers and informants ready to act.

4.1.5 COMPLEXITY, UNCERTAINTY AND ANTICIPATION

In our understanding of risk – and of its psychology – there are challenges that are difficult to grasp and are not adequately considered: the role of complexity, uncertainty and of anticipation. Risk inherently comprises a complexity that should be made explicit and intelligible

to public audiences by segmenting its main factors and vectors: i) the mechanisms by which a hazard creates damage; ii) the types and severities of consequences; iii) the various forms of protection; iv) the timeline; v) a system approach to actions.

Each of these components include elements of probability and of uncertainty. Uncertainty may be linked to a few things: the probability of occurrence; the precise predicted time of occurrence; the misunderstanding about the mechanism of action (such as for the zika virus at present), or the effectiveness of mitigation and prevention measures. This inherent uncertainty should not be presented, nor understood as incompetence, but explained as the natural progression of time and the evolution of knowledge. Thus, communicating uncertainty as a vector of progressive adaptation and preparedness becomes a factor of resilience.

Furthermore, these considerations overlap: for experts, risk is complex; for the public, risk is uncertain.

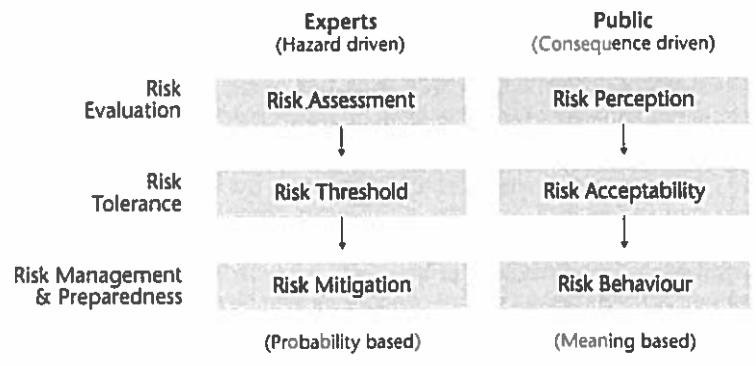
Risk communicators must acknowledge and explain that uncertainty and complexity are key elements of forecasting and anticipating, which are central to appraising risk and adapting. Communicating uncertainty is not a sign of incompetence, rather, it allows for planning and preparation processes under conditional scenarios.

4.1.6 RISK EVALUATION: ASSESSMENT AND PERCEPTION

In Canada, as a bilingual country, it is important to note that the English language has an advantage over French to reconcile risk science and risk psychology by using two distinct terms: risk assessment and risk evaluation (whereas in French the word *evaluation* is used for both meanings). The distinction can be reflected through a) the concept of risk assessment as the technical quantification of probabilities, impact and uncertainty margins, and b) the concept of risk perception to identify a more qualitative appraisal of the meaning of the risk.

For a technical expert, risk assessment mostly involves how the hazard is characterized. For the public, who bears the consequences, the assessment focuses on the extent of losses and damages. Each weighs the probabilities of different scenarios: probability of occurrence and severity of the hazard for the former, versus probability of the threat and losses for the latter. The expert carries out a limited technical analysis while the public sees the broad, fluid and intricate ripple of risk (figure 4.3).

FIGURE 4.3
Parallel Streams of Risk Assessment and Risk Perception



Source: Lemyre *et al.*, 2016.

4.2 RISK PERCEPTION: LEVERS OF COMMUNICATION

Risk perception is often the poorly managed offshoot of risk science. Viewed as a misunderstanding, distortion, incompetence, or even an unpredictable change in mood, risk perception is considered a naïve approximation of laypeople that rational experts should disregard and good communicators should rectify. However, risk perception points to the difference between the technical assessment of the risk and the appraisal of other issues at stake. It reflects the mental representation of probabilities, of the mechanisms by which a hazard creates impact, and the appreciative evaluation of the potential losses, damages and threats. Risk perception provides a window into how communication can be leveraged.

It is somewhat pointless to debate whether public perceptions are inaccurate or not. Instead, a communicator should focus on deconstructing the differences as additional dimensions of concerns. To the public, which aspects of risk are most salient, meaningful, consequential or worrisome?

The field of **risk perception**, as it is normally referred to, focuses on *valuing* the risk. The field is often criticized by experts, yet it is so fundamental to risk communication. It combines the cognitive function of estimating probability, the emotional function of qualifying, and the anticipatory function of controlling the hazard or its

consequences. For example, an individual's perception of the risk of a snow storm prompts him or her to weigh a) the willingness to travel to a given activity or event, b) the likelihood of dangerous roads, and c) the individuals driving skills. This analysis goes beyond characterizing the strength of the storm. It provides the possibility for two additional risk communication targets outside of the storm: i.e. re-evaluate the uniqueness or value of the activity, and recalibrate one's skills to avoid car accidents.

Since risk perception involves the understanding of the dynamics of the risk, it is the gateway to effective communication to promote protection and prevention behaviours. It reflects a highly adaptive function, weighing pros and cons, involving explicit information, overall assessment, and decision-making. Risk perception is also a temporal projection of the hazard, its consequences, and one's capacity to respond and cope throughout the timeline. The debate against risk assessment and risk perception dismisses these fundamental processes and issues. It is less a matter of discrepancy in assessing the risk than a difference in the evaluation parameters and considerations. Risk perception is particularly relevant to risk communication because it is tied to people's behaviours and decisions. To better understand risk perception, it is necessary to examine the following underlying principles.

4.2.1 COGNITIVE AND EMOTIONAL RISK APPRAISAL

Risk assessment allows for a better understanding of how individuals can absorb information and gain a feeling of control to adapt and protect themselves. Among factors in this appraisal we note the following heuristics at play: cognitive information processing, mental models, emotional load and trust.

4.2.2 HEURISTICS

Among the many forms of cognitive appraisal, the Nobel prize-winner Kahneman (2011) describes information-processing heuristics, which allow humans to manage a vast and rapid flow of information, albeit with some errors, called cognitive biases. There seems to be an adaptive value, even evolutionary-based value, in using quick information association mechanisms. In processing large amounts of data, people have certain biases that Kahneman and Tversky have extensively described in their careers.

These biases are integral to the way humans process information. For instance, it has been established that the mental representation of quantities and numbers does not follow the linear arithmetic curve; rather, it is an asymptomatic function of assessment which shows that humans differentiate between small quantities but are unable to do so with larger quantities. Thus, one might criticize the higher cost of living, but lose sight of the fact that the national deficit increased from \$200 million to \$20 billion. It is the risk communicator's task to relate numbers and probabilities using comparative benchmarks to provide an accurate relative value for events.

Overestimating small probabilities (e.g. terrorism attacks) and underestimating high risks (car accidents) gets combined with the effects of recency, salience, mental availability bias, trauma, or rarity bias, which distort the mental representation of such events. Often these feed rumours and generate spirals. Heuristics are mental shortcuts that allow information to be processed quickly. A good communicator should know how to provide background data and examples to counter these effects. There are a number of popular books available that describe these effects, which can be likened to that of distorting mirrors at the circus.

Another well-known bias is loss aversion, which is to perceive losses as being more significant and more alarming than gains of a similar amount. A penalty or cost of five dollars is perceived as more substantive than a profit or incentive of five dollars. This imbalance in values based on context demonstrates an adaptive value and the paradox of risk assessment: is the gain or the loss of five dollars equivalent in value? For an accountant they are, but for the layperson they are not. The same applies to five degrees above or below the seasonal norm: it does not have the same impact on one's view of climate change.

Understanding the difference between these two viewpoints is not simply a tool that can be used to manipulate people: it reflects how the human mind works.

To avoid these automatic biases in situations, Kahneman proposes inducing a slow, conscious and explicit information processing mode. This can be created by either showing contradictory evidence or by evoking conscious deliberation. The idea is to trigger a thought process by a task or a context: having to collaborate for problem-solving in an interdisciplinary manner or in an inter-organizational setting drives such awareness.

Messages can be designed in such a way to leverage these effects. For example, risk perception for tornados in Canada can be increased by disseminating images and testimonies of victims, which will facilitate availability bias and, thus, increase likelihood estimates.

4.2.3 MENTAL MODELS

To better understand mental representation phenomena that are key in changing behaviours or practices, Fischhoff and Bruine de Bruin developed methods to study mental models to better understand people's reasoning behind their reactions to risks (Bruine de Bruin and Bostrom, 2013; Fischhoff and Sheufele, 2013). Their methods map out the values, barriers and explanations that prevent people from adopting appropriate behaviours. Mental models form causal pathways in people's understanding of an event. They are the logical basis for people's behaviours. These models are useful for understanding decisions, and therefore allow for behavioural change.

4.2.4 EMOTIONAL COMPONENT

Slovic studied the affective processing of information parallel to cognitive processing (Slovic, 2000). Many characteristics of message content, such as familiarity of images, risks to children, traumatic imagery and connection to identity influence our emotional appraisal of risks and, thus, our evaluation of them. The way messages are emotionally processed should be considered by communicators so they can properly calibrate the message.

The consequences of a hazard can be intangible, emotional, and symbolic. Apart from death and cost, there is a ripple of interdependent consequences that affect people's values, employment and social networks. These are important elements in the public's perception of risks.

4.2.5 TRUST, ETHICS, BENEVOLENCE

Risk perception consists of a highly comprehensive evaluation that involves much more than a probability assessment of occurrences or of damages. Studies have shown that risk perception includes ethical evaluation, trust evaluation regarding the source of information, and a judgment on the benevolent or manipulative intent of the communicator.

The public integrates the perception of the messenger's intentions in its evaluation of risk management. Public trust is crucial for any communicator. Trust should be earned early on, in the prevention stages, and especially in times of uncertainty, through transparency and authenticity. Studies demonstrate that perceived benevolence generates more trust than the communicator's personal credibility and competence.

To sum up, there are three main aspects of risk perception: 1) perceived impact stemming from perceived probability and severity (two concepts well differentiated by the public); 2) sense of control over knowledge, skills and information with respect to resolution methods; 3) uncertainty, either in margin of error, confidence intervals, variability, reliability of the sources, or yet unknown consequences.

The difference between risk perception and risk assessment is not based on mistakes or distortions, but on the complementary or contrasting nature of the evaluative aspects prioritized by the experts versus the public.

4.3 RISK COMMUNICATION: AIMING FOR MOBILIZATION AND EMPOWERMENT

As mentioned in the introduction, the goal of risk communication is to promote action through motivation and mobilization and to provide the knowledge and tools to respond effectively. The previous section showed the critical role of risk perception dynamics to achieve this goal. By integrating the known perception of risks, risk communication can lead to the adoption of appropriate behaviours through effective and empowering messages.

The main components of risk and risk perception should be reflected in the risk communication strategy. This should take into account the technical knowledge and the effective risk mitigation and prevention measures. It should also consider the dynamics of risk perception and the main aspects of risk assessment (perceived impact, sense of control, and uncertainty). Risk communication strategies should answer the questions the public asks itself: What does this mean for me? What are the associated uncertainties? How do I best prepare and protect myself?

Notably, one of the main drivers of human behaviour is the search for control. Risk communication should be a means to *empower*: risk communication must elicit action and mobilization.

In meteorology, risk communication contains: 1) the description of the weather event in terms of probability and severity (likelihood of a storm, and its strength and magnitude); 2) the foreseeable consequences (flash flooding); and 3) proper preparedness (avoiding transport), following a timeline from T_2 , at the anticipation phase, with suggestions for secondary and tertiary preventive measures. Three target groups should be considered: individual, community, and organization. The key message being empowerment.

4.3.1 STRATEGIC APPROACH

Fischhoff developed a method for strategic risk communication by separating the components of the hazard and its consequences; the mapping of contextual vulnerabilities according to increased susceptibility and sensitivity; the typology of at-risk groups; the type of mitigation measures and protective behaviours; and timeline. He also takes into account the social ecology of risk. What are the various analysis and dynamics units: individual, family, community, work, public service, and government. What are the mental models of all these stakeholders? From there, Fischhoff pairs target audiences with target messages, at the individual and collective levels. Messages should 1) state the extent and scope of the risk, its probability and severity, 2) the direct consequences and the indirect ripple effects; and 3) propose effective preventive measures and concrete protective behaviours.

From these considerations, a set of simple, clear, complementary messages should be created, tested, and evaluated. Three major target groups should be involved in such pretests: 1) emergency responders and public service organizations; 2) the public; and 3) community support groups, non-profit organizations, schools, support centres, etc. The goal is to develop the capacity to mobilize.

4.3.2 CONTEMPORARY PARADIGM

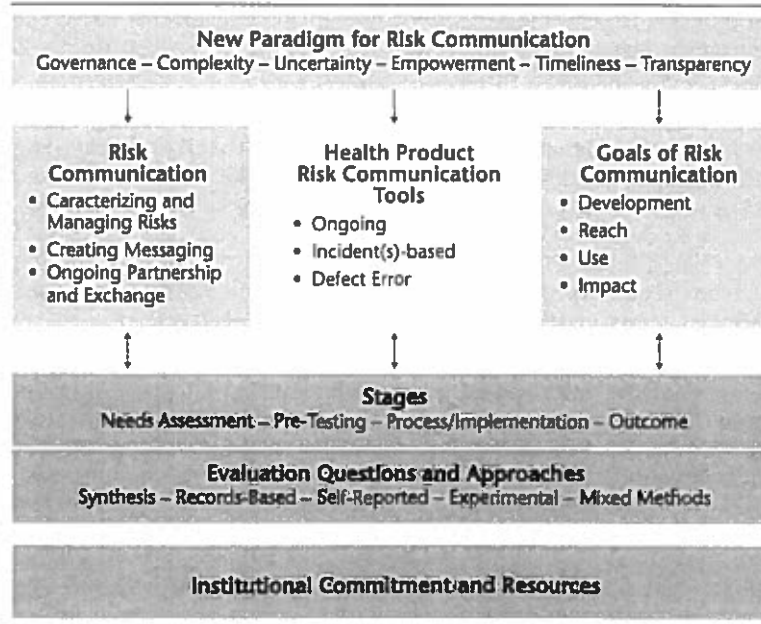
After establishing the role of risk perception as an insight into the mobilization and empowerment factors for risk communication, a communicator needs to create the context to facilitate discussions on uncertainty, sharing of knowledge and responsibility, control, trust, resilience, anticipation and prevention.

The contemporary paradigm of risk communication recognizes the value and validity of risk perception as indicating the meaning and scope of the many direct and indirect consequences of risk, of the mechanisms at play and of the emotional appraisal.

For example, meteorological risk communication should address both the complexity and uncertainty inherent to the phenomena in a manner that promotes empowerment. This can be done by identifying personal risk, vulnerability and protective factors, and by conveying mitigation and prevention measures that are feasible and realistic. Even if it is not part of the explicit mandate, it is critical that meteorological organizations participate in the governance of risk management within its social ecology. Indeed, many stakeholders and interventions depend on this expertise at the municipal or national level, and for individual behaviour.

The Council of Canadian Academies (CCA) recently gathered these considerations and published an evidence-based summary of this data in a scientific report on risk communication (figure 4.4). Although it focuses on drug-related risks, the elements and model apply to meteorological risk communication: *Does the message get through?* (CCA, 2015).

FIGURE 4.4
The Risk Communication Paradigm



Source: CAC, 2015, p. XII.

4.3.3 RESPONSIBILITIES AND EVALUATION

Once we have understood the different stages and dynamics of risk perception in risk communication, there is a professional duty to not only develop messaging that will foster mobilization and empowerment, but also to evaluate effectiveness.

Is risk communication effective in ensuring an understanding of the hazard? Does it elicit an evaluation of consequences, provide the skills and knowledge to protect oneself in a given context and timeline for different populations and target groups?

Responsible risk communication requires testing messages, validating those messages with groups and measuring their impact through appropriate research.

4.3.4 EXAMPLES

Beaudry and Lemyre (2016) recently carried out a series of experiments that illustrated the varying impacts of a message depending on whether consequences of the hazard were explicitly mentioned, as well as the impact of including preparedness suggestions. Controlling for message length, messages with prevention suggestions had more impact on behavioural intent, preparedness and perceived risk than messages solely on risk probability (figure 4.5).

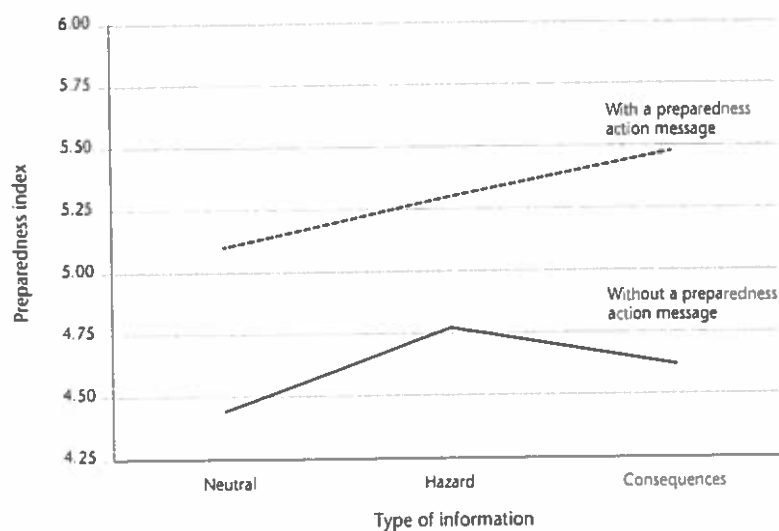
In a similar manner, a systematic experimental testing of risk messages revealed that words such as **Advisory**, **Watch** and **Warning** did not have the desired effect. For example, the term “watch” did not result in increased vigilance, but rather reassured the audience. A more in-depth review showed that “watches” generated confusion about when the event would occur. The work of risk communication therefore requires pretesting messages with various audiences to assess their risk representation and understanding of messages.

Other recent studies with immigrants to Canada (Yong and Lemyre, 2016) demonstrated the need for caution and nuance when using the concept of “vulnerable” populations. Although immigrants are often identified as a vulnerable subgroup and indeed live in environments and neighborhoods at higher risk of natural disasters, and are less aware of the available services, they had more experience with severe meteorological events and showed better adaptability and resilience. However, they indicated greater dependency on governmental preparedness: their mental models suggested that in Canada, the government takes care of everything and everyone. They therefore did not need to prepare. They relied on the government for their

safety. Thus, it is crucial to emphasize to these subgroups the importance of being able to be self-reliant for at least 72 hours. Their initial openness to individual preparedness was replaced by the perception of governmental responsibility.

FIGURE 4.5
Preparedness Index Based on Message Content

Preparedness for flooding



Source: Lemyre *et al.*, 2016.

CONCLUSION

Risk perception reveals the significant issues of a hazard's consequences. It also reveals the tacit understanding of the cause-and-effect relationship that links a hazard to the consequences, and to the mitigation measures. This helps to identify leverage factors for protection and prevention behaviours. Mapping risk components and the clusters of factors should not detract from the essential phenomenology of risk

– the management of uncertainty – especially before the event occurs. The goal of risk communication is to provide information to support mobilization and empowerment in the preparing and planning.

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