

University of Nevada, Reno

**Why safety assurances lead to higher risk perceptions:
A conversational approach**

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in
Social Psychology

by

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ABSTRACT

WHY SAFETY ASSURANCES LEAD TO HIGHER PERCEPTIONS OF RISK:

A CONVERSATIONAL APPROACH

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Safety assurances are meant to decrease people's perceptions of risk. This paper explored the notion that safety assurances may produce the opposite effect – higher perceptions of risk regarding the object of assurance. The project pursued two objectives: 1) to provide a theoretical analysis of the cognitive mechanisms facilitating the unintended effect of safety assurances, and 2) to obtain empirical evidence for this effect in the context of risk communication.

Pragmatic theories of speech acts, conversational logic, and common ground provided a theoretical framework that explains this paradoxical effect as the outcome of a hearer's inferences about the meaning of a speaker's communication. Based on a review of empirical evidence for the operation of conversational rules in institutional settings, the paper explored contextual factors that would contribute to the unintended effects of safety assurances in risk communication.

Using a simulation approach, a series of four experiments examined the effect of safety assurances on the perceptions of risk regarding future events in a local community. Studies 1 ($N = 141$) and 3 ($N = 411$) showed that participants who read an announcement of an upcoming transport of mining wastes through the area, complemented by a safety assurance, perceived the campaign to be more harmful than the participants in control

condition who read the announcement without assurance. In Study 4 ($N = 516$), a similar pattern of higher perceptions of risk was observed for participants who read an article about a restaurant, in which the owners assured the safety of their food. In Study 2 ($N = 153$), participants read assurances about safety of their drinking water but no significant differences in perceived risk were observed.

The studies examined a number of variables that had been found to moderate perceptions of risks. Consistent with prior research, compared to men, women perceived significantly higher risks on several dimensions. The length of residency in the local community moderated the extent of the safety assurances effect. Consistent with the prediction of the conversational framework, long-term residents inferred higher risks and less benefit from future events in response to safety assurances compared to short-term residents. Studies 3 and 4 explored the conditions under which safety assurances would result in lower perceptions of risks.

The discussion focuses on the implications of the findings for conversational framework and risk communication and elaborates on methodological limitations as well as directions for future research.

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FOREWORD

To begin, let me assure you that the paper on which this text is printed is perfectly safe. The prolonged contact of paper with your skin, through touching and turning over the pages, reading this text from the beginning to the end, will not expose you to any risks. Moreover, the text is absolutely safe if you access this dissertation in electronic form. If you have any questions or need any additional information please contact the author at the address below.¹

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INTRODUCTION

Most likely, the foreword above has been somewhat confusing to you. Please, read it again. There is a good chance that you as a reader were not concerned about the safety of this document. But now, having read my assurance, you may feel some doubts whether everything is as fine as you thought it was. The safety assurances possibly made you *question* your implicit assumptions about paper safety, even if only for a split second. In other words, my safety assurances may have suggested a possibility of harm unknown to you, and as a result, brought about a concern with paper safety that was not there before.²

This dissertation will attempt to explain some of the processes that lead to this counterintuitive effect, i.e. *higher* perception of risk in response to safety assurances. My analysis will focus primarily on contextual factors that guide people's interpretation of safety assurances. Central to this analysis will be the role of conversational processes, such as performance of speech acts (Austin, 1962; Clark & Carlson, 1982; Searle, 1969, 1975), use of conversational rules in the production and the interpretation of speech (Grice, 1975, 1978), and the role of common ground (Clark, 1992, 1996; Clark & Carlson, 1981; Clark & Wilkes-Gibbs, 1986) as a necessary foundation for understanding and inference making in conversations.

Why is it important to investigate safety assurances? The purpose of this dissertation is both theoretical and applied. On the one hand, safety assurances and their

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consequences are analyzed using major theories from language pragmatics approach. The empirical studies that follow provide empirical evidence that is in line with some of the outcomes that were theoretically derived from the conversational framework. This analysis expands our understanding of safety assurances as a type of a speech act and provides empirical evidence for unintended perlocutionary effects. It demonstrates participants' interpretation of meaning according to the conversational rules and explores additional ways to operationalize aspects of common ground in investigating its role in the interpretation of meaning of public communication.

On the applied side, the present research examines the possibility that unintended consequences of safety assurances, similar to the ones illustrated at the outset, may present an intrinsic challenge to risk managers in *communicating a safe state of affairs*. In the United States, government agencies and private companies are obligated to inform the public about regular operations as well as changes in procedures and new developments that involve certain hazards and risks, even if it does not always entail public participation in the decision-making. There is a significant body of federal laws, such as Administrative Procedures Act of 1946, Freedom of Information Act of 1966, the National Environmental Policy Act of 1970, the Emergency Planning and Community Right to Know Act of 1986 etc., many of which were reinforced by federal court decisions and presidents' executive orders. These laws manifest the national policy for transparency and accountability in the area of risk management and represent the driving force in mandating risk communication between risk managing agencies and general public.

If we were to look at an ideal or a simplified model of a situation, in which the risks are present and a risk managing agency has to report those to the public, the public's perception of risk most likely will go up. However, when all the regulations have been followed, when there were no accidents or violations, a risk managing agency still has to report to the public in order to fulfill the legal obligations. Even when this report says that everything is safe, I anticipate that public's risk perceptions will still go up. The reason for this is that talking about safety *implies* the existence of risk, and even when the risks are said to be absent, a proclamation of safety implies the *possibility* of risk under different circumstances.

For the field of risk communication, the analysis of unintended consequences of safety assurances may contribute to a better understanding of why public perceptions of risk are often amplified and, sometimes, exaggerated. I propose that such an analysis will deepen our understanding of *individual* cognitive processes leading to risk amplification within a particular social context. A more well-rounded analysis of risk amplification at this *social psychological level* could be a valuable tool for the larger social analysis of risk amplification (Kasperson, 1992; Kasperson et al., 1988; Pidegon, Kasperson, & Slovic, 2003). Further investigation of this intrinsic communicative challenge may contribute to a better understanding of the public response to risk communication and, hopefully, may lead to the development of additional strategies in communicating absence of risks. The purpose of the present work is to take a first step in that direction.

The dissertation will proceed as follows. The primary focus of the dissertation will be on the examination of safety assurances as a general conversational phenomenon in daily language use. After this analysis in general terms, safety assurances will be

placed in a more specialized context of risk communication, and additional factors affecting risk perceptions will be introduced. Thus, in Chapter 1, the operation of safety assurances will be examined from the perspective of speech act theory, conversational logic theory, and common ground theory. In Chapter 2, I will review social psychological evidence on the role of inferences and common ground in interpretation of the speaker's intention and in consequent action in response to this perceived intention. Such an extended account of *inferring speaker intention* in the context of institutional communication is justified as I consider it as the main mechanism responsible for the unintended effect of safety assurances. In Chapter 3, the concept of risk and perceptions of risk will be addressed and followed by a selective review of psychological and social factors that influence risk perceptions in the course of risk communication.

Chapters 4-7 will introduce the research program on safety assurances that consists of four studies. Study 1 (Chapter 4) provided empirical support to the hypothesis that safety assurances may result in higher perceptions of risk. Study 2 (Chapter 5) looked at the role of common ground and speaker expertise in producing unintended effect of safety assurances. The remaining two studies aimed to explore the conditions under which safety assurances could result in lower perceptions of risk. Study 3 (Chapter 6) tested whether expressing a safety concern prior to provision of safety assurances would result in lower risk perceptions. Study 4 (Chapter 7) tested whether raising a safety concern in one discourse and providing a safety assurance in another discourse could lead to lower risk perceptions.

Finally, Chapter 8 includes general discussion of results, limitations, and future directions for this line of research. Appendices include research materials used for data

collection and a sample of risk communication material.

To counterbalance gender bias in public discourse, in this dissertation, the speaker will be commonly referred to in 3rd person as 'she' and the hearer as 'he', with few exceptions.

CHAPTER I

SAFETY ASSURANCES AND THE RULES OF CONVERSATION

In order to discuss the psychological effects of safety assurances, I begin by defining the terms. The term “assurance” in general will be understood here as “an act of making a person certain in a particular outcome.” There can be many different kinds of assurances, depending on whatever aspect of reality needs to be asserted with more certainty. The term “safety assurance,” one subtype of assurances, will be understood here as “an act of making a person certain that he/she is or will be safe from harm.”³

Following these definitions, I will treat a safety assurance as an act. This act can be carried out verbally, non-verbally, or combining the two ways. For example, one can simply say words of assurance, or signal assurance with a thumbs-up gesture, or one can combine verbal safety assurance with a “reassuring” hug. In this paper, I will be focusing exclusively on *verbal* safety assurances.

Since verbal safety assurances are carried out through communication of information, I will treat verbal safety assurances as *communicative acts*. To adequately examine the safety assurances as communicative acts I will begin by reviewing some of the insights of the speech act theory (Austin, 1962; Clark & Carlson, 1982; Searle, 1969, 1975), as a framework directly addressing the phenomenon of “doing things through speaking.” In performing and interpreting speech acts, interactants rely on established conventions of language use and the rules of conversation. To explore some of these principles, I will review conversational logic theory (Grice, 1975, 1978) and the theory of

³ These approximate definitions were derived using materials from the Webster’s Unabridged Dictionary (Gove, 1961) and the Oxford English Dictionary (Simpson & Weiner, 1989).

common ground (Clark, 1996). Each reviewed theory will be applied to the theoretical analysis of safety assurances. Specifically, I will be looking for possible mechanisms that each theory can offer for explaining higher risk perceptions in response to safety assurances.

Speech act theory of Austin and Searle

J. L. Austin (1962) proposed that people, when talking, do not just say something *about* things, but they *do* things through the use of language. If statements like ‘violets are blue’ are propositions about objects in the world and their properties, statements such as ‘I request your attention’ represent less of a characterization of things in the world but more of an *action* performed through the process of speaking. The first type of statements Austin called ‘constatives’ and the second type he called ‘performatives.’

Austin (1962) divided the process of executing a performative into a number of component acts. He differentiated between locutionary, illocutionary, and perlocutionary acts. A locutionary act is the act of speaking itself, according to the rules of language. An illocutionary act is doing something through speaking, such as asking for directions or assuring somebody of a positive outcome. Finally, a perlocutionary act is the consequences of speaking, or the effects of performing an illocutionary act, such as receiving directions from the hearer in response to a request. Perlocutionary effects, however, can also be unintended. For example, a speaker may ask for directions but not get them, or a hearer that received a safety assurance can take it as a sign of warning and begin to worry more about safety instead of feeling safer.

Elaborating on Austin’s (1962) theory, Searle (1969) proposed a distinction of four aspects of the speech act: utterance, proposition, illocution, and perlocution. The

original act of speaking was divided into the utterance act and propositional act. The utterance act involves voicing of the words and sentences, that is, the very process of producing audible speech. The propositional act refers to a certain entity in the real world and predicating it with certain characteristics. For example, by uttering “This paper is safe!” we refer to an entity – ‘this paper’ and predicate it with the characteristic of safety – ‘is safe.’ The illocutionary act is conceptualized as a component of a speech act by which the speaker intends the hearer to recognize that the speaker is performing a certain set of actions, e.g., warning, questioning, requesting, assuring. For example, saying “This paper is safe!” can be taken as an illocutionary act of providing a safety assurance. Finally, perlocutionary act is the production of the effects through speaking, e.g., actually *convincing* the hearer that the paper is safe. Thus, one of Searle’s contributions to Austin’s theory was the differentiation between a physical event of uttering sounds and the two possible *intentions* that can be associated with it: 1) to make a linguistic proposition about a piece of reality and 2) to pragmatically use this proposition to signal performance of a certain act, such as command, request, assurance, etc.

According to the speech act theory, the hearer’s recognition of the speaker’s intention to perform a specific speech act is central to the understanding of the meaning of communication.⁴ Because the same proposition can be performed with different pragmatic intentions, there are a number of devices in English that are used to indicate how an utterance is to be taken by the hearer. These include: word order, stress,

⁴ In other approaches, understanding is a function of decoding sounds or symbols, identifying words, retrieving mental meanings associated with those words, identifying grammatical relations of words within statements, identifying meaning of sentences on the basis of discourse context, etc. (e.g., Clark & Clark, 1977; D’Arcais & Jarvella, 1983; Van Dijk & Kintsch, 1983). In speech act theory, however, the focus is on inferring intentions and pragmatic meanings, i.e., how conventional language means are used to communicate personally determined meanings in specific situations.

intonation, punctuation (in writing), verb mood, and the performative expressions, such as ‘I assure,’ ‘I promise,’ ‘I ask,’ all underlined and bolded in illustrations below:

There is a point to all of this.

There is a point to all of this?!

I assure you there is a point to all of this.

I promise there is a point to all of this.

Is there a point to all of this (**, I ask**)?

There **might be** a point to all of this.

There is a point to all of this!!!

Austin (1962) and Searle (1969) referred to this varying pragmatic quality of utterance as ‘illocutionary force,’ which simply denotes the use of an utterance as a part of specific type of speech act, e.g., an assertion, a command, a request, etc. Searle (1969) noted that, while performative verbs allow the speaker to articulate explicitly what she is doing by saying it, as in ‘I repeat, there is a point to all of this,’ the illocutionary force of an utterance often can be identified exclusively on the basis of context.

An important point in Austin’s (1962) theory of speech acts was the recognition that simply uttering a performative statement was not sufficient for a speech act to be successful. There are conditions that have to be met. For example, the statement “I hereby pronounce you husband and wife” will be effective only when uttered by a specially licensed person, i.e. one that has the recognized authority to marry people, in a special social situation, i.e., marriage ceremony. Austin (1962) termed these conditions *felicity conditions*.

The central idea of felicity conditions is that people conducting particular speech

acts have to adhere to already established conventions in wording, situational circumstances, and anticipated results. They also have to be sincere and act in accordance with their speech acts. If there is a mismatch among any of these factors, the speech act may fail to achieve the intended effect. The outcomes of the current investigation should contribute to the empirical knowledge of felicity conditions for the assurances of safety.⁵

Informative speech acts

According to Clark and Carlson (1982), the speech act theory of Austin (1962) and Searle (1969) and most of its later developments treated a hearer exclusively as the proper addressee of communication. A speaker would direct an illocutionary act at a hearer and intend him to recognize the speaker's intention. Analysis of conversation that included only one speaker and one hearer confined speech act theory to the analysis of one-on-one conversation.

Examining conversations that involve multiple participants, Clark and Carlson (1982) proposed that there can be three types of hearers: addressees, side-participants, and overhearers. Addressees and side-participants constitute all those hearers who take part in the conversation, i.e. their presence is recognized by the speaker. Overhearers are those hearers who are not part of the conversation altogether. Clark and Carlson (1982) note that very similar distinctions in types of hearers were made by Goffman (1976). He differentiated between ratified participants, i.e. formally sanctioned by the speaker, that are addressed directly and are expected to react to communication, the ratified participants who are present but not specifically addressed, and overhearers, whose

⁵ Searle (1969) developed further the necessary conditions for the successful performance of specific speech acts, e.g. assertions, promises, warnings, and other. These formulations, however, have been derived analytically and are of limited applicability for the present study.

presence, whether inadvertent or intentional, is not ratified. To illustrate, take the setting of a criminal court in which a prosecutor asks a question of a defendant in the presence of a judge, jury, and court officials. In this situation, the prosecutor is the speaker, the defendant is the addressee, the judge, jury, and court officials are side-participants (for this particular speech act), and the audience, whether in the courtroom or on TV, can be viewed as overhearers.

Differentiating several types of hearers allowed Clark and Carlson (1982) to demonstrate that an illocutionary act directed at an addressee differs from the illocutionary act directed at a side-participant. Overhearers, by definition, are not participants in the interaction; therefore, they are not usually a target of any illocutionary act. However, they can still infer to a varying degree what is going on in the interaction.

When a prosecutor asks a defendant a question, she conducts two different illocutionary acts simultaneously. The *addressee-directed* illocutionary act is asking a question, e.g., “Where were you on the day of Mr. Zagidullin’s dissertation defense between the hours of 2 and 4pm?” Clark and Carlson (1982) argued that, in doing so, the speaker also conducts *participant-directed* illocutionary act of *informing* everybody that she is asking a question of a defendant that is inquiring about the defendant’s whereabouts on a particular date. Strictly speaking, the targeted audience that the prosecutor informs is the jury and the judge, but not the audience in the court. However, thanks to these informative illocutionary acts, *everybody* in the courtroom is more or less able to keep track of what is being said. Even overhearers on the radio can do so with a more limited success (see more on this below, under ‘grounding’).

Based on this analysis, Clark and Carlson (1982) proposed a significant addition

to the existing scheme of speech acts. They argued that illocutionary acts, such as promises, requests, warnings, etc., are conducted by means of an informative act. This act occurs logically prior to the illocutionary act and it informs all the participants in the conversation of the speaker's intention to conduct a traditionally recognized illocutionary act. The informative acts facilitate the accumulation of necessary facts and figures, or *common ground*, shared by all participants. This common ground, using our earlier example, will allow the jury eventually to reach a verdict, for the judge to make a ruling, and, for the overhearing audience to be informed about what events took place.

Application of speech act theory to the analysis of safety assurances

Austin (1962) and Searle's (1969) speech act theory is useful for the current analysis of safety assurances because it highlights that people do things through speaking and this may have some form of impact on hearers. When I provide you with a safety assurance and you recognize my intention correctly, you will know that I, as a speaker, intend you to feel safe(r) as a result of my communication. The speech act theory thus draws our attention to the interactive aspect of communication, by explaining how an action from the speaker elicits *a reaction* from the hearer. Such a reaction can be seen here as a consequence of the very process of understanding of speaker's intention behind particular speech act.

Clark and Carlson's (1982) expansion of the original theory through the addition of informative speech acts placed the performance of speech acts in a social context, recognizing the fact that typical everyday exchanges occur not just in one-on-one, face-to-face conversation, but often in the middle of multiple ongoing interactions, including group interactions, written and telecommunication, and exposure to mass media

information. Clark and Carlson's (1982) valuable contribution to the current analysis explains how people who overhear communication addressed to others are still able to understand it, i.e. by inferring the communicative intention of the speaker to perform a specific type of speech act when addressed to target audience. Using this inferential understanding, the overhearers can then choose whether to react to the original communication or to ignore it as information of no concern to them.

It should be noted that the written record of a typical conversation only partially reflects interactants' performance of speech acts (e.g., see footnote on p. 22), more so on the part of the speaker, and to a lesser or no degree on the part of the hearer, especially if the hearer is not an addressee. Speech act theory illuminates the fact that there is a considerable amount of social psychological activity that underlies language exchange and that only some of this activity manifests itself in the linguistic record. The purpose of this dissertation, then, is to bring to light some of the *reactions* to communication that may not manifest themselves immediately, but which can play an important role in subsequent decision making and social action on the part of the hearers. The speech act theory, therefore, is a good departure point for the objectives of this research topic.

The problem of indirect speech acts

Searle (1975) noted that some speech acts can be carried out by uttering a sentence and meaning exactly what was said, e.g., "I urge you to take a break and read on." However, there are other cases, where the speaker may utter a question, but mean it as a request, such as "Don't you think it is time for a break?" Searle (1975) has called these acts 'indirect speech acts.'

The question that emerged with the identification of indirect speech act was, “How do conversation participants manage to recognize both the direct and indirect meaning of these types of speech acts?” Searle (1975) answered this question based on conceptualization of language use as a rule-governed behavior (see also Wittgenstein, 1953). The rules of language use determine the meanings of utterances depending on conditions of their use, and also specify how personal intentions or meanings can be realized by conventional means. It is precisely the knowledge of conversation rules both by the speaker and by the hearer that enables them to utilize indirect speech acts and interpret them appropriately.

Apart from the knowledge of the rules of language, conveying multiple meanings becomes possible through engaging general background knowledge of the participants, which allows them to draw further inferences from what was said. Searle (1975) wrote:

...The apparatus necessary to explain the indirect part of indirect speech acts includes a theory of speech acts, certain general principles of cooperative conversation..., and mutually shared factual background information of the speaker and the hearer, together with an ability on the part of the hearer to make inferences. (p. 61)

This statement represents a roadmap for the analysis of not only indirect speech acts, it also provides an outline for the analysis of any conversational phenomena dealing with multiple meanings (for a detailed account of indirect speech acts, see Brown & Levinson, 1987; Davison, 1975; Morgan, 1978; Searle, 1975).

Using Searle’s statement as a guide for the remainder of the chapter I will review general principles of cooperative conversation: first, the conversational logic of H. P. Grice, followed by the theory on mutually shared background information – theory of

common ground of H. H. Clark. The last component in the apparatus outlined by Searle – the ability of the hearer to make inferences – will be addressed in Chapter 2.

Conversational logic theory of Grice

In his 1975 paper on differences between formal and natural languages, H. P. Grice pointed out that utterances in natural languages may carry additional meanings that go beyond the literal meaning of the words. This point underlay Grice's distinction between 'saying' and 'meaning.' Through 'saying,' people relay conventional, literal meanings of the words, whereas through 'meaning' or 'implying,' people relay idiosyncratic meanings that they create for particular situations. For example, by uttering "The door is right behind you!" the speaker may say where the door is located, but mean or imply that the other person is to leave the room (example from Akmajian, Demers, Farmer & Harnish, 1990). Grice termed this phenomenon of conveying the speaker's idiosyncratic meaning through the use of literal conventional means *implicature* (Grice, 1975).⁶

The ability of the speaker to operate with multiple meanings of utterances in natural languages and the ability of the hearer to identify them accordingly is possible due to a set of rules that guide every conversation exchange. According to Grice, conversations represent cooperative effort, in which each participant recognizes a common purpose or direction for the conversation. Every conversational contribution, therefore, is required to be in accordance with 1) the purpose of the conversation, and 2)

⁶ Grice proposed the use of implicature as 'implying,' verb to implicate as to 'imply,' and implicatum as 'what is implied.'

the particular stage of the conversation. This is what Grice (1975) called the ‘Cooperative Principle.’

Based on this general Cooperative Principle (CP), Grice outlined four categories of rules or ‘maxims’ that guide both the linguistic output by the speaker and the interpretation of its meaning by the hearer. The four categories included Quantity, Quality, Relation, and Manner. The category of Quantity regulated how much information the speaker is to supply in the conversation:

1. Make your contribution as informative as is required (for the current purposes of exchange).
2. Do not make your contribution more informative than is required.

The category of Quality articulated the requirement to provide true information:

1. Do not say what you believe to be false.
2. Do not say that for which you lack evidence.

The category of Relation articulated the requirement to remain consistent with the goals of the conversation:

1. Be relevant.

The category of Manner regulated how things should be said in terms of linguistic clarity:

1. Avoid obscurity of expression.
2. Avoid ambiguity.
3. Be brief (avoid unnecessary prolixity).
4. Be orderly (adapted from Grice, 1975; pp. 45-46).

As an illustration, let us examine a typical doctor-patient interaction and see how conversational maxims guide the course of interaction. According to maxims of quantity,

the doctor expects the patient to give enough information regarding the symptoms that will allow the doctor to identify the source of the problem. If the patient gives more information than necessary, the doctor will communicate that very promptly. According to the maxims of quality, the patient is expected to provide true information about his symptoms, his health behaviors, life-style, medication compliance etc., and the doctor is expected to make a correct diagnosis and recommend course of treatment that will eliminate the problem. If the patient lies about his health history or life-style, or if the doctor recommends treatment that has not been sufficiently tested, problems may ensue. According to the maxim of relation, the conversation in the course of the whole visit is expected to remain on the topic of identification and treatment of patient's problem(s). If all the patient talks about during the visit was a recent conflict at work rather than issues with health, or if a doctor only discusses the stock market and says nothing about the treatment plan, they both do not adhere to the maxim of relation in their conversation.⁷ The maxim of manner is also essential for this situation. If either the patient cannot clearly and briefly explain the nature of the problem or if the doctor cannot give instructions on the course of treatment in clear and understandable language, then the patient's life might be in serious danger (e.g., see Einarson, 1993; Patel & Zed, 2002; Suh et al., 2000 on adverse reactions to medication).

Grice (1975) formulated the Cooperative Principle and ensuing conversational maxims as factors that facilitate the maximally effective exchange of information. He considered this maximally effective exchange of information as one of the most common purposes of conversation. However, Grice also indicated a need to expand this model in

⁷ Strictly in linguistic sense.

order to incorporate other general purposes, such as influencing or directing the actions of others.

Grice (1975) pointed out that speakers may not always adhere to the Cooperative principle or conversational maxims. Sometimes speakers can violate maxims quietly and unostentatiously, or they may openly opt out of adherence to maxims and the Cooperative Principle altogether. In these cases the speaker may be misleading or openly uncooperative, but in either case the effective exchange of information will not be achieved (e.g., see Tornqvist, Anderson, & DePaulo, 2001 on deception).

In other cases, however, the speakers may deliberately disregard some of the maxims while still *observing* the Cooperative Principle. Grice referred to this as *flouting* a maxim. It is in these situations that the necessary conditions for the utilization of conversational implicature are created. For example, consider the following exchange, which occurs late in the evening:

Speaker 1: “Would you like some coffee?”

Speaker 2: “The coffee will keep me awake” (taken from Sperber & Wilson, 1995).

Speaker 2 openly flouts the maxim of quantity, as it is common knowledge that coffee keeps people awake, and by saying it, he is not contributing anything new to their common knowledge. Speaker 1, however, assuming that Speaker 2 still observes the Cooperative Principle and that each utterance in conversation comes with the guarantee of its relevance (Sperber & Wilson, 1995), may infer the implication that the Speaker 2 does not want to stay awake much longer as bedtime is near. Speaker 1 thus relies on the literal meaning of the utterance, on the Cooperative Principle and conversational maxims,

and on the larger situational context, in this case, the time of the utterance, to infer the implicature.

The importance of this combination of linguistic and non-linguistic factors for the hearer's interpretation of speaker's meaning was pointed out by Grice (1975) as follows:

To work out that a particular conversational implicature is present, the hearer will rely on the following data: (1) the conventional meaning of the words used, together with the identity of any references that may be involved; (2) the CP and its maxims; (3) the context, linguistic or otherwise, of the utterance; (4) other items of background knowledge; and (5) the fact (or supposed fact) that all relevant items falling under the previous headings are available to both participants and both participants know or assume this to be the case. (p. 50)

In other words, the use of conversational implicature is possible through the interactants' adherence to Cooperative Principle and conversational maxims, taking into consideration the linguistic and the social context of the situation, and through mutual awareness of these contexts.

Application of conversational logic theory to safety assurances

Conversational logic theory of Grice (1975) identifies some of the fundamental principles governing everyday conversation. The Cooperative Principle and the maxims of quantity, quality, relation, and manner are powerful prescriptions that facilitate the most effective exchange of information. These rules also allow conversation participants to create idiosyncratic meanings that go beyond the literal meaning of their utterances.

When one of the maxims is openly flouted, but the speaker still adheres to the Cooperative Principle, the hearer interprets this as a case of conversational implicature. In

this case, the hearer has to look beyond the literal meaning of the sentence and infer the implications based on the conversational rules, linguistic context, and situational factors.⁸

The act of providing a safety assurance, in essence, may represent the flouting of the maxims of quantity, manner, and relevance. To illustrate, assuring the safety of paper in the introduction to this dissertation violated the maxim of quantity because the safety of paper had already been taken for granted and, as a piece of information, it would not add anything to the conversational exchange. This assurance was also ambiguous, i.e. its parameters and validity were unclear. It was also out of order because it was unexpected. Finally, it was not immediately clear how it was relevant to the purposes of the exchange. But the fact that all this happened at the very beginning of a body of work that involved the investment of considerable effort and time made this act a deliberate one, and this may have signaled to the reader that conversational implicature was used.

It is necessary to note, that the Cooperative Principle and conversational maxims hold not only in face-to-face interaction, but also in written communication. Just as a speaker in face-to-face setting, I undertook the writing of this dissertation with the goal of sharing information about a subject with you, the reader, while also demonstrating qualifications in making a solid argument and conducting methodologically sound research. Just as a hearer in face-to-face setting, you, as the reader, identified as your goal to learn more about the subject and evaluate the academic merits of the present work. In this mutually assumed goal, we both adhered to the Cooperative Principle. For the purpose of the most effective exchange of information, I, as the writer, also strived to

⁸ Conversational implicature may also refer to the whole set of implications that can be “read between the lines” but are not ostensibly manifested through violation of the maxims. This broader understanding of conversational implicature will be illustrated by empirical studies reviewed in Chapter 2.

adhere to conversational maxims of quantity, quality, relation, and manner, just like you, as the reader, expected the text to have not too much or too little information – only enough to make the argument hold, to contain valid evidence, to present points that are relevant to the argument, and for the whole text to be concise and clearly organized.

Since each statement in a conversation or text comes with a guarantee of relevance, it was expected that you, the reader, would be predisposed to treat the assurance about safety of the paper as a meaningful contribution to the interaction. This, however, brought it in contradiction with the existing background knowledge on paper safety, according to which paper is already safe as a rule. At this point, in order to examine how such a contradiction can be resolved, I need to explore more in detail the background knowledge that is shared by participants in a conversation.

The concept of mutually shared background knowledge plays an important role both in Searle's account of speech acts and in Grice's account of conversational logic. Given that neither of the authors developed this concept at any length, I will utilize for this purpose the theory of common ground of Herbert Clark.

Theory of common ground of Clark

Originally, the term *common ground* was introduced by Grice in his William James lectures and developed further by Karttunen and Peters (1975) and Stalnaker (1978) in their discussions of presupposition (see also Lewis, 1969; Schiffer, 1972).

Stalnaker (1978) wrote:

...The presuppositions of a speaker are the propositions whose truth he takes for granted as part of the background of the conversation...Presuppositions are what is taken by the speaker to be the common ground of the participants in the conversation, what is treated as their *common knowledge* or *mutual knowledge*. (p. 320)

The concept of common ground was developed most thoroughly by H. H. Clark (see Clark, 1992, 1996; Clark & Carlson, 1981; Clark & Wilkes-Gibbs, 1986).

Clark viewed conversation as a joint activity. Importantly, Clark considered language use not as a goal in itself, but as a tool that facilitated coordination of larger joint activities or interactions, e.g., providing services, buying products, maintaining relationships, playing games, etc. However, the goals of these joint activities are established and their achievement coordinated through language.

To coordinate their actions, the participants in the joint activity have to appeal to their common ground. By entering conversation, the interactants presuppose common ground and through the conversation, they try to validate it and then add on to it. Clark (1996) suggested that people in joint activity make use of two types of common ground: 1) communal common ground, which ensues from their membership in various cultural communities, and 2) personal common ground, which emerges from people direct experiences with each other.

In Clark's (1996) terms, cultural communities are formed around areas of knowledge that other communities lack, such as nationality, residence, language, ethnicity, gender, education, occupation, religion, politics, subculture, hobby, cohort, and other social categories. Because of the close link between memberships in cultural communities and cultural knowledge, whether two interactants share a joint group membership or not is an important basis for the communal common ground. People that meet for the first time can go to some lengths in trying to identify another person's cultural community membership and through this establish the degree of shared knowledge between them (e.g., see Cohen & Ebbesen, 1979; Ruscher & Hammer, 2006).

When participants enter a joint activity, they bring with them initial common ground, that is, assumptions and beliefs that each participant had prior to activity. Once in the activity, the participants share physical space, mutual awareness of their co-presence in this physical space, and linguistic co-presence (participating in the same language interaction). This differentiation is important in that the common ground is accumulated not only through linguistic exchange, but also through shared perceptual experiences of physical space and one another in it. The mutual awareness aspect underlines the reflective nature of joint activity, in that common ground comes from self-awareness, i.e. perceptual knowledge of the situation and oneself being in it, as well as an assumption of other person having similar awareness of the situation and herself being in it. Note that Grice (1975) proposed similar components as the foundation of conversation.

According to Clark (1996), joint activities progress one step at a time, and every step has to be agreed upon by the participants. In conversations, every contribution by a speaker is presented to the addressee and the addressee has to acknowledge the understanding of it, before the conversation can proceed any further. By doing that, both participants register the incorporation of the speaker's utterance to the common ground of their joint activity. Clark and Schaefer (1989) called this process *grounding*, and the two phases of grounding are the *presentation phase* and the *acceptance phase*. The following example from Clark and Schaefer (1989), originally from the London-Lund corpus (Svartvik & Quirk, 1980), illustrates that process⁹:

⁹ Numbers in parentheses are mine - (MZ).

A. is it . how much does Norman get off --	} presentation phase (1)
B. pardon	} acceptance phase (1)
A. how much does Norman get off	
B. oh	
only Friday and Monday	} presentation phase (2)
A. m	} acceptance phase (2)
B. [continues] ¹⁰ (pp. 264).	

In the above example, the first acceptance phase took three turns. First, B's 'pardon' indicated to A that what A said was not clear enough to acknowledge understanding. When A repeats the question, B first acknowledges understanding by saying 'oh', and then, in response, presents a new piece of information (presentation phase 2), which A acknowledges having understood by saying 'm' (acceptance phase 2).

Clark and Schaefer (1989) pointed out that there are several ways for the addressee to accept the contribution of the speaker:

1. *Continued attention.* B shows he is continuing to attend and therefore remains satisfied with A's presentation.
2. *Initiation of the relevant next contribution.* B starts in on the next contribution that would be relevant at a level as high as the current one.
3. *Acknowledgment.* B nods or says *uh huh, yeah*, or the like.
4. *Demonstration.* B demonstrates all or part of what he has understood A to mean.
5. *Display.* B displays verbatim all or part of A's presentation. (p.267).

¹⁰ It is important to note that "ungrammatical" phrases, self-repairing constructions, interjections, pauses are pervasive in everyday language use and often play a meaningful role in the conversational exchange, as illustrated here. They are often excluded from literary texts and other recorded narratives (see also Clark, 1997). However, analysis of carefully recorded actual language use, as practiced by conversational analysis research (e.g., Schegloff, 1968; Sacks, 1992; Schegloff & Sacks, 1973) has been crucial in uncovering the complex dynamics of conversational interactions. The actual spoken language thus is very different from what traditionally has been identified as the object of linguistic studies, i.e. the language structure (Clark, 1992; also see de Saussure, 1916/2006, for the distinction between speech (*parole*) and language [*langue*]).

Through the process of grounding the participants in joint activity can modify their initial common ground by validating or destroying presuppositions (see Lewis, 1969). These modifications accumulate common ground about their interaction. Thus, the emergent common ground consists of what participants believe about the current state of their joint activity and their perceptions of the events that occurred between them from the beginning of their interaction.

Importantly, the grounding process works optimally in face-to-face conversations between two people, but it is not always possible in other settings. Fillmore (1981) argued that face-to-face conversation is the primary setting for language use, and that every other setting deviates from the basic setting by missing some of its characteristics. Phone conversations lack the co-presence and visibility. In lectures and other non-personal, institutional settings, hearers often cannot control how the interaction proceeds so they cannot immediately provide feedback to the speakers to verify their understanding. The same goes for written settings. To deal with all these challenges, the participants have to develop specialized skills and procedures (Clark, 1996). For the grounding to occur in phone conversations, participants have to rely more on providing verbal evidence for their understanding, such as much more frequent use of 'uh huh' and repeating parts of speaker's utterances. In public speaking and written settings the grounding process is often not possible; therefore, the hearers have to rely more on inferences and contextual clues (e.g., Schober & Clark, 1989).

Returning to face-to-face interaction, the current state of joint activity often has physical representation that is mutually observable by the participants (Clark, 1996). For example, if two people have started planting a garden, at any step of their joint activity,

the current state of activity will be manifested by the conditions of the garden. In other cases, however, such as engaging in a verbal argument, the manifestation of the current state of the argument is more difficult to apprehend.

Common ground between any particular two people can also accumulate across several joint activities over the course of time. To illustrate, new colleagues at work entering their work space for the first time, bring their initial expectations of the workplace and other people based on their presuppositions. In the course of their actual experiences with one another they accumulate shared experience, test their assumptions in practice, and thus validate, modify, or discard their presuppositions regarding their job and co-workers.

Established common ground plays an important role in communication. Clark and Carlson (1981) proposed that the common ground is what constitutes the *context*, i.e. knowledge, beliefs, and presuppositions that interactants assume they are sharing at the time of exchange and is therefore used by them for the interpretation of word meanings and for making inferences. This shared context facilitates narrowing of the meanings of common words down to those that are relevant to the shared domain of experience. It also allows the use of specialized vocabulary and makes it unnecessary to provide definitions or other sorts of explanations which would normally be required from the speaker in order to be understood (Clark & Wilkes-Gibbs, 1986; Manktelow & Over, 1990).

Application of common ground theory to safety assurances

The conceptualization of common ground as a set of background presuppositions that are continuously modified in the course of interaction provides a useful framework in explaining the impact that the provision of safety assurances can have on risk

perceptions. Following the assumption of the Cooperative Principle and maxims of quantity and quality, the interactants try to add on to their common ground by verifying presuppositions that are relevant to their shared experience.

Assuring safety of the paper in the introduction was assuring something obvious, given that paper is normally assumed to be safe. Assertions of things that are obvious or normally taken for granted, e.g., “He has five fingers on his left hand,” or “She remembers her own name,” are appropriate only if the situation is aberrant (Searle, 1969). In other words, these assertions are meaningful only if having five fingers or remembering one’s name were not a part of the normal state of affairs. Applying this logic to the assurances of safety, the communication of safety of an event that is normally taken for granted will be meaningful only if the safety of that event would not be assumed to be a part of the normal state of affairs.

The assurance of the safety of the paper in the introduction has signaled to the reader that conversational implicature was used and the reader must infer the implications of this assurance. Adherence to the Cooperative Principle implicated that the speaker had reasons for stating the obvious, i.e. concern with paper safety that derived from personal background knowledge, and the need to share this information with the hearer in order to create a joint understanding of the situation. As a result, the provision of the safety assurance called for a rejection of the presupposition of the intrinsic safety of the paper, and second, required the creation of the new supposition that the paper in question was safe for the purposes of the current exchange of information.

As I tried to illustrate in the opening paragraph, the process of interpretation of the meaning of assurance of the safety of the paper, necessitated that the readers

challenged their existing “taken-for-granted” safety of the paper and made the content of the paragraph meaningful by altering the background context, i.e. assuming uncertain state of affairs regarding paper safety. Consequently, risk perceptions regarding paper were likely to rise. I can conclude that asserting the safety of something that is taken for granted can put the safety itself into question.

The situation can be exacerbated by the problem of grounding. Misinterpretation of safety assurances provided through written texts or public communication settings, whereby risk perceptions increase, may lie in the fact that the meaning of such safety assurances cannot be immediately grounded. In other words, due to the constraints of one-sided communication, the reader cannot verify the speaker’s intentions for the provision of safety assurances and has to accept each proposition unilaterally and assume the burden of clarifying the meaning of communication through inferences and contextual clues (more on it in Chapter 2).

Summary

From the outset of this chapter, I have treated safety assurances first and foremost as speech acts that intend to produce a particular effect in the hearer, namely, a feeling that outcomes from an event or an object will be safe. Speech act theory of Austin (1962) and Searle (1963) provided a useful framework for the discussion. Importantly, the act of utterance of a safety assurance can carry two intentions: 1) to predicate an object or event with a characteristic of being safe, and 2) to signal the performance of an act of safety assurance, which is to assertively communicate the information that an object is safe to another party and elicit feelings of safety in the other party. The specific reaction to any speech act is determined by its illocutionary force, which can be indicated either by

performative phrases and other linguistic means, as in “I assure you,..” or it can be inferred by the hearer from the context.

Conversational logic theory and the theory of common ground provide us with necessary tools that allow us to understand how the inferences can be drawn from the linguistic and general background contexts. Underlying rules of conversation provide the parameters by which each proposition is decoded based on the assumptions of necessary amount of information, truthfulness, relevance, and proper organization. In this light, the safety assurance regarding an object that was already assumed to be safe, is still treated as a *meaningful* piece of information, due to the assumption of speaker’s adherence to the Cooperative Principle and conversational maxims.

The theory of common ground by Clark (1996) explained how the Cooperative Principle may take precedence in guiding the interpretation of the safety assurances over the validity of background knowledge that interactants bring with them to the conversation. Rather than assume speaker’s erroneous judgment or non-adherence to the Cooperative Principle, hearer or reader may modify his background beliefs about the world as a way of building and expanding common ground. This is particularly likely if the immediate clarification of a speaker’s intention (grounding) is not possible, as is the case with written communication, public announcements, and other types of one-way communication. So, the interpretation of safety assurances by the hearer under the assumption of speaker’s adherence to the Cooperative Principle and conversational maxims can lead to the revision of background presuppositions that form the basis of the common ground between the interactants, including the perceptions of risks.

The next chapter will examine some empirical evidence, which shows that, when grounding of meaning is not possible, recipients of communication make the most of information available to them. They actively draw inferences based on the rules of conversation, contextual clues, and perceptions of the speaker as an intentional agent.

CHAPTER II

EMPIRICAL EVIDENCE FOR THE USE OF INFERENCES AND CONVERSATIONAL RULES

Through indirect speech acts, interactants can successfully convey their personal meanings in addition to literal meaning of utterances. Searle (1975) pointed out that the ability on the part of the hearer to make inferences is an essential component to interpreting such indirect meanings. In the previous chapter, the primary trigger for drawing inferences rather than relying on literal meaning of propositions was Grice's (1975) conversational implicature, which was manifested by obvious flouting of one of the conversational maxims while adhering to the overall Cooperative Principle (Arundale, 2005). The concept of conversational implicature directly addressed the problem of interpretation of indirect speech acts, as discussed by Searle (1975), by specifying the "general principles of cooperative conversation" as another necessary component in the interpretive arsenal for handling indirect speech acts (see p. 15).

In this chapter, I review empirical evidence that illustrates the common utilization of inferences in the active process of decoding the speaker's intentions by the recipient of communication. I will use only one particular type of interaction – between researchers and participants in social and behavioral research. Even within this type of interaction, drawing inferences based on conversational rules will manifest itself in a variety of ways.

Usually when researchers and participants communicate, the grounding (i.e. step-by-step clarification and acceptance of each contribution to conversation) is not possible, either because communication is mediated, as in mail-in survey, or interaction is very structured, as in standardized interview. Under such conditions, the recipients of

communication heavily rely on drawing inferences in the course of interpretation of meaning.

The goal of this review is twofold: 1) to provide empirical evidence for the operation of conversational rules across a variety of settings and modes of communication (through which interaction between researchers and participants can occur), and 2) to illustrate a crucial role of inferences in interpretation of meaning under conditions where grounding (verification of speaker's intention) is not possible. This discussion is an important step on the way to addressing the topics of risk communication and processing of risk information in the next chapter.

Conversational logic and social-behavioral research procedures

A number of authors suggested that a psychological experiment should be conceived of as just another conversational situation (Bless, Strack, & Schwarz, 1993; Clark & Schober, 1992; Hilton, 1995; Hilton & Slugoski, 2000; Schwarz, Strack, Hilton, & Naderer, 1991; Strack & Schwarz, 1992; Tetlock, Lerner, & Boettger, 1996). In other words, in the interaction between researchers and research participants, one must assume that conversational rules are in effect. The participants treat the researcher as a cooperative speaker who adheres to the conversational maxims and provides participants with information that is relevant, true, sufficient, and clear. The researcher thinks the same of the research participant and designs any research materials with a cooperative participant in mind.

However, the type and the amount of information provided to the participants are largely determined by the technical aspects of the experimental material. The specific manipulation can be the primary concern to the researcher to the point that the

perspective of the research participant is lost. This type of communication therefore does not guarantee the adherence to the Cooperative Principle and conversational maxims. Specifically, the researcher may be severely constrained by the requirement of standardizing experimental procedures, which sets strict limits on how much feedback an experimenter can provide verbally or otherwise when the participants try to infer the meaning and the purpose of the task. The result is a possible mismatch in perceptions: the respondent assumes that the researcher adheres to Cooperative Principle, when indeed the researcher did not (regardless of whether the researcher thinks he or she did).

This mismatch in degree of cooperativeness may result in participants interpreting the experimenter-provided information in an erroneous fashion. In fact, it has been shown in a number of experimental studies that this 'one-sided application' of the Cooperative Principle led to the patterns of responses that were interpreted as evidence of bias or the inadequacy of human information processing (Kahneman et al., 1982; Tversky & Kahneman, 1973). However, various authors argued that these findings reflect conversationally cooperative responses to what participants thought that the researcher wanted to know (Bless, Strack, & Schwarz, 1993; Hilton, 1995; Schwarz, 1994). The bias in judgment tasks disappeared once the experimental manipulation indirectly brought into question the cooperativeness of the source of information for the participants (e.g., Schwarz et al., 1991; see more on this below).

According to Bless, Strack and Schwarz (1993), research participants are unlikely to perceive that conversational norms do not apply to their interaction with the experimenter. It is only at the very end of the experiment, when during the debriefing stage the actual purpose of the experiment is revealed, that participants have a chance to

verify (or ground) their initial interpretations of the experimental conditions and research materials. In case of a written mail-out survey, no debriefing is possible altogether, unless a participant contacts the researcher, which seldom happens.

Thus, when faced with questions and instructions in an experimental situation, participants have to rely on contextual clues, ranging from features of the questionnaire design, identity and behavior of the experimenter to features of experimental conditions in order to infer the communicative intention of the experimenter. The sections below will briefly address the role of these contextual clues. I will first review some positive evidence of the workings of conversational logic in social and behavioral research. Following that, I will review some literature that has applied conversational logic analysis to studies that previously documented apparent deficiencies in human reasoning. This second set of experimental findings revealed that in many cases these “deficiencies” resulted from the fact that research participants treated the research material as being part of cooperative communication, while the researchers themselves did not.

Questionnaire design and question comprehension

Respondents often rely on characteristics of the survey itself to interpret the meaning of survey questions. For example, in an experiment in which participants were asked ambiguous questions about a fictitious entity that they could not have known anything about, respondents relied on the preceding questions to interpret the meaning of the ambiguous question (Strack, Schwarz & Wänke, 1991). In one of their studies, German students, for whom a university education is free, were asked about their attitudes towards the concept of “educational contribution.” When preceding questions had asked about tuition in American universities, their attitudes toward it were negative.

However, when preceding questions referred to government support of students in Sweden, their attitudes were positive. The study identified that participants interpreted the meaning of “educational contribution,” in reality a non-existent entity in the context of Germany, as a fee or as a stipend depending on the preceding questions. Such use of the preceding question was warranted by the Cooperative Principle and the requirement for the experimenter to provide relevant information (“Be relevant”) and in logical order (“Be orderly”).

The assumptions of relevance and orderliness also lead participants to believe that the experimenter would not ask questions about the same subject twice in a row.¹¹ Studies have shown that in situations in which participants face somewhat similar questions, they utilize the order of questions in a questionnaire or an interview to interpret their meaning. Strack et al. (1991) asked participants to rate their personal happiness and, in a separate question, their life satisfaction. When the two questions were asked side by side, the participants provided dissimilar answers to these questions. Presumably, participants thought that experimenter wanted them to differentiate between the concepts of happiness and satisfaction, and, in order to avoid redundancy, they seem to have based their two answers on different aspects of their lives. However, when the two questions were separated by a number of other questions, respondents provided very

¹¹ Apart from the maxims, this belief can be formed on the basis of the given-new contract, which according to Clark (1977a, 1977b) guides the structure of the discourse. The speaker, using syntax and intonation, partitions each utterance into two parts: given information and new information (the same rule is true in written communication). The given information is what the speaker assumes the hearer already knows, and the new information is what the hearer is assumed not to know. The hearer accordingly decodes the information assuming that the speaker follows the given-new contract in her discourse. The hearer identifies which information is given and which is new and establishes the reference of the given information to the preceding parts of the discourse.

similar ratings for happiness and satisfaction because respondents perceived that both questions tapped the same general domain of personal well-being.

Another clue that respondents utilize in interpreting the meaning of the experimental tasks are the nature of response alternatives provided to them (Schwarz, 1990; Bless, Strack, & Schwarz, 1993). As part of a survey study, Schwarz, Strack, Müller, and Chassein (1988) asked participants about how often they felt really annoyed. When the response scale ranged from once a year to once over every 3 months respondents indicated more extreme examples of annoyance than when response alternatives were in the range of less than twice a week to several times a day. It appears that because feeling of annoyance can comprise episodes of major discontent as well as momentary unhappiness over daily hassles, participants relied on the anchors provided in the question as to how to interpret the question itself.

Similarly, Winkielman, Knäuper, and Schwarz (1998) had participants report on past emotional experiences, while varying the length of the period they were asked to recall. If the reference period was long, the participants interpreted it as an indication that researcher was interested in rare instances of strong emotion. However, if the reference period was short, lighter instances were included into consideration. This effect was neutralized when the concept of anger was clearly defined by the researcher, which eliminated the need for participants to draw inferences in interpreting the meaning of the emotion terms.

Persuasion

The principles of cooperative communication also guide how persuasive messages are understood. For instance, Igou and Bless (2003) showed that the order in

which persuasive arguments are presented influences the relative degree of importance that hearers attach to them. In one-sided communication, that is, when information only supports one side of the argument, the most important argument is expected to be given at the beginning, as the most relevant and true piece of information. In two-sided communication, where interactants deal not only with information supporting the argument, but also with counterarguments, the most important argument is expected to be given at the end, as a logical conclusion of a two-way deliberation process.

The Cooperative Principle and conversational maxims play an important role in shaping the expectations of where most important argument should come. In two-sided communication, once an argument is provided and is followed by a counterargument, the Maxim of Manner requires that the speaker resolves the ambiguity of information by the end of her contribution. In this way, the orderliness and quality of information is achieved, and the communicative competence of the speaker is reaffirmed, in which case the argument carries more persuasive power.

In one of their experiments, Igou and Bless (2003) undermined the cooperativeness of the source of information by informing the participants that the arguments were provided in random order. As a result, the study found that the persuasiveness of the arguments was significantly reduced. This could be seen as an indicator that the participants had different expectations in the face of a speaker that did not uphold the Cooperative Principle, whereby expectations that a speaker would follow any of the conversational rules were no longer valid. Given that arguments were not intentionally structured according to conversational rules, their perceived persuasiveness decreased (see also Igou & Bless, 2007).

Author identity and response processes

Other findings highlight that survey respondents may take the identity of the survey author into consideration in order to be relevant and informative in their answers. Norenzayan and Schwarz (1999) provided participants with a description of a man who had engaged in a violent attack against his supervisor at work and asked the participants to explain why this event occurred. Participants received one of the two questionnaire versions, with one indicating that the survey authors were personality researchers and the other one suggesting that they were social scientists. When the participants responded to the survey by personality researchers, they utilized more dispositional explanations for the violent behavior. However, when they responded to a social science survey, they provided more situational explanations. This finding illustrates the operation of the Cooperative Principle from a slightly different angle. Based on the speaker's presuppositions about what the background of the hearer entails, the speaker attempted to add on to that area of knowledge by providing information relevant, in their view, to the experimenter's interests. Norenzayan and Schwarz (1999) illustrated that responses to survey questions are inextricably embedded in the social and communicative contexts of interaction.

Unintended consequences of unwarranted rewards

Respondents may assign equal importance to the circumstances surrounding the task as the task itself. When the experimenter provides a reward for their performance on an unfamiliar task, this may serve as an important cue to participants regarding the nature of the task. Typically, tasks for which rewards or compensation is provided are more difficult and require more cognitive effort than others. In many instances, they are

provided as an incentive for the person to engage in behavior that they would not otherwise engage in. If the task were not difficult, effortful, and its solution not obvious – why would a rational interactant promise a reward?

Indeed, Kimmelmeier, Bless, Schwarz and Bohner (2004) found that participants who were provided with a reward performed worse on an easy cognitive task than those who were not promised a reward. A detailed analysis of the data showed that rewarded participants took more time, considered the task more difficult and were less likely to find blatantly obvious aspects of the correct solution. Though, typically, providing a reward is expected to enhance performance, Kimmelmeier et al. (2004) demonstrated that, due to the operation of conversational principles, receiving what, in real life, could be considered an unwarranted reward, results in paradoxical effect, where the reward is made meaningful by exerting more resources on the completion of the task.¹²

Recruitment of research participants

Researchers found similar paradoxical consequences of the operation of conversational principles when they tried to recruit volunteers for their studies. Singer, Hippler and Schwarz (1992) found that providing prospective research participants with the assurance that all their data would be kept confidential led to a *decrease* in their willingness to take part in the research, even though they had not been given any details about the study. Confidentiality is a concern when personally sensitive information is involved, which might lead to potential embarrassment for the person in question. Hence, when provided with a confidentiality assurance, potential participants seemed to infer that

¹² Similarly, receiving a safety assurance about something that was presumed to be safe, due to the operation of conversational principles, can be made meaningful if one starts seeing something as more dangerous than one thought it was.

the study addressed sensitive areas and asked unpleasant or embarrassing questions (even if it were not going to be the case). Consequently, they were less inclined to agree to participate. The work by Singer et al. (1992) is crucial for the present research in that it provides initial evidence of the unintended effects of assurances in general.

Research on heuristic biases

In their famous studies, Kahneman and Tversky (1972; see also, Kahneman et al., 1982; Tversky & Kahneman, 1973) argued on the basis of empirical evidence that average people are prone to make errors in a variety of judgment tasks that involve probability assessment. Among such errors, relevant to our discussion, were base-rate error (Bar-Hillel, 1980, 1990; Fischhoff & Bar-Hillel, 1984; Osberg & Shrauger, 1986), conjunction fallacy (e.g., Leddo, Abelson, & Gross, 1984; Morier & Borgida 1984), and dilution effect (e.g., Kimmelmeier, 2007a; Nisbett, Zukier & Lemley, 1981; Waller & Zimbelman, 2003).

Base rate error

Base-rate error occurs when people ignore the overall frequencies (base rates) of what is likely to happen, and make decisions based on plausibility of a description of an object or event, or on how closely it matches their concept of what this object/person would be like in real life. For example, when faced with the task of assessing the probability whether a person of a given description belongs to one category or another, people tend to be influenced in their decision more by a detailed and personal description of a person than by general statistical probabilities that are given to them prior to the task.

Kahneman and Tversky (1973) conducted an experiment in which they compared the use of the base-rate information by the same participants under two conditions. In the

first condition, participants learned that 6 people were randomly drawn from a pool of 100 that contained 30 engineers and 70 lawyers. In the second condition, the same happened with a pool that contained 70 engineers and 30 lawyers. The participants were asked to read the descriptions and indicate the probability that this person is a lawyer or an engineer. There were five cases that contained thumbnail descriptions of individuals and their hobbies, which were constructed in a way that it would be equally suitable to describe either, like the following one:

Jack is a 45-year-old man. He is married and has four children. He is generally conservative, careful, and ambitious. He shows no interest in political and social issues and spends most of his free time on his many hobbies which include carpentry, sailing, and mathematical puzzles. The probability that Jack is one of the 30 engineers in the sample of 100 is _____. (Kahneman & Tversky, 1973, p. 241).

The sixth case (abstract case) contained instructions to estimate the same probability when no description of a person was available.

The results showed that, on average, participants in the first condition estimated 30% probability in the abstract estimates case. But when it came to individual descriptions, the same participants rated the probability as roughly 50%, which means that the participants ignored the base rates and estimated that the description could equally match both an engineer and an a lawyer, i.e. 50-50 chance. Importantly, the outcomes in the second experimental condition followed the same pattern, 30% probability for a lawyer in the abstract estimation case and a 50-50% for individual descriptions.

In their interpretation of the results, Tversky and Kahneman's (1973) point of reference was the normative theory of statistical prediction, according to which "one is

allowed to ignore the base rate only when one expects to be infallible” (p. 241). The authors wrote that “one of the basic principles of statistical prediction is that prior probability, which summarizes what we knew about the problem before receiving independent specific evidence, remains relevant even after such evidence is obtained... Our subjects, however, failed to integrate prior probability with specific evidence” (p. 243).

The Tversky and Kahneman themselves, however, considered the individual descriptions as “worthless evidence,” meaning that they intentionally supplied it in the way that it did not to carry informational value in differentiating between the categories. Kahneman and Tversky (1973) therefore concluded that “the failure to appreciate the relevance of prior probability in the presence of specific evidence is perhaps one of the most significant departures of intuition from the normative theory of prediction.”

For a considerable period of time, these results were interpreted as evidence that most people do not apply correct logical and statistical principles but, instead, are prone to using cognitive shortcuts, which were termed ‘heuristics.’ These and similar findings spawned a considerable body of research on ‘heuristic biases’ (e.g., Gilovich, Griffin, & Kahneman, 2002), and the overall interpretation of the results continued along the lines of puzzling deficiency of laypersons, often referred to as nothing other than *naïve* subjects (when compared to *sophisticated* subjects) (Berkeley & Humphreys, 1982).

Application of conversational logic theory to the analysis of the results of Kahneman and Tversky’s studies and subsequent research offered an alternative framework. According to it, the errors mentioned above, in fact, do not represent instances of irrational judgment, but, on the contrary, demonstrate sophisticated

application of the inferential strategies on the basis of rules of conversation, as outlined by Grice (1975). From a conversational perspective, the central point in the explanation of base-rate error is that the participants believed that the additional information was *meaningful* and *intentionally provided* by the experimenter. This belief was based on the assumption that the experimenter was an intentional speaker who followed the maxims of relevance and quantity. Thus, participants *had* to take that additional information into consideration.

To support this argument, Schwarz and colleagues (1991) replicated the base-rate fallacy when individuating information was presented by the experimenter. However, the results showed that the “fallacy” was eliminated when the same information was attributed to a computer. Schwarz et al. (1991) argued that information that generated by computer or otherwise randomly selected does not carry the same implication as information presented by an intentional speaker who adheres to the Cooperative Principle. Specifically, randomly generated information does not come with a “guarantee of relevance” (Sperber & Wilson, 1995); hence, the applicability of conversational norms is deactivated, implying that this information cannot be used to infer a speaker intention. Researchers hypothesized that, if an apparent “reasoning error” was driven by the assumed intentionality of the experimenter, the same “error” should disappear or be weakened substantially when intentionality could not be assumed. Indeed, the Schwarz et al. (1991) study found that in computer-generated case, the participants utilized the base-rate information just in the way that Kahneman and Tversky’s (1973) so-called sophisticated subjects would (see also Krosnick, Li, & Lehman, 1990).

Conjunction fallacy

The conjunction fallacy, a term also coined by Tversky and Kahneman (1982, 1983) refers to an outcome, in which people, assessing the probability that a person belongs to a particular category, chose a conjunctive, or more complex, description to categorize a person rather than a single characteristic. The error, according to the authors, consisted of ignoring the fact that probability of two characteristics occurring together in one case is much lower than having only one characteristic present. To illustrate, Tversky and Kahneman (1982) gave their respondents the following description and a task:

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations. Please check off the most likely alternative:

- Linda is a bank teller
- Linda is a bank teller and is active in the feminist movement. (Dulany & Hilton, 1991, p. 86).

Participants overwhelmingly considered Linda to be a bank teller and a feminist rather than just a bank teller (almost 90% of respondents). This finding showed again that the participants faced with a detailed description tended to ignore the fundamental rule of probability, i.e. that the probability of somebody being just a bank teller or a feminist will always be much higher than for somebody to be both at the same time. Thus, the list of laypersons' thinking deficiencies was expanded to include conjunction fallacy.

Dulany and Hilton (1991), in a series of experiments, not only replicated Tversky and Kahneman's (1982) study but, importantly, asked the participants in each experimental condition about whether these statements carried with them some additional implications. For example, after provision of a detailed description of Linda as a socially active person, the assertions such as "Linda is a bank teller" can also imply the negation

of all her other possible roles. Thus, after taking into account a variety of epistemic, empirical and logical implicatures possible under each condition, Dulany and Hilton (1991) found that the incidence of genuine conjunction fallacy was between 0% and 38% compared to 85 and 90% reported in Tversky and Kahneman (1982). These findings provided additional evidence that the conversational logic plays a significant role in the laypersons' performance in probability judgment tasks and ignoring this fact renders the analyses of such processes inadequate.

Dilution effect

The dilution effect refers to people's tendency to be influenced by non-diagnostic or irrelevant information in their assessments of persons or events. For example, when a description of a student contained only a number of study hours per week, participants were inclined to estimate his Grade Point Average on average higher than compared to a student whose description also included number of siblings, age, hair color, and other. The presence of additional information seemed to affect the participants' assessments of the student even though the type of information, e.g. hair color, was not relevant to student's performance, in other words, it could not shed any additional light on his study skills (e.g., Nisbett, Zukier, & Lemley, 1981; Zukier, 1982; but see Kimmelmeier, 2007a, 2007b).

The dilution effect has received alternative explanations. Nisbett et al. (1981) and Zukier (1982) attributed it to the operation of the representativeness heuristic, a term coined by Tversky and Kahneman (1973). According to this heuristic, people predict outcomes based on category membership; specifically, if a person resembles category A, people assume that the person experiences the outcomes that are typical for a member of

category A. For example, if a college student studies only three hours per week, the most likely outcome for this student is a low GPA. However, the introduction of irrelevant information disrupts this association because it reduces the similarity between the category and the target person. Whereas a college student who only studies 3 hours is perhaps a very typical member of the category “lazy student,” a student who studies 3 hours, drives a Toyota and loves chicken noodle soup appears to be a less typical of a member of the “lazy student” category, notwithstanding that one’s car and food preference have no implications for academic success.

Tetlock, Lerner and Boettger (1991) proposed that the dilution effect can be seen as a rational response to the operation of conversational norms, whereby the provision of additional information is perceived as relevant to the task and has to be taken into consideration by the participants. Tetlock et al. (1991) successfully demonstrated that deactivation of conversational norms led to elimination of dilution effect. Participants were less likely to use non-diagnostic information in their judgments when they learned that the relevance of additional information to the task at hand could not be guaranteed as it was randomly selected from a computer data file (however, see Kemmelmeier 2004, 2007a for additional arguments supporting similarity-based approach and opposing the conversational foundation for dilution effect).

Summary and application to the present research

Studies reviewed in this chapter presented strong empirical support for the operation of conversational rules in decision making processes. In these studies, participants’ received verbal and written instructions, filled out surveys, and performed a variety of judgment tasks. In a context of behavioral research, communication process

was constrained by institutional rules, such as requirements for standardized procedures. Under these circumstances the grounding was not possible; therefore, recipients of communication extensively relied on the contextual clues to identify social category membership of another party (to utilize relevant parts of shared background information) and to infer the intention behind speaker's communication, all with the objective of ensuring the most effective exchange of information.

No matter what type of information was provided, by the very fact that it had been given by the speaker, the recipients assumed its relevance and utilized this information to generate inferences that would help them with a decision. In this light, the hearers faithfully followed the Cooperative Principle. However, in the original studies on heuristic biases, the researchers violated their part of the assumed agreement and only created an appearance of performing some speech act when in fact they did not. By providing an assurance, giving a reward, asking for help with assessments, they were successful in eliciting reaction according to "already established conventions in wording, situational circumstances, and anticipated results" (see p. 10). The participants in the research trusted that experimenters would be sincere in their actions and would not purposefully give them "worthless evidence" or rewards or assurances without real basis for them, therefore they acted just as it was anticipated.

Some researchers were not aware of their "conversational rule violation" and claimed that the inferences of laypersons violated principles of formal logic. However, this so-called biased reasoning disappeared when the operation of conversational norms was experimentally de-activated in replication experiments (by different researchers), so that the cooperativeness and intentionality of a speaker could not be assumed. Had the

participants received a full disclosure about experimental design and motivations of the researchers behind their communication before taking part in these studies, there would be no effects to discuss, as the experimenters would fail in their performance of their speech acts and consequently would fail to achieve any perlocutionary effects or reactions from the participants. The partial disclosure at the outset of all these studies serves as the proof to this fact.

The empirical evidence reviewed here suggests that the interpretation of safety assurances as meaningful assurances is contingent upon whether the speaker is perceived as an active agent possessing intentionality or as an inanimate object whose participation in the exchange of information does not have an underlying intention of its own. The perceived intentionality of the speaker can be seen as the necessary condition for the operation of the Cooperative Principle of communication. Providing empirical evidence to this proposition, a number of studies reviewed in this chapter examined the effect of perceived intentionality of the agent and the type of inferences that it generated. Specifically, research relied on paradigms in which the intentionality in communicating a message was deliberately undermined. This was accomplished by casting the fact that the information was presented as an accident (McGarrigle & Donaldson, 1975), by presenting the information as randomly generated as part of a game of chance (Ginnosar & Trope, 1987), or as generated by a computer (Schwarz et al., 1991). The perceived randomness and the absence of underlying intention in the communication of messages indicated to the recipients that such messages must be interpreted literally and without the decoding of possible implications.

Studies by Kemmelmeier et al. (2004), Singer et al. (1992), and even Kahneman and Tversky (1973, 1982), showed that a deliberate “misrepresentation” of the communicative intention behind a speech act can be successful in eliciting normally anticipated responses from the recipients of communication. In my own research, I would like to examine the cases where unintended misrepresentation of the communicative intention trigger the conventional interpretation and elicit strong responses that are have been established for this particular speech act.

Based on the reviewed studies, I hypothesize that misinterpretation of the speaker motivation behind providing safety assurance (e.g. driven by the presence of threat or by legal obligations) would be more likely to occur under conditions where grounding is not possible, due to institutional or other situational constraints on the amount of exchange that can take place among the interactants. When the recipients of communication cannot verify or clarify the meaning of communication directly with the speaker they have to rely on inferential strategies to make the best use of all information available to them.

Having laid out the general approach of this investigation – examination of the role of conversational rules in processing the meaning of communication – the time has come to look closer at the concept of risk and risk perceptions in relation to communication processes.

CHAPTER III

RISK COMMUNICATION AND PERCEPTIONS OF RISK

Safety assurances are used to decrease perceptions of risk. In preceding chapters, I have reviewed key points of speech act theory, conversational logic theory, and common ground theory to address various aspects of communicative process in face-to-face interactions that may account for unintended effects of providing safety assurances. So far, in the attempt to apply conversational framework to the case of safety assurances, the discussion remained at the level of general cognitive processes, without examining neither the nature of risk perceptions nor the processes specific to the area of risk communication.

In this chapter, I will review the factors that have been found in the literature to influence risk perceptions and review empirical studies concerning real-life practices and challenges of risk communication. In this way the current investigation can be situated in relation to the existing body of research on risk communication.

From the start of this review, it is important to point out that the term ‘risk perceptions’ has been reserved to refer to ordinary citizen’s conceptualizations and assessments of risk (Otway, 1992).¹³ Risk perceptions of general public have become the

¹³ Some researchers proposed that the term ‘risk perception’ is a misnomer, as it applies the term designated for processing of sensory information to the processing of conceptual information, i.e. risk construed as a probability of adverse outcomes is an abstraction that cannot be sensed, but rather must be understood (e.g., Slovic, 1972; Otway, 1992). This, however, presumes an oversimplified notion of “perception.” It is true that sensory input plays a significant role in perceptions of risk. For example, individuals processing risk communication concerning environmental pollution may rely on personal sensory input to a significant degree. This includes smell, vision, attention to health problems, and attribution of their causes (Horlick-Jones, Sime, & Pidgeon, 2003). However, in addition to sensory input, individuals also utilize their own prior and present experiences, general knowledge, and personal attitudes. In that way, the concept of “risk perception” does not only involve bottom-up processes, but also involves considerable top-down processing. Individuals construe risks based on whatever information is available to them. Their current sensory experiences as well as prior exposure to the hazard both play an important role.

object of systematic study after the risk managing agencies experienced serious difficulties in communicating the “safety” of particular technologies to the members of hosting communities (Slovic, 1986).

I will begin with an introduction of expert versus non-expert definitions of risk and will briefly review factors that impact non-expert perceptions of risk on individual level, community level, and societal level. My review of these “background” factors will be followed by a discussion of the dynamic processes that take place in the course of communication of risks between risk managing agencies and whole communities. These interactional factors will be addressed using findings from the persuasion literature, hazard/risk communication literature, mass communication literature, and risk amplification theory. The goal of this review is to illustrate a complex interaction of various levels of social structure in shaping perceptions of risk of individual members of community in response to public communication. Thus, having begun previous chapters with analysis of safety assurances in interpersonal settings, the present chapter will place the provision of safety assurances in larger institutional and societal contexts.

Defining risk

Various fields that deal with potential hazards, e.g., engineering, epidemiology, economics, all developed their own technical approaches to studying risk (e.g., see Renn, 1992 for a full review). Across these technical approaches, in general terms, *risk* is defined as a *probability* that a particular hazardous process or activity will result in a harmful outcome over the specified period of time (Kasperson & Pijawka, 1983).¹⁴ Some

¹⁴ *Hazard* is an entity or a process that poses a threat to humans and what they value, e.g., life, resources, well-being, environment, and other (Hohenemser, Kates, & Slovic, 1983). Hazards can be natural, e.g.,

researchers also proposed to include into this measurement the *magnitude* of consequences in addition to the probability itself (e.g., Starr, Rudman & Whipple, 1976).

If technical approaches to risk tend to operate under assumptions of measuring ‘objectively’ real hazardous forces in the outer world, social sciences approached risk as a social construction, as a way for human beings to cope with real life dangers and uncertainties. Social scientists acknowledge that risk is subjectively defined and is a function of specific cultural beliefs about the nature of reality and its workings (Douglas & Wildavsky, 1982; Thompson, 1980). From this perspective, it can be argued that even technical calculations of risk are based on value-laden theoretical models and subjective assessments of scientists (Slovic, 1992).

In some studies on risk perceptions, such as psychometric studies by Slovic and colleagues (e.g. Slovic, 2000), the risk itself is intentionally left undefined to allow the participants to base their answers on their own subjective definitions of risk. In other studies, within cultural and anthropological tradition, risk has been conceptualized as a “condition of the mind” that perceives danger (Flint & Luloff, 2005). In the daily language use, as reflected in the dictionaries of English language, the word ‘risk’ is often synonymous with ‘danger.’¹⁵

flood, plague, or technological, e.g., radioactive materials, toxic chemicals. Risk is thus a probability that a hazard will “strike” and bring about adverse outcomes.

¹⁵ According to Webster’s dictionary (Grove, 1962) and the Oxford English Dictionary (Simpson & Weiner, 1986), the word ‘risk’ means “the possibility of loss, injury, disadvantage, or destruction” (Grove, 1961); it can also be a factor or a person that creates exposure to hazard or adverse chance (Simpson & Weiner, 1986). ‘Risk’ is semantically very close to ‘danger’ and ‘hazard’. They can all mean “either the state of being threatened with serious loss or injury or the cause or source of such a threat...” But there are some important differences: “DANGER, the general term, implies the contingent evil <...> HAZARD..., implies danger from something fortuitous or beyond one’s control <...> RISK implies a voluntary placing of oneself in circumstances of doubtful and possibly adverse outcome” (Grove, 1961).

Studying risk perceptions

From these differences in defining risk emerge the differences in assessing risk. Again, the experts, e.g., planners of a power plant or a chemical production facility, focus on objectively measurable harm utilizing statistical records of the past periods, and project the probability of its occurrence in the future (Renn, 1992). The final product of these analyses is usually an assessment of the benefits relative to the possible harm to people and infrastructure that arise from the use of technology or from residing in a region with unstable natural forces. Often, such assessments lead to implementation of safety management procedures and regulations in order to prevent or to deal with possible negative outcomes (Renn, 1992).

On the other hand, the ideas of how *non-experts* assess risks have often been shaped through the prism of expert opinion. Many empirical studies on how non-experts assess risks attempted to elicit the answers from participants along the dimensions set by the technical definition of risk. Specifically the analyses focused on how non-experts handle probabilities, how accurately they conceptualize the nature of the hazard, and how adequately they assess potential magnitude of harmful consequences. As Otway (1992) pointed out, people usually answer questions given on the questionnaire, but it does not usually mean that these questions are relevant to their own conceptualizations of the issue.

Risk perceptions have been differentiated into two levels – individual, i.e. beliefs about own condition and chance harm, and societal, i.e. beliefs about conditions of larger community and its residents in relation to particular risks (Park, Scherer & Glynn, 2001). In their empirical study, Park et al. (2001) identified community involvement as a

significant factor in reducing the differences between perceptions of risk toward self and toward the society. It is important, however, to recognize that some issues are more individual oriented, such as STDs, and some are more community oriented, e.g., environmental impact. In the following sections I will review the key factors that were found to affect perceptions of risk on individual level, community level, and societal level.

Individual characteristics

Individual level variables important for the perceptions of risk can be divided into cognitive and affective factors, involving the patterns in processing of information, and personality factors, involving individual predispositions, concept of self, values and worldviews as related to assessment of risk. Of course, these factors do not operate independently from one another, however, a number of empirical studies have identified their respective significant roles in varying assessments of risk.

Role of cognitive and affective processes in risk perception

Because risk entails uncertainty regarding whether an adverse event will occur or not, it was hypothesized that the way people assess this probability will have a profound effect on their risk perceptions. As part of their research on the dynamics of human judgment, Kahneman and Tversky (1982, 1974) identified a number of so-called “heuristics and biases.” As mentioned in Chapter 2, the authors argued that people, rather than carefully attending to all information available to them, tend to rely on cognitive “shortcuts.” In many situations, heuristics allow people to arrive at fairly accurate judgment with great speed and facility. However, because heuristics tend to be over-applied in situations for which they are not designed, human probability judgment

typically reveals a number of characteristic biases.

The *availability heuristic* was found to play an important role in the assessments of risk. Application of the availability heuristic leads to decisions and perceptions based on the ease to which pertinent memories or thoughts come to mind. That is, to the extent that people only thought about a dangerous event recently (e.g., an airplane crash) they are likely to find it easy to think about the same event again when asked about the dangers of modern life. Because this event comes to mind easily, people are likely to overestimate its actual danger or frequency (Slovic, Fischhoff & Lichtenstein, 1980).

A significant number of empirical studies investigated factors that influence whether people will engage in heuristic processing of information, relying on approximations and shortcuts, or whether they will exert effort in systematic cognitive processing (see Chaiken, 1980; Eagly & Chaiken, 1993 on the heuristic-systematic model; see Petty & Cacioppo, 1981 on the elaboration-likelihood model). Cacioppo and Petty (1982, 1984) argued that there are stable individual differences among people that motivate them to engage in effortful thinking processes, similarly to some people's tendencies to take on physically challenging tasks (see also Cacioppo, Petty & Morris, 1983). The differences in thinking were conceptualized in terms of individuals' *need for cognition* (Cacioppo & Petty, 1982; Cohen, Stotland & Wolfe, 1955). People with high need for cognition were found to systematically engage in and enjoy effortful cognitive endeavors (Cacioppo, Petty & Kao, 1984; Cacioppo, Petty, Kao & Rodriguez, 1986).

Trumbo (1999, 2002) applied the heuristic-systematic model (Eagly & Chaiken, 1993) to the processing of risk information. He found that individuals processing

information heuristically estimated lower risk in response to experimental condition (suspected cancer clusters) compared to individuals who process information systematically (see also Johnson, 2005).

Recent research on the role of intuition in judgment has expanded our understanding of risk perceptions by focusing on the role affect and emotion (Finucane, Alhakami, Slovic & Johnson, 2000; Fischhoff, Gonzalez, Lerner & Small, 2005; Loewenstein, Weber, Hsee & Welch, 2001; Slovic, 1997). Specifically, Finucane et al. (2000) argued that, when determining risk, people often rely on an *affect heuristic*, which resembles other heuristics known to shape probability judgments. According to this notion, people decide about risks based on the affective connotations of risk factors (e.g., possibility of radioactive pollution tends to elicit strong emotional reactions) and the benefits that are expected to flow from a potentially risky activity (e.g., cheaper electricity as a result of having a nuclear power plant in the area). When relying on the affect heuristic, people make decisions about risks based on the balance of positive and negative feelings, and, consequently, favor or reject implementation of particular technologies. Rather than engaging in a thorough evaluation of known facts, people may abbreviate the judgment process and focus on the preponderance of one type of affect.

Loewenstein and associates (2001) focused on the problem of emotional reactions to risk coming into conflict with cognitive assessments of the same risks. Given that affective reactions to stimuli have been shown to be more rapid and primary, affect often overcomes rational thought in motivating actions. Based on an extensive review of empirical evidence, Loewenstein et al. (2001) proposed a model that highlights the role of anticipatory emotions, such as fear, anxiety, and dread, in making the decision under

conditions of uncertainty. Such model, according to the authors, provides an adequate framework for explaining the instances when affective reactions bypass cognitive evaluations in determining behavior. At the social level, this model addresses the situations when emotional reactions of the public significantly diverge from the rationalizations of the experts concerning particular risks.

Emotions do not impact risk perceptions in one direction. Fischhoff et al. (2005) demonstrated that specific negative emotions may have different outcomes for the perceptions of risk. Experimental conditions that induced fear clearly lead to higher perceptions of risk, whereas experimental conditions evoking anger lead to lower levels of perceived risk (see also Lerner & Keltner, 2001).

Apart from the nature of cognitive processing, the important component for this discussion is the content of the cognitions involving risk, such as people's understanding of the dimensions and the nature of a hazard and its potentially negative impact. Several empirical studies have shown that non-experts' knowledge of the nature of a hazard, e.g., indoor radon, toxic chemicals, etc., included significant gaps and misconceptions, which would result in unreliable judgments about risks (e.g., Atman, Bostrom, Fischhoff & Morgan, 1995; Bostrom, Fischhoff & Morgan, 1992; Kraus, Malmfors & Slovic, 1992).

Slovic, Fischhoff and Lichtenstein (1980) conducted a factor analysis of non-experts evaluations of over 90 hazardous activities, objects, and processes and identified several dimensions that participants use to differentiate severity of risks. They found that people often evaluate an object, event or technology based on its *catastrophic potential*, with more sudden and extensive events (e.g., an explosion) leading to greater perceptions of danger than slow, diffuse events (e.g., the continuous release of low-level toxins).

Further, Slovic et al. (1980) discovered that *voluntary acceptance* of a risk factor or one's sense of being able to deal with it lowered people's perception of danger. Also, laypeople often appeared to be guided by *a sense of dread* evoked by potential consequences.

Rather than taking the probability of an adverse event into consideration, people often seem to forget how often something actually happens, e.g., a terrorist attack on an aircraft is extremely rare. Yet, when thinking about the danger of flying, people feared that harm caused by such an event may easily outweigh the fact that its probability is extremely low. Finally, if people are more familiar with an object or event (e.g., alcohol consumption), exhibit a tendency to downplay its danger compared to unfamiliar ones (e.g., radiation). This finding is corroborated by an investigation of adolescents and young adults (Halpern-Felsher, Millstein, Ellen, Adler, Tschann & Biehl, 2001). Those who had personally experienced a natural disaster or engaged in a risky health behavior estimated the likelihood of negative outcomes much *lower* compared to participants without direct experience. In other words, people judge risk based on what they know or have experienced. And given that their knowledge is less complete than knowledge of the experts and is experientially based, it is not surprising that laypeople and experts may come to dramatically different perceptions of risk and danger.

Role of personality characteristics

Personality factors that have a differential effect on assessment of risk include self-esteem, self-efficacy, locus of control, level of anxiety, and individual worldviews, among others. Kallmen (2000) tested a hypothesis that personality differences may significantly affect how personal and general levels of risk are perceived. Specifically, Kallmen proposed that individuals with internal locus of control, low level of anxiety,

and high self-efficacy perceived lower levels of risk, compared to individuals with external locus of control, high level of anxiety, and low self-efficacy. Overall, Kallmen found that the reported higher levels of general anxiety were strongly positively correlated with perceptions of personal risk. There was also a weaker negative association between self-efficacy and the perception of risk. These results by Kallmen can be interpreted as an indication that individuals with higher general anxiety tend to perceive more threat to their well-being. Individuals with high self-efficacy and internal locus of control would appear to be less concerned about risk due to belief in its controllability and the personal capacity to reduce risks.

These findings correlate with the research on the role of self-esteem and engaging in risky health behaviors. Empirical evidence suggests that high self-esteem individuals tend to report lower degree of personal vulnerability to STDs, unplanned pregnancy, or dangers of smoking (Boney-McCoy, Gibbons & Gerrard, 1999; Gibbons & Gerrard, 1995; Smith, Gerrard & Gibbons, 1997; also Bohner, Danner, Siebler & Samson, 2002).

Apart from attitudes to self, there is a body of literature that examined the role of worldviews on risk judgment (Buss, Craik & Dake, 1986; Dake, 1991). Worldviews can be understood as general attitudes or orientations that underlie people's judgments regarding complex issues. Examples of the worldviews include: fatalism, egalitarianism, individualism, and technological enthusiasm. Studies by Dake (1991), Jenkins-Smith (1993), and Peters and Slovic (1996) have found that worldviews are strongly correlated with attitudes to nuclear power. For example, individualist, fatalist, and more hierarchy-oriented persons tended to be pro-nuclear in their orientation, whereas egalitarian persons tended to be anti-nuclear. Attitudes toward nuclear power were significant predictors of

perceptions of risk from nuclear industry and the endorsing of the construction of nuclear power plant in one's community. Egalitarian persons in general may view the risks as embedded in the intrinsically unfair power processes, where the elites control and manipulate enormous resources for personal profit and impose the costs, including the risks, onto communities and populations (Margolis, 1996).

Community-level factors

In the contemporary United States, community is the main site for the formation of social beliefs, formulating the response and carrying out political action in relation to individual and societal risks (Fessenden-Raden, Fitchen & Heath, 1987). Importantly, communities may differ in terms of physical characteristics and social characteristics.

Physical characteristics of communities that may influence the perceptions of risks involve geographical boundaries, environmental characteristics, such as presence or absence of natural resources, and ecological characteristics, such as traditional industries and resources that community utilized for its survival. Natural resource-based communities are particularly vulnerable to risks in that they attract technological intervention and therefore are prone to destructive environmental and societal processes (Flint & Luloff, 2005). Moreover, what used to be viewed as mainstay industries in traditional communities, e.g., logging, fishing, dairy farming, have recently acquired stigma as a main cause of a harmful environmental impact (Gregory & Satterfield, 2002).

Social characteristics of communities may include self-identity, degree of diversity and social cohesiveness, and the prevalent attitudes to local government, federal agencies, and private companies, especially those who are presumed to be polluters (Fessenden-Raden et al., 1987). Within communities themselves, there may be internal

differences in perceptions of risk. These may be based on prior affiliations and antagonisms among smaller groups and their value orientations, such as growth vs. open space, acceptable degree of contamination etc. (Fessenden-Raden et al., 1987).

Sociological research has examined multiple cases of community mobilization in response to environmental contamination and other crises (e.g. Couch & Kroll-Smith, 1985; Freudenburg & Jones, 1991; Erikson, 1994; Freudenburg, 1997). There is also a growing body of research that addresses consensual community response, or citizen inaction in the face of chronic technological disaster (e.g., Gunter, Aronoff & Joel, 1999; Zavestoski, Mignano, Agnello, Darroch, & Abrams, 2002).

Most of the community level factors manifest themselves in the process of communication and processing of risk information, which usually takes place at the level between a risk managing agency and community at large. These interactional factors and their outcomes will be considered later in the chapter.

Societal-level factors

The major contribution of the analyses of societal-level factors role in perceptions of risk was the unveiling of social stratification and power relationships that significantly influence the social processing of risk. Risks can be differentially distributed based on sex, race / ethnicity, and socioeconomic status.

Numerous studies have documented significant sex differences in risk perception (see Slovic, 1997). Men have been consistently found to perceive a smaller degree of risk compared to women (Brody, 1984; Sjöberg & Drottz-Sjöberg, 1993). A number of hypotheses have been advanced to explain this difference. Biological explanations draw attention to higher physical vulnerability of women to violence, which could make them

more receptive to other risks (Baumer, 1978; Riger, Gordon & LeBailly, 1978).

Socialization explanations are based on the fact that traditional gender roles cast women as nurturers and givers of life, which should increase their sensitivity toward issues of health and safety (Steger & Witte, 1989). Contrary to initial suggestions of a lack of familiarity with science and technology among women, empirical studies showed that, even in scientific occupations, female physical scientists rated the risks from nuclear facilities higher than male physical scientists (Barke, Jenkins-Smith & Slovic, 1997).

Apart from sex, significant differences in risk perceptions have been found in relation to race and socioeconomic status. Flynn, Slovic, and Mertz (1994) showed that in the U.S., whites reported lower risk perceptions compared to African Americans and Hispanics. Among white males, the subgroup with the lower risk perceptions had higher level of education, of household incomes, and displayed more conservative political views. Importantly, the male-female differences in risk perceptions were not observed among non-white groups. The researchers interpreted the results as an indication that the dominant social group perceives the lowest amount of risk due to its trust in institutions and subscription to authorities as primary decision makers in risk management (supported also by its conservative anti-egalitarian views). This is also the group that ratifies, controls and benefits from most of the technological developments. Importantly, the absence of difference in risk perception between white females and non-white males in the Flynn et al. (1994) study gave priority to sociopolitical explanations over biological ones regarding the sex differences in risk perceptions.

Depending on the nature of risk, race and sex may vary in their outcomes for perceptions of risk. For example, in the Johnson (2002) study of outdoor air pollution, the

differences between males and females were less frequent compared to differences between whites and non-whites. In a study by Satterfield, Mertz and Slovic (2004), white and non-white males offered lower risks ratings regarding motor vehicles compared to white and non-white females (see also Gutteling & Wiegman, 1993; Mohai & Bryand, 1998; Jones, 1998).

Satterfield et al. (2004) further developed an explanatory framework on the differential role of sex and race in perceptions of risk by examining the subjective experience of *vulnerability* to environmental injustice, and economic and physical discrimination. In their empirical study, Satterfield et al. not only replicated the 'white male' effect from Flynn et al. (1994) study, but also established that the highest risk perceptions were characteristic of non-white females. Interestingly, among the white males, those who scored high on perceived vulnerability and environmental injustice were similar in their risk evaluations to non-white males and females.

Individual level factors, community level factors, and societal level factors jointly create a background context in which risk managers attempt to communicate risk information to general public. The following sections will address interactional factors that influence perceptions of risk in the course of risk communication. First, some of these factors will be illuminated by the literature of persuasive communication. This will be followed by a review of some of the relational factors, such as trust, on interpersonal, community, and societal level. Finally, I will review some of the mass media processes that have been examined in relation to perceived risk.

Risk communication and persuasion

Providing safety assurances can be conceptualized as an instance of persuasive communication. Specifically, the speaker providing safety assurances tries to persuade the audience in the absence of risks and thus decrease their risks perceptions. Research literature in persuasive communication identified several key factors that play a role in the success of such communication. These include characteristics of the source of the message, characteristics of the recipient, and the characteristics of the message itself. The sections that follow will address these more in detail.

Characteristics of the source

The socio-demographic characteristics of a figure to which the message is attributed – age, socioeconomic status, sex, and ethnicity – all play a role in persuasiveness of communication (McGuire, 1989). Individuals of older age, higher socioeconomic status, of male sex, and those belonging to an ethnic majority are perceived as more persuasive compared to individuals of younger age, lower socioeconomic status, female sex, and belonging to an ethnic minority.

Higher order factors that influence persuasiveness of communication, and that can be considered to some extent as a function of demographic factors, are credibility, attractiveness, and power (e.g., DeBono & Harnish, 1988; McGuire, 1989). Credibility is an aggregate characteristic which involves such dimensions as expertise (i.e. presumed accurate knowledge of the subject matter) and trustworthiness (i.e. predisposition to provide reliable information, to tell the truth). Attractiveness is understood as the ability of the speaker to arouse interest and engage the receiving audience. Finally, power is understood as a control over the rewards and punishment (Kelman, 1958).

What are the mechanisms that link these speaker characteristics to persuasion effects? According to Kelman (1958), credibility of a message leads to persuasion through the process of internalization, which involves integration of the message by the receiver into her/his cognitive system. Attractiveness leads to persuasion through identification, i.e. through perceived or desired similarity with the source or the sense of bond with the source. Power leads to persuasion through the receiver's compliance, or the recognition of source's control over punishments and rewards.¹⁶

Tumbo and McComas (2003) proposed that the formation of risk perceptions in relation to perceived credibility was mediated by the way that recipients processed risk information. The Tumbo and McComas (2003) proposal was based on extensive literature on the role of processing strategies in assessing persuasive message that were addressed earlier in the chapter (Chaiken, 1987; Eagly & Chaiken, 1984; Petty & Cacioppo, 1986). Empirical studies showed that source characteristics and message characteristics enter a complex relationship in determining which processing strategy is employed (Chaiken, 1980; Petty et al., 1990, Petty, Cacioppo & Goldman, 1981) (more on this below).

It has been suggested that credibility can be viewed as "interpersonal trust," which is a function of the particular characteristics of the source of the message. This should be distinguished from "social trust," which refers to the complex social processes involving assignment of management responsibilities assigned to groups and organizations (Earle & Cvetkovitch, 1995). In the field of risk communication, federal

¹⁶ According to more recent studies, processes of internalization, identification, or compliance are not the only mechanisms that facilitate the contribution of credibility, attraction and power to persuasive effect (see Petty & Wegener, 1998)

and state agencies and industry sources were found to be perceived as less credible among individuals and communities, compared to physicians, friends, and environmental groups (Fessenden-Raden, Fitchen & Heath, 1987; Frewer, Howard, Hedderley & Shepherd, 1996; Slovic, Flynn & Layman, 1991).

Characteristics of the recipients of the communication

Apart from the speaker, the outcomes of persuasive communication are also contingent on the characteristics of the receiving party. These involve socio-demographic characteristics on the one hand, such as age, sex, and individual personality variables and cognitive characteristics on the other, e.g., level of self-esteem, degree of self-monitoring, need for cognition, personal experience with the attitude object, and other.

With regards to age, the literature suggests that older individuals are less susceptible to influence in their beliefs and attitudes than younger individuals. One of the factors proposed to account for that was the higher level of general knowledge of the issues (e.g., Herzog, 1979; Tyler & Schuller, 1991). With regards to sex of the recipients, women have been found to be more susceptible to persuasive influence than men (Eagly & Wood, 1982). This was partially attributed to women's socialization into behavioral norms that are harmony seeking and socially accommodating.

High self-esteem individuals are more established in their beliefs and practices and, consequently, are less prone to be susceptible to persuasion than low-esteem individuals when the information is not consistent with their perceptions and opinions (Cohen, 1959; Gollob & Dittes, 1965; Nisbett & Gordon, 1967). Differences in self-esteem have the parallel effects to differences in self-monitoring. Degree of self-monitoring refers to the degree to which individuals are concerned with social desirability

and appropriateness of their beliefs and attitudes in particular social circumstances. If high self-monitoring individuals are more susceptible to persuasion, especially by an attractive or powerful source, the individuals with low self-monitoring typically make their behavioral choices in accordance with their own values and feelings, and are therefore less susceptible to persuasion (Snyder, 1987; Snyder & DeBono, 1987).

The construct of the need for cognition was developed as an extension of the elaboration-likelihood model (Petty & Cacioppo, 1986) of processing information, which has strong parallels with heuristic-systematic model (Chaiken, Liberman & Eagly, 1989). Central route of information processing in the ELM corresponds to systematic route in HSM, and peripheral route in ELM corresponds to the heuristic route in HSM. Empirical evidence suggests that individuals with high need for cognition are more persuaded by the qualities of the argument, whereas individuals with low need for cognition are more persuaded by the attractiveness of the speaker (Haugtvedt, Petty & Cacioppo, 1986).

Characteristics of the message

The characteristics of the message itself may also play a significant role, very often moderating the route to persuasion. Degree of personal relevance of the message, i.e. the content of the message that facilitates higher degree of personal involvement, and the degree of threat or fear-arousing content have received extensive treatment in persuasion literature (Chaiken, 1980, 1987; Petty et al., 1981; Pallak, 1983; de Hoog et al., 2007).

When degree of personal involvement in the subject of persuasive message is low, individuals tend to process information through a peripheral / heuristic route and rely on characteristics of the source, such as expertise and attractiveness, regardless of the quality

of the presented argument (Chaiken, 1980). When the subject matter is more personally relevant, individuals tend to engage in central route / systematic processing and focus on the quality of the argument, paying less attention to who presented it (Petty et al., 1981).

Warnings that elicit fear have been found to increase people's vulnerability to risks and make them adapt their behavior to reduce the perceived risks. This phenomenon received a wide application in health behavior campaigns (Hale & Dillard, 1995; Schneider et al., 2001; Sturges & Rogers, 1996). An important finding by Lench and Levine (2005) was that the higher the feeling of fear that was induced in the subjects the lower was their perceived level of control over the risks.

Contextual factors play an important role in the interpretation of the meaning of the message. The following section will address some of these contextual factors in which communication takes place, such as the nature of the relationship between interactants and environmental factors

Context of risk communication

Risk communication is commonly understood among the experts as "communication intended to supply laypeople with information they need to make informed, independent judgments about risks to health, safety, and the environment" (Morgan, Fischhoff, Bostrom & Atman, 2002, p.4). However, the National Research Council of the United States defined risk communication in less unidirectional fashion, as an interactive process of exchange of information and opinion among individuals, groups, and institutions. It involves multiple messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions, reaction to risk messages or to legal and institutional arrangements to risk management. (National Research Council, 1989, p. 21).

Risk communication can take place on two primary levels – individual level and community level. Risk communication targeted at an individual often has to do with providing options for personal choices concerning consumer products, health issues, or what to do in case of disaster (Kikkawa, 2003). Risk communication at the community level usually takes the form of public debate and has a goal of reaching the consensus between risk managing agencies and local communities concerning acceptability of risks toward public health, environment, and other resources (see Fischhoff, Slovic, Lichtenstein et al., 1978).

Given that individual level factors have been examined in detail in preceding sections, in the remaining part of the chapter the discussion will focus on the risk communication at a community and societal level.

Historically, the relationship between participants in risk communication has been antagonistic. The Right to Know movement emerged in the course of 1970-1980s in response to unethical practices of the industrial sector, whereby the health of employees and environment have been seriously compromised in pursuit of increased profits (e.g., Burns & Lynch, 2004). The movement culminated in the adoption of the “Right to Know” laws, such as Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA a.k.a. “Superfund”), and Emergency Planning and Community Right to Know Act (EPCRA, 1986).

Under ERCRA (1986) and other federal laws and regulations, e.g., Clean Air Act of 1970, Occupational Safety and Health Act of 1970, any facilities that handle, store, transport chemical substances in quantities potentially hazardous to the environment and population, have to report on the regular basis to the designated authorities, such as local

supervisory commissions, etc., and make information available to any member of the public, who can request such information through designated authorities. The facilities handling hazardous substances also have an obligation to report any releases of these materials into environment as well as transfers and other waste management activities.

Another outcome of the Right to Know movement was that, in the course of the last 50 years, the approaches in risk communication evolved from educating the public in handling risk probabilities to orienting technical experts toward establishing common ground and involving the public in the decision-making process “as legitimate partners” (e.g. Fischhoff, 1995). Recognition of social and cultural aspects of risk perceptions has become the part of the vocabulary of risk managers and policy makers (Horlick-Jones, Sime & Pidgeon, 2003). Nevertheless, the challenges of bridging the wide disparity between the expert and public perceptions of risk remain topical today. The risk communicators have to overcome distrust of the public and achieve some form of consensus in the light of recurring evidence of the corporate violation of environmental laws on the one hand and fallibility of the experts’ judgment on the other (e.g., Freudenburg, 1992).

Trust

The management and distribution of risks often becomes part of the political discourse, where perceptions of risk as such maybe determined by ideological considerations and political agenda rather than objective evidence. Because this leads to the variable degrees of the distortion of reality, the issue of trust becomes very prominent. According to Cvetkovitch and Lofstedt (2000), the degree to which public trusts risk managing agencies, including government, business, and science, to manage

environmental and technological hazards is the strongest predictor of perceived risk among the public. Growing lack of trust towards authorities became a critical factor that undermined the cooperative communication process regarding the management of risks in the recent decades (e.g., Cvetkovich & Earle, 1992; Flynn & Slovic, 1993; Kasperson, Golding & Tuler, 1992; Smith, Desvousges, Johnson & Fisher, 1990).

Some of the important mechanisms for gaining or losing trust toward a source of information, from the point of view of the public, are: 1) whether the validity of information is later confirmed or proven wrong and 2) whether the source has demonstrated the absence of bias (Frewer et al., 1996). Other researchers suggested that trust is an outcome of perceived competence and fiduciary responsibility (Renn & Levine, 1991), sharing of common values (Earle & Cvetkovitch, 1995), and perceived concern or care for public welfare on the part of an institution (Johnson, 1992; Sandman, Miller, Johnson & Weinstein, 1993). Frewer et al. (1996) found that positive attitude toward the sources of risk information leads to increased trust. Finally, institutions that practice a moderate degree of accountability and transparency to the public are trusted most.

Communication of risks at the level of community and society is often conducted through the mass media. There are important factors that have to be taken into consideration regarding mass media.

Mass media effects

Mazur (1990) proposed that, in mass communications concerning environmental and technological hazards, the intensity and the volume of reporting on a particular issue directly affects the amount of perceived risks from that hazard. Edelman (1988) found

that extensive reporting on waste-disposal site, regardless of the content of the communication, increased fear in adjacent community and created the opposition to its operation. This mass media effect is corroborated by some findings on individual level, when, in one study, the increased amount of technical information on magnetic fields increased perceived level of risk from these fields (Morgan, Slovic et al., 1985). However, in the Johnson (2003) study the amount of technical information in water quality reports did not significantly affect perceived risks.

Tyler (1984) proposed an impersonal impact hypothesis, according to which mass mediated messages affect people's societal risk perceptions, but they do not affect their personal risk perceptions. The latter are usually influenced by communication within social networks, such as family, friends, and neighbors.

Consistent with that, earlier studies in mass communication (see Rogers, 1994 for review), found that the mass media seldom have strong direct effects in changing people's behavior, only with particularly vulnerable groups, such as children. It was argued that, instead, mass media often have indirect effects by attributing particular importance to some news items over the others. In more recent studies (see Rogers 1995; 1998) it was suggested that mass media have strong effect on people's behavior if the presented information stimulates interpersonal communication among consumers of the news, e.g., within a peer group or a family circle. This phenomenon has been termed *intermedia processes* (see also, Hawkins, Wiemann & Pingree, 1988; Readron & Rogers, 1988). The effect of stimulation of interpersonal communication regarding risks could be viewed as one of the driving mechanisms in the processes of *social amplification of risk*

that was proposed in risk communication literature. This framework will be considered in the next section.

Community interaction and social amplification of risk

Interactional factors, such as circumstances of receiving risk information (through random discovery vs. routine checks), promptness of response from authorities, availability of additional information significantly shape the impression of the seriousness of threat at the community-level (Fessenden-Raden et al., 1987). The social construction of risk at the community level can result in what Kaspersen et al. (1988) have called *social amplification of risk*. This framework was developed to explain those societal outcomes in response to risk communication that far exceed the magnitude of risk.¹⁷

According to this model, communication about potential risk or actual disaster is processed by individuals in accordance to their personal mental schemes and representations. Through the discussion in their social groups and the exchange of individual interpretations, people arrive at some form of shared interpretation of the events. These interpretations are then placed in relation to the social group's common concerns, which may mobilize the group to actively respond to the event itself or to the

¹⁷ Three Mile Island accident represents a classical example of social amplification of risk with long-term consequences for the country. The accident occurred in 1979 and involved series of human errors that lead to mechanical failure with cooling system of a nuclear reactor, which led to generation of immense heat and release of radioactive substances into environment. The lack of information about the amount of radiation exposure, the confusing and contradictory responses to the events from the utility company, government and mass media, the additional releases of radiation in the process of decontamination, led to the erosion of local residents' trust toward these sources and escalated public fears in the face of absence of reliable information. Slovic (1987) pointed out that two factors: unknown risk and sense of dread evoked by the risk, lead to the massive reaction of the resident population that far exceeded the seriousness of the outcomes. There were no immediate fatalities and few latent cancer fatalities anticipated, however, the public reaction resulted in imposing of enormous costs on nuclear industry through stricter regulations, reduction of nuclear reactor operations, as well as halted the development of nuclear technology and construction of new nuclear power stations.

manner in which it is being handled by authorities. The processes of exchange of information within groups of different caliber, e.g., informal networks, public organizations, or social institutions, facilitate the process of amplification of signals communicated by the events. Signals communicated by a disaster event refer to the new information on the likelihood of similar or worse adverse events happening in the future (Slovic, Lichtenstein & Fischhoff, 1984).

Individuals' personal beliefs and values and their values and norms as members of social groups or institutions play a crucial role in the selective processing of the signals and interpretations that get socially formulated by members of a group. Interpretations of signals inconsistent with previous beliefs are ignored, while the signals confirming prior convictions are intensified. Consequently, larger social units, such as cultural groups and institutions, have been termed "social stations of amplification" (Kasperson, 1992) due to their structural role in processing and exchange of information.

Initial processing of information and behavioral reaction can generate secondary effects that include psychological, behavioral, economical, social, and political changes that may have significant consequences for a wider range of population, including the country as a whole. Psychological changes consist of reassessment of probability of risk, change of attitudes to specific technologies, physical environment, risk management authorities, etc. Behavioral changes include display of stress, increased political activity, protesting and rioting, or, on the contrary, social apathy. Economical changes include the reaction of market prices to instability caused by disruption of industries, hence the rise of gas prices, decline in sales, property values, rise of insurance costs, stigmatization of the region where disaster occurred, etc. Political changes may include legal and practical

changes in monitoring, regulation and management of risks, with consequences for the development of particular technologies; the reorganization of governing authorities, and implementation of programs aimed at regaining public trust.

These secondary effects may initiate a new loop of processing of information by social groups and processes of amplification that would produce third-order effects, encompassing even larger groups of population and even future generations. Thus, the effects of adverse events spread from victims to risk managing agencies to larger groups of population and higher institutions. The processes of risk amplification may bring about positive changes in risk reduction and increase the toleration of this risk by the society, while risk attenuation may hinder any of such changes (see Kasperson & Kasperson, 2005). Thus, when risk communication takes place at a community or societal level, perceived level of trust, mass media effects, and social amplification of risk processes significantly impact how the safety information will be interpreted.

Summary and integration for the study

I began this chapter by briefly reviewing a variety of approaches to the study of risk. Technical approaches focus on objectively measurable indicators of physical damage to people and resources. Social science approaches look at people's subjective assessments of risks in terms of various dimensions, such as potential for catastrophe, familiarity, and dread.

The second part of the chapter selectively examined some of the individual, community-level, and societal-level factors that may bring about variation in the perceptions of risk. In addition to these contextual factors, I also discussed parameters of the interactional process itself, that traditionally have been examined by persuasion

literature, such as perceptions of the speaker, susceptibility of the audience, and characteristics of the message. Finally, the context of risk communication and features of an institutional setting were outlined as important factors in the outcomes of risk communication.

So far, the discussion focused on the challenges of mitigating disasters or other events where harmful forces posed an imminent threat to community well-being. The current research, however, attempts to bring to light an intrinsic challenge of communicating safe state of affairs to the public without increasing perceptions of risk. I argue that there are structural arrangements in present-day risk communication that may come into conflict with conversational rules and result the higher perceptions of risk.

In practical terms, as an ongoing policy of the United States government, communication of absence of danger (e.g., if operations proceed as normal) becomes mandated to the same degree as the communication of presence of danger (e.g., see Appendix E). If the receiving party is not aware of this mandate, the communication will then flout the conversational maxims, according to which, if no danger is present there is no need to bring it up in a communication. Consequently, assuring the absence of risks in the light of the intrinsically hazardous nature of the materials or processes involved may backfire by heightening the recipient's awareness of the possibility of risks.

Moreover, there are several important features of risk communication that may additionally impede the most effective exchange of information and preclude the verification of the meaning of communication. Specifically, the form of risk communication and features of a setting, e.g. public announcement, press-conference, written notice, TV ads often severely limit the possibility of grounding of the meaning of

communication for the recipients. In this case, the latter have to rely on contextual clues, including the preceding context, situational factors, and personality of the speaker in order to make appropriate inferences (see Chapter 2).

In addition, the participation of the audience in risk communication can vary from ratified, or formally approved (as in case with press-conference or town hall meeting), to non-ratified, as in case of broadcasts of specialized committee meetings (e.g., on C-SPAN TV channel). In the latter case, the audience essentially gains the same status as overhearers, whose participation in the interaction is not accommodated, i.e., by definition, interactants will not wait until an overhearer has grasped the meaning before moving on. As a result, the information that the general public may receive can be fragmented, incomplete, and uncoordinated. With incomplete information and limited opportunities for grounding, drawing of inferences acquires additional importance.

The features of the institutional setting impose a number of constraints on the successful communication process. The institutional rules may pose external constraints on the speaker's output in ways that may significantly impact the speaker's ability to follow conversational rules. For example, the content and amount of communication can be a subject of institutional protocol, time and budget constraints, as well as political considerations imposed onto the speaker. The speaker may be not just speaking on her own behalf, but be delegated to represent somebody else's position or present somebody else's information (so called "principal" versus "animator" in Goffman, 1974). It follows that only limited intentionality on the part of the speaker can be presumed as the speaker does not get to choose her own message.

The institutional context may also reinforce unequal status between the sources of risk communication and its recipients, as traditionally has been the case between risk experts and non-experts (e.g., Morgan et al., 2002). Together these factors can put into question the assumption of the cooperativeness of the speaker in the context of risk communication. On the other hand, the conversational rules serve as the foundation for the inference making regarding the intentions of the speaker behind providing safety assurances. In this context where intentionality and cooperativeness of the speaker is uncertain, perceptions of the speaker credibility and trustworthiness gain additional significance.

A significant body of official regulations represents a driving force for the majority of risk communication. An important aspect of the current investigation is that it attempts to approach risk communication from the ideal angle of successful compliance with environmental and other risk regulations on the one hand and with the community's right-to-know on the other. If all regulations have been complied with and no incidents necessitated the provision of hazardous substance information, will it be possible to communicate that to the public without increasing their perceptions of risk?

In the four chapters that follow, I will report a series of empirical studies that will examine the dynamic of risk perceptions in reaction to safety assurances and see whether the conversational rules framework can offer some insights into observed outcomes.

CHAPTER IV

THE EFFECTS OF SAFETY ASSURANCES

The previous chapters examined some of the factors that influence hearer's or reader's response to safety assurances. I reviewed pragmatic rules that guide usual conversational exchange and looked at empirical evidence for making of inferences on the basis of the conversational rules. Also, I reviewed possible individual variations in risk perceptions at individual, community, and societal levels.

In this chapter, I would like to introduce an empirical research program that examined the operation of safety assurances in a context of public communication. This research program had 3 objectives: 1) to provide empirical evidence for the claim that safety assurances can result in higher perceptions of risk; 2) to provide empirical evidence for the role of conversational factors in facilitating this effect; specifically, the role of conversational implicature and the role of common ground; and 3) to examine some operational conditions for the successful assurance of safety¹⁸.

On the choice of design and selection of variables

Many psychometric studies have assessed relative ratings of hypothetical risks and their categorizations on attributes suggested by investigators (e.g., Slovic 2000). Such studies did not incorporate contextual and interactional factors which, as literature shows, significantly influence perceptions of risk as a result of risk communication. According to Sandman et al. (1993), most research on risk perceptions has not been experimental for logistical and ethical reasons. On the one hand, to systematically vary

¹⁸ Cf. Austin's (1962) felicity conditions and Searle's (1969) necessary conditions for successful speech acts.

people's exposure to hazards by a single attribute in order to measure their risk perceptions would be unacceptable. On the other hand, real-life situations seldom provide systematic exposure to risks among comparable groups.

In their study of communication between agencies and members of community, Sandman et al. (1993) proposed simulation scenarios as a suitable solution, where reporting different behaviors of risk managing agency within a hypothetical news story would elicit possible variation in risk judgment among the participants. Applying this notion to the current research objective, provision of safety assurance was treated as a communicative behavior of the risk managing agency, specifically, as a speech act aiming to produce low perceptions of risk. The effects of speaker's engaging or not engaging in this speech act were then measured on various perceptions of risk among the participants. To make the participants include themselves into the target audience to which safety assurances were directed, it was necessary to provide a realistic scenario based on local events that would be relevant to the interests of all residents of local community.

Thus, all four studies utilized an experimental design, where the experimental groups were given a realistic scenario and were compared on the degree of perceived risks from an event as a result of receiving or not receiving a safety assurance. For the purposes of empirical investigation using experimental design, the multitude of factors involved in the formation of risk perceptions in response to risk/safety communication, which were reviewed in the previous chapter, necessarily had to be reduced to a bare minimum that would make experimental manipulation feasible. I had to make an assumption that most of independent factors were constant across conditions, except the

experimental manipulation (presence or absence of safety assurance). I also had to focus on measuring only key outcomes (perceptions of risk) and selected interactional components (perceived trust and credibility of the source of safety assurances).

In measuring perceptions of risk, it was important to tap into various dimensions of risk, characteristic of non-expert conceptualizations of risk. Based on the reviewed literature, it was important to tap into the participants' assessments of risks both towards self and toward the community. In addition, it was necessary to measure possible alternative factors that could also be responsible for the observed results. Apart from major demographic factors, such as sex and age of the participants, I decided to introduce additional moderator variables, but sparingly, one by one, to explore their possible role in risk perceptions vis-à-vis the experimental manipulation. The priority in this research was given to factors from the domain of cognitive processes, such as need for cognition, background knowledge, etc.

Thus, the research program involved four separate studies. Study 1 established that safety assurances can lead to higher risk perceptions and this result was replicated in Study 3 and 4. Study 2 explored the role of speaker expertise and common ground in the production of this effect. Study 3 and 4 examined whether the unintended effect of safety assurances can be eliminated if conditions were created when safety assurances were expected to be given in response to a raised safety concern. Study 3 tested a hypothesis whether expressing a safety concern first and then giving a warranted safety assurance leads to lower perceptions of risk. Study 4 tested a hypothesis whether introducing a safety concern in one domain and giving a safety assurance in another domain results in lower perceptions of risk.

Study 1: The unintended effects of safety assurances

The goal of Study 1 was to establish the existence of the supposed safety assurances effect. The hypothesis to be tested was formulated as follows:

Hypothesis 1: Providing safety assurance will lead to higher perceptions of risk compared to when no safety assurances have been provided. (Safety assurance and risk perceptions concern the same subject).

When a hearer receives a safety assurance about an unfamiliar object or an object that is presumed to be safe and assumes that the speaker is cooperative, then the hearer has to infer that the cooperative speaker knows more about possible risks in this domain. Consequently, the hearer should revise his notions of possible risks in the domain accordingly. The heightened awareness of possibility of risks, as a result, should manifest itself in higher risk ratings compared to when no safety assurances are provided.

Study 1 utilized a scenario in which research participants received descriptions of a future event, some containing safety assurances and some not. Then, participants were asked to assess the perceived risks associated with the described event. Safety assurances were presented in two different forms to examine possible variation in effects on risk perceptions.

Method

Design

The study utilized an experimental between-groups design with 3 conditions: no assurance condition (base-line against which to examine effect), absolute assurance condition, and qualified assurance condition. Experimental conditions were created by presenting participants with one of the three versions of a scenario.

Participants

Participants in Study 1 were a convenience sample of 141 undergraduate and graduate students at the University of Nevada, Reno.¹⁹ They included 82 women and 59 men, which constituted 58.2 and 41.8 percent respectively. Their mean age was 25.86 years ($SD = 7.18$). In terms of racial/ethnic identification (participants could check multiple categories), 76 percent marked Caucasian, 9.2 percent – Hispanic, 7.1 percent – Asian American, 3.5 percent – Pacific Islander, 2.1 – African American, 2.1 – Native American. There were 49 participants in the base-line condition, 47 in the absolute safety assurance condition, and 45 in the qualified safety assurance condition.

Participants were recruited during regular class sessions in sociology, health ecology, and political science, following the permission of instructors in these classes. Students were asked for 10 minutes of their time. No extra credit or other rewards were given for taking part in the study. Students' agreement to participate in the study was an indicator of their consent.

Development of the instrument and pre-tests

The topic chosen for the scenario had to be as little known as possible to the general population so that prior attitudes did not influence the nature of the responses. After considerable search, I chose the topic of mining wastes. Unlike nuclear wastes, medications, fast food, air quality, water quality, and many other topics, mining wastes seldom entered general public discourse. At the same time, mining had been one of the major industries in Nevada and provided a realistic context for risk assessments.

¹⁹ Due to the importance of geographical location of the participants to their degree of involvement in risk assessment for the community in the scenarios it was necessary to ensure that all participants were attending the University of Nevada, Reno.

Given the environmental impact of mining on large geographical areas, communication of safety assurances had to take place at the level of community. Specifically, an agency was going to address involved communities at large and provide safety assurances about the mining wastes to the members of these communities. This form of public communication provided an opportunity to examine risk perceptions both on individual level (risks toward self) and societal level (risks toward community).

Following real-life examples of safety information (e.g., see Appendix E) the scenario had to contain a sufficient degree of uncertainty or ambiguity in safety reports that would suggest potential for risks under other circumstances (see Jaeger, Renn, Rosa & Webler, 2001, Slovic, Kunreuther & White, 2000 on risk judgments and uncertainty). In the scenario of transportation of mining wastes through populated communities, such uncertainty was created by mentioning the safety rating of railcars on a (fictitious) Federal Hazard Scale. A small pre-test ($N = 29$) showed that not including such rating completely eliminates any unintended effects of safety assurances.

Finally, the scenario had to contain not only a reference to a potential hazard, but also a degree of benefit. With mining wastes, the potential benefits were introduced by framing the whole event as part of environmental effort – to clean up the environment and recycle contaminated mining wastes previously discarded as unusable.

In its final form, Study 1 provided the participant with a transcript of a press conference that discussed the prospective transportation of mining wastes from a mining site in Northern Nevada through Reno, NV to a processing plant in California. The mining wastes were said to contain a high level of heavy metals and were transported to

be recycled for use in chemical industry as a part of continuous environmental effort of the mining company.²⁰

I hypothesized that providing a safety assurance would lead to higher perceptions of risk from the transportation campaign due to the operation of conversational logic. Because safety of mining transports is not typically discussed in a public discourse, residents of Nevada assume their safety by default. According to my earlier conceptualization, providing a safety assurance regarding mining transports should trigger inferential processes that would lead the reader to believe that the speaker has access to knowledge of risk factors that motivate the speaker to alleviate any fears on the part of the audience. Thus, the reader would infer that his previous assumptions concerning safety of all sorts of train transports passing through Reno are potentially mistaken and that actual risk factors are present. Although he would not know any specifics, he may abandon previously held assumption of the safety of transports and consider the potential for actual danger.

Two pilot pre-tests with selected individuals ($N = 10$, and $N = 29$) constituted a first step in the development of this study. The goals of the pre-tests were to receive initial evidence for the occurrence of the unintended safety assurance effect, to examine the inferential processes that participants go through, and to develop adequate measures that demonstrate the higher risk perceptions in response to safety assurances.

For the first pilot ($N = 10$), I used a convenience sample of students on University of Nevada campus. I had a chance to debrief most of the participants and interview them

²⁰ A note to a reader with expertise in mining: Regardless of the possible technical inaccuracy of the scenario, its main purpose was to present a plausible situation from which risks could be inferred. This approach was based on the notion that risks are socially constructed, even if they may have no objective threat to support them in reality.

about their thought process in the course of completing the questionnaire. The recurring theme in their accounts was “Wait a minute, why are they telling me it’s going to be safe?” This statement indicated that safety assurance triggered a chain of inferences that not everything might be the way the speaker tried to present it. The resulting uncertainty and search for information affected the way the participants perceived the safety of the transportation campaign. Pilot study 2 ($N = 29$) established that element of uncertainty was essential for investigating unintended effects of safety assurances.

Based on these promising insights from pilot studies, Study 1 was designed as an attempt to provide methodologically sound evidence that safety assurances can result in higher perceptions of risk. One of the technical questions that emerged was the format of a safety assurance, that is, what grammatical, semantic, and pragmatic features of a safety assurance had to be included in order to substantiate the claim that the study really tested safety assurances and not something else. For example, one could claim that phrases like “Don’t worry!” and “I assure you that the tailings from mines are free of hazardous contaminants” could both be considered to be safety assurances, based on the context of their use. The latter type of assurance, however, is more semantically complete and less context-dependent, that is, regardless where it is used, the semantic meaning across these contexts remains more or less invariable. To reduce possible variation in interpretation, the following format of a safety assurance was adopted for the four studies: A safety assurance had to include: 1) “[subject] assure(s)” clause, e.g. “I assure that...” or “<Company name> assures that...” 2) the object of assurance, predicated with some characteristic of safety. This solution however still left considerable room for the actual way how safety can be characterized, e.g., “the transports are safe” or “the transports

present no risk to the communities” or in many other possible ways. For the initial exploration of safety assurance, such variation was treated as part of the normal investigation process.

Procedure and materials

The experimenter recruited students at the end of regular class sessions in non-technical fields and introduced the study as an investigation into how people make sense of public announcements in their daily lives. Such partial disclosure was used to avoid biasing the participants’ answers. Students were asked to volunteer 10 minutes of their time to fill out a questionnaire.

After the introduction, the experimenter distributed questionnaires and by doing so, randomly assigned the participants to one of the 3 experimental conditions. The participants had to read a text and answer in writing the questions that followed. Afterwards, participants were debriefed on the purpose of the study and fictitiousness of the scenario.

The core of the scenarios consisted of a transcript of a press conference, given by Chief Executive Officer of a mining corporation to an unspecified audience, regarding a new environmental campaign (see Appendix A). The campaign involved the transportation and recycling of previous discarded mining gravel with the high level of heavy metal contaminants from a mining site near Fallon, NV (a town 60 miles to the East) through Reno, NV to a processing plant near Oakland, CA (210 miles to the West).

The *baseline condition* only described the transportation campaign and contained no assurances. There were two experimental conditions that included safety assurances in addition to the materials of baseline condition. In the first, the *absolute safety assurance*

condition, the speaker, on behalf of a mining company, assured the hearer that the transports were absolutely safe: “The Newforb Mining Corporation assures all concerned citizens of the above counties that these transports will present absolutely no risk to their communities.” The *qualified safety assurance condition* contained assurances in less absolute terms: “The Newforb Mining Corporation assures all concerned citizens of the above counties that it will take all necessary measures to ensure the safety of these transports. As a result, these transports will present absolutely no risk to the communities.”²¹

The former ‘absolute’ type of safety assurance negates any threat potential whereas the latter, a ‘qualified safety assurance’, implicitly acknowledges the existence of threat, which necessitates ‘taking measures’, yet vows to eliminate the risks through proactive intervention on the part of the speaker. Arguably, both kinds of safety assurances can be used for the purpose of the study. While I explored any potential variation between the two types of assurance, I predicted that both assurance conditions would lead to higher levels of perceived harmfulness of the event compared to the no-assurance condition.

Measures

The main independent variable was the experimental condition, that is, presence or absence of safety assurance in the scenario. I also found it necessary to examine potential moderating role of several variables on risk perceptions. Sex had been established in the literature to have a differential effect on risk perceptions. Trust toward the source of risk information was another important factor (I measured perceptions of

²¹ See Appendix A for a complete rendering of the scenario and its experimental conditions.

speaker trustworthiness, honesty, as well as deceptiveness and dishonesty on several items). Finally, participants also completed the short version of the Need for Cognition Scale (Cacioppo, Petty & Kao, 1984), which addressed participants' preference for and degree of enjoyment derived from performing cognitive tasks. Unlike the other two controls, the need for cognition was included merely for exploratory purposes.

All perceptions were measured as a degree of agreement with a number of affirmative statements, such as "the transports are safe" or "the campaign will be harmful to Reno". Participants responded to all items using a 5-point Likert-type scale rating from 1 'strongly disagree' to 5 'strongly agree.'

The first set of dependent variables concerned the perception of danger (to self), harm to Reno, harm to Nevada, as well as perceived benefits to Reno and benefits to Nevada. I also assessed, using two separate items, if respondents thought that the transport would have a positive or negative impact on their lives.

To increase the degree of personal involvement, respondents had to agree or disagree with allowing transports to pass through Washoe County (which encompasses the Reno area), were they in charge. The last item measured perceived catastrophic potential from transportation campaign (e.g., Slovic, 2000).

Importantly, the questionnaire contained a comprehension check to provide some evidence that the participants read the original text to the end and had a chance to be exposed to different experimental conditions. The comprehension check was an open-ended question asking the participants to recall what was said about the safety of the transports, without going back to the press conference transcript. That said, one should

bear in mind that respondents could have easily checked the conference transcript by turning over the page.

Results

Preliminary analyses

Comprehension check. Three coders (the author and two assistants) coded the recall of the press-conference material into ‘acceptable’ and ‘problematic’, based on subjective evaluation whether the participant showed enough evidence of having read the experimental condition text to the end (intercoder reliability = .874). Out of 141 participant, 119 were found ‘acceptable’ and 22 (16%) were found ‘problematic’ either because they did not provide sufficient information or skipped the question altogether. However, after conducting two-way analysis of variance, no significant interaction effects were found between experimental condition and the recall evaluation variable. Based on this finding, I decided to include all participants in the final analyses.

Formation of indices. Items measuring perception of danger (to the self), harm to Reno, harm to Nevada, perceived benefits to Reno and benefits to Nevada were found to substantially correlate (Cronbach’s $\alpha = .74$). I therefore combined them into a perceived harm index by taking an average of scores of danger and harm variables and reversed scores of benefit variables.

Items measuring perception of speaker’s honesty, interest in informing the public, trustworthiness, deceptiveness and dishonesty were found to cohere as well (Cronbach’s $\alpha = .86$). Thus, I combined all five variables into a distrust index, reverse-coding the first three of the variables.

Main analyses

First, the perceived harm index was submitted to a 3 (experimental condition) x 2 (sex) analysis of variance (ANOVA). I found that there were no significant interaction effects for experimental condition and sex, $F(1,135) = 1.20, p = .306$. However, the predicted *main* effect for experimental condition was significant, $F(2,135) = 3.48, p = .034, \eta_p^2 = .05$ (there was no main effect for sex of the respondents, $F(1,135) = 2.34, p = .129$). Using Tukey's HSD to examine differences between the three experimental conditions, I found the only significant pairwise difference between the no-assurance (baseline) condition and qualified assurance condition, $p = .032$.

Because I predicted that the no-assurance condition would result in lower risk estimates than either of the assurance conditions, I used a planned contrast analysis to compare the no-assurance condition to the two safety assurance conditions. This contrast revealed the perceived harm index in the no-assurance condition to be lower than in the combined two conditions with safety assurances, $p = .014$, thus confirming the central prediction of Study 1.

All other ratings of the transport (perceived necessity and safety of transport, willingness to allow transports to pass through local community, catastrophic potential, positive and negative impact on respondent's life) were analyzed using the same 3 (experimental condition) x 2 (sex) ANOVA design. With the exception of a trend for experimental condition to influence perceived catastrophic potential, $F(2,135) = 2.52, p = .084, \eta_p^2 = .04$, and trend for sex differences with regard to the willingness to allow the transport to pass through local county, $F(2,135) = 2.82, p = .096, \eta_p^2 = .02$, none of the effects approached statistical significance, all $F < 2.34, p > .10, \eta_p^2 < .034$. The means for

all variables across 3 experimental conditions are presented in Table 1.

To examine the moderating effect of trust on risk perceptions, first I had to check,

Table 1

Means of dependent variables as a function of experimental condition (Study 1)

	No assurance (A)	Absolute assurance (B)	Qualified assurance (C)	Contrast A vs. (B+C)
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>p-value</i>
<i>Perceptions of transports</i>				
Harm index	2.86 ^a (0.68)	3.10 ^{ab} (0.79)	3.24 ^b (0.74)	.014*
Necessary through Nevada	2.98 (1.16)	2.62 (1.19)	2.89 (1.03)	.30
High catastrophe potential	3.00 (1.15)	3.47 (1.14)	2.96 (1.31)	.43
Transports are safe	3.00 (1.07)	2.72 (1.06)	2.82 (1.07)	.24
Positive impact on my life	2.73 (1.17)	2.57 (1.14)	2.44 (0.92)	.70
Negative impact on my life	3.43 (0.96)	3.43 (1.08)	3.07 (0.99)	.73
Would allow transports pass	3.12 ^a (1.23)	2.60 ^b (1.17)	2.71 ^b (1.08)	.034*
<i>Perceptions of speaker</i>				
Distrust index	2.75 ^a (0.74)	2.85 ^{ab} (0.74)	3.15 ^b (0.84)	.057+
Appeared to pursue agenda	3.71 (1.07)	3.85 (1.01)	3.86 (1.17)	.54
<i>Miscellaneous</i>				
Need for cognition	3.50 (0.77)	3.51 (0.61)	3.53 (0.53)	.53

+ $p < .10$; * $p < .05$

Notes: Cell means in three columns on the left denote to what degree participants agree with statements listed with the item (response scale 1 = strongly disagree to 5= strongly agree). Means with different single superscripts differ at $p < .05$.

whether the perceptions of trust themselves were impacted by the experimental manipulation. If the latter was the case, then trust variables were to be treated as dependent variables, rather than independent moderators of risk perceptions. In other words, if there were systematic differences in perceptions of trust between experimental groups, then presence of safety assurance could be influencing the level of distrust of the speaker, but not the other way around. When using the same 3 (experimental condition) x 2 (sex) ANOVA design to examine the distrust index, I found a main effect for experimental condition, $F(2,132) = 3.23, p = .043, \eta_p^2 = .05$. As with the harm index, the only significant pairwise comparison was between the no-assurance condition and the qualified assurance condition, $p = .038$. Yet a planned contrast analysis showed both assurance conditions to result in somewhat higher levels of distrust than the no-assurance condition, $p = .057$ (see Table 1). Neither experimental condition nor sex had any effect on perception of whether the speaker had an agenda, all $F_s < 1$. The means for trust variables across 3 experimental conditions are also presented in Table 1.

Need for Cognition as a moderator variable

One goal of Study 1 was to examine whether individual differences in Need for Cognition influenced the impact of safety assurances on perceptions. For this purpose I first submitted Need for Cognition to the same 3 x 2 ANOVA design and verified that neither experimental condition nor sex had an appreciable effect, $F < 1$. Subsequently, I performed a median split on this variable and added it as a factor to the above two-way ANOVA design, which was now a 3 (experimental condition) x 2 (sex) x 2 (high vs. low NFC) design. Relying on this design, I repeated an analysis of all dependent variables. NFC did not interact with experimental condition, all $F_s < 1.2$, in all cases except one (see

below).

Significant effects were found for main effects: high NFC were less likely to find transporting mining wastes through Nevada necessary, $F(1,129) = 6.28, p = .013, \eta_p^2 = .05$, and more likely to believe that the speaker pursued his own agenda, $F(1,126) = 5.71, p = .018, \eta_p^2 = .04$. Surprisingly, there was also a significant NFC by condition interaction for perceived negative effect on respondent's life, $F(2,129) = 4.72, p = .01, \eta_p^2 = .07$, revealing that condition effects occurred only for low NFC, but not for high NFC individuals, though this pattern was further qualified by a three-way interaction, $F(2,129) = 4.28, p = .016, \eta_p^2 = .06$.

Discussion

Overall, the results of Study 1 showed that participants who read an announcement of an upcoming transportation campaign involving mining wastes that was concluded by a safety assurance perceived the campaign to be more harmful than the participants who read only the announcement. The significant differences on perceived harm index, combined with the general pattern of differences in risk perceptions between group means provided sufficient evidence to support H1, namely that receiving safety assurances results in higher perceptions of risk compared to when no such assurances are given.

This effect of safety assurance is counterintuitive as typically safety assurances aim to lower perceptions of risk and danger, not to heighten them. However, the findings are consistent with the predictions of the conversational logic framework. Rather than responding primarily to what was explicitly stated, people read “between the lines” or interpreted a risk-relevant communication based on what seemed to be implied.

Informing participants that mining transports would effectively present no threat may have triggered a chain of inferential processes that resulted in higher assessment of harmfulness of these transport compared to when no safety assurances were provided. Because it had to be assumed that the speaker followed the Cooperative Principle, and because respondents had no firm knowledge about the danger emanating from mining transports, the very fact that a safety assurance was provided led them to revise their background knowledge on the safety of transports with mining wastes.

An additional factor that may have heightened the role of conversational logic was that research participants in this study were essentially ‘overhearers’ that were exposed to communication that happened in the past and was addressed to a different audience. Because of this, the study participants were unable to utilize the usual conversational tools available to them in face-to-face interaction, such as grounding, in order to verify the meaning of communication and had to rely on contextual clues to guide their inferences. Consistent with the informative speech act theory, however, the participants could recognize safety assurances and interpret them accordingly, in spite of their role as overhearers.

Interestingly, a qualified safety assurance resulted in higher degree of perceived distrust toward the speaker representing a mining corporation. This could possibly be attributed to the fact that the qualified safety assurance contained an implicit acknowledgment of objective risks, which the mining company then claimed to have under control.

Including the Need for Cognition in analyses did not produce any substantial results. If anything, the individuals with a high Need for Cognition would be expected to

draw *more* inferences and to manifest an unintended effect of safety assurances compared to the individuals with low Need for cognition. However, the opposite results were observed. Further exploration of the role of NFC in risk perceptions was excluded from present research for the time being.

Limitations

Results of this first study have several limitations. The primary limitation is that the qualified safety assurance essentially acknowledged presence of risks by mentioning ‘necessary’ safety measures. It can therefore be argued that the significant differences in risk perceptions may be attributed to this acknowledgment of risks rather than to the assurance of safety itself.

Another limitation has to do with the fact that the study did not take into account the degree of familiarity with the topic of the text nor the students’ major and minor specializations. Both of these factors could have moderated the degree of perceived risk, considering the availability of mining and environmental engineering as courses of study on the university campus where the investigation was conducted.

Returning to the conversational framework, I have assumed that all participants in the survey shared more or less similar common ground with the source of information regarding the subject matter on the survey. This was arguably a plausible assumption given that all participants were students at the local university. However, participants may have varied in their length of tenure as local residents, their degree of attachment to the local community and may have different experiences in matters of environmental protection in the Northern Nevada. Such differences may have affected responses to

safety assurances in the present study. Therefore, the studies that followed included various measures to examine these factors.

CHAPTER V

STUDY 2: THE ROLE OF INTERACTANTS' CHARACTERISTICS IN THE
UNINTENDED EFFECT OF SAFETY ASSURANCES

Study 2 had two objectives: 1) to replicate the unintended safety assurances effect in a different domain, and 2) to explore the role of characteristics of the interactants in risk communication in producing this effect. Regarding the speaker, I was going to test whether a safety assurance provided by a domain expert would result in higher risk perceptions than if the same assurance were provided by a non-expert. Regarding the hearers, I was going to examine the extent to which hearers' response to unwarranted safety assurances would be dependent on the degree of common ground shared with the speaker. In this study, I utilized length of residence in a community as one of the possible ways to operationalize common ground. To facilitate that, the hearers needed to be local community members, the speaker needed to represent local authorities, and the safety communication needed to concern local community-based issues.

My prediction concerning the role of expert status was derived from the empirical evidence that hearers treat *intentional* and *non-intentional* speech differently. This fact has implications for different aspects of communication. For example, if the speech is attributed to intentional source, people pay attention to the order arguments, and ignore this order if the speech was non-intentional, e.g. computer generated (Igou & Bless, 2003; see Chapter 2).

I proposed that hearers respond to the communication of highly technical information in a similar fashion. When information is communicated by a domain expert, the hearer must assume that the speaker fully understands what she is saying. That is,

statements are made intentionally and come with the full guarantee of relevance (Sperber & Wilson, 1995). As a result, the hearer can apply the Cooperative Principle and draw strong inferences.

The situation is somewhat different, however, when the same technical information is communicated by a non-expert. In this case, it is doubtful whether the speaker has the qualifications to fully understand what he or she is saying. Although the person maybe a competent communicator in general, with regard to technical information this may be questioned because the person cannot fully *mean* what he or she is saying. Because the Cooperative Principle cannot be fully applied, the speaker's statements do not lend themselves to any strong inferences.

Apart from the level of expertise, institutional context itself can impose additional constraints on the intentionality of the speaker. Playing the role of an agent or, more literally, a mouthpiece of an organization, a speaker may be limited in the choices of words, the amount of information provided, and the degree of accommodation of the audience in delivering their message. A good example would be the U.S. White House Press Secretary, who has to carefully articulate the official position of the office to the public, while clearly restraining her/himself in the amount of disclosed information. These limitations may impact the audience's perceptions of intentionality of the speaker and the consequent interpretation of the meaning of information.

Applied to safety assurances, I hypothesized that risk perceptions would be higher if safety assurances were given by an expert compared to when they were given by a non-expert. Additionally, the expertise of the speaker had been identified in the literature as a dimension of perceived credibility – one of the key factors of persuasive communication

(see Chapter 3). Safety assurances provided by an expert should therefore be more persuasive and, consequently, lead to higher levels of unintended safety assurances effect.

The hypothesis formulated for Study 2 was based on the original hypothesis from Study 1, but was targeting the moderating role of the speaker in providing safety assurances:

Hypothesis 2a: H1 will hold in a condition where the speaker providing safety assurance is an expert on the subject.

Returning to the conversational framework, it was also important to examine the role of the common ground between the speaker and the audience (Clark, 1996). The availability of the common ground with the source of communication facilitates the types of inferences that hearers can draw about communication from that source.

Clark differentiated between a communal common ground, arising from a membership in a cultural community, and a personal common ground, emerging from people's direct experiences with each other. For the purposes of this study, I focused on the communal common ground and conceptualized it as a function of the length of residency in a local community of Reno/Tahoe. According to Clark (1996), cultural communities are formed around areas of knowledge specific to them. Consequently, I would like to argue that the length of residency in local community is one of the key factors that can influence the amount of knowledge of local issues and their history (see p. 22).

For Study 2, I assumed that short-term residents in Northern Nevada would not have much background knowledge about local issues. So, after receiving a safety assurance, they are likely to draw fewer inferences and take the safety assurance at a face

value. Consequently, they should not manifest significantly different perceptions of risk, compared to when no such assurances are provided.

For long-term residents of Northern Nevada, the outcomes should be very different. Due to their presumed knowledge of local issues and their history they would have the necessary context against which the possibility of risk would become salient. Consequently, I anticipated that long-term residents of Northern Nevada would manifest higher perceptions of risk in response to safety assurances and the effect observed in Study 1 would be replicated.

Therefore, in addition to the Hypothesis 2, I proposed one more, targeting the moderating role of communal common ground based on residency in the unintended effect of safety assurances:

Hypothesis 2b: H1 will hold among long-term community residents compared to short-term community residents.

To provide a different subject matter for Study 2, I used a scenario involving assurances concerning water safety. The scenario drew on actual recent changes in U.S. Environmental Protection Agency (EPA) regulations concerning the allowed maximum contaminant level for arsenic in drinking water in the U.S. In the period from 1942 to 2001, the maximum level had been set at 50 parts per billion (ppb). In October 2001, EPA significantly reduced the permissible amount to 10 ppb. This change required the public water suppliers to improve on their capacity to produce cleaner water with fewer chemicals in it. Several years were given for infrastructural upgrades and the rule became enforceable beginning from January 23, 2006. It was possible to utilize this scenario because the original events did not catch the attention of the general public, as the study

later confirmed. To make the scenario more engaging, the dates of adoption of the new standard and the enforcement deadline were changed to 2005 and 2009 respectively, so that the event would appear as an issue of today and near future.²²

In Study 1, I established that conditions of uncertainty are an important requirement for the investigation of the unintended effects of safety assurances. In Study 2, uncertainty conditions were created by the very fact that the standards for arsenic level in drinking water were going to be changed. Such change carried multiple interpretations. The literal interpretation of change could be that already safe water standards were being improved thanks to newly developed cost effective technologies in water processing. The alternative interpretation, however, would be that under the old standard of 50 ppb, which had been observed since 1942 to the present day, the public was not, in fact, well protected, and that new standard of 10 ppb was meant to remedy the situation. In this case, the change would imply that the public had been drinking unsafe water for 64 years.²³

Method

Design

The study utilized a 4 (experimental groups) x 2 (short-term vs. long-term residency) x 2 (sex) factorial design. The experimental conditions were created by presenting participants with one of the 4 versions of the scenario.

²² Data collection for this study took place in the Fall 2006.

²³ It could be argued that under this interpretation, even if baseline condition did not provide assurances of any kind, the very fact of communication that such change would occur implied taking steps to improve safety, which by itself may have already presented a safety assurance. Acknowledging this possibility, I would like to point out that the study tried to investigate whether provision of explicit safety assurances on the top of the baseline condition would result in higher perceptions of risk.

Participants

Participants in this study were 153 undergraduate students at the University of Nevada, Reno.²⁴ There were 91 female and 62 male participants, which constituted 59 and 41 percent of participants respectively. The overall mean age was 20.16 years ($SD = 3.96$). In terms of racial/ethnic identification (participants could check multiple categories), 86.8 percent marked Caucasian, 7.9 percent – Hispanic, 3.9 percent – Asian American, 1.3 percent – Pacific Islander, 4.6 – African American, 1.3 – Native American. There were 41 participants in the *no assurance* condition, 37 in the *expert statement* condition, 39 participants in the *expert safety assurance* condition, and 36 in the *non-expert safety assurance* condition.

Procedure and materials

The experimenter addressed students in regular classes in liberal arts and social sciences, following the permission instructors in these classes. The study was introduced as an investigation into “how we deal with public information and make decisions based on it.” Such partial disclosure was used to avoid biasing the participants’ answers. Students were asked for 10 minutes of their time. No extra credit or other rewards were given for taking part in the study. Students’ agreement to participate in the study was an indicator of their consent. The experimenter distributed questionnaires and by doing so, randomly assigned the participants to one of the 4 experimental conditions.

The questionnaire first asked the participants to carefully read a short text and then answer a series of questions regarding respondent’s perceptions of the text content. The core of the text consisted of a brief description of arsenic as a chemical element,

²⁴ Study 2 recruited different participants than those who took part in Study 1.

sources of its occurrence in nature, and the official U.S. Environmental Protection Agency (EPA) regulations regarding permissible maximum of arsenic content in drinking water. The uncertainty regarding safety status of arsenic was created by mentioning essential role of arsenic to living organisms and the toxicity of its inorganic forms.²⁵

The remainder of the text contained and introduction of change in arsenic standards, followed by 4 different versions of a scenario. Similar to Study 1, the *baseline condition* described recent changes in arsenic standards, but contained no speaker and no assurances of any kind. In an *expert statement condition*, the expert speaker, the Executive Director of the Department of Safe Drinking Water of the Nevada EPA, James Merton, PhD, stated that Nevada was determined to comply with the new rule by the specified deadline. This condition was included to verify that higher perceptions of risk were not produced simply by the expert statement about implementing change. This statement could be interpreted as an acknowledgment of the existing problem with water safety and that the change was meant to remedy this problem. This would imply that until the new rule had been implemented there was high possibility of risk from arsenic in drinking water.

In the *expert safety assurance condition*, in addition to materials of the baseline condition, the Executive Director of the Department of Safe Drinking Water of the Nevada EPA, James Merton, PhD assured the public that Nevada will comply with the new rule, but that the water in Nevada was safe already at present moment. In the *non-expert safety assurance condition*, identical assurances appeared, but they were attributed

²⁵ See Appendix B for a complete text of the scenarios.

to James Merton, the Chief Information Officer of the Communication's Department of Governor's Office.

Measures

The main independent variable was the experimental condition, i.e., presence or absence of safety assurance. The second independent variable was the type of the speaker, whether he had credentials of an expert or a non-expert. I also found it necessary to examine the potential moderating role of sex of the respondents, and their length of residence in the community where described events were to take place. To measure the length of residence in local community, respondents were asked to indicate how long they lived in Northern Nevada, in years and months. The months were necessary for cases when students just began their studies and did not reside in the area for a full year.

The primary dependent variable was respondent's perceptions of safety of water in Nevada today and in the near future, i.e. when the rule becomes enforceable. Another dependent variable measured respondents' perception of harm vs. benefit of arsenic to humans. The answers were given in response to questions, e.g., "Is the drinking water in Nevada safe today?" on a 6-point Likert-type scale. The answer options were given on a continuum from 1 - *clearly unsafe*, 2- *mostly unsafe*, 3 - *somewhat unsafe*, 4 -*somewhat safe*, 5 - *mostly safe*, and 6 – *clearly safe*. The scales for arsenic question contrasted *harmful* vs. *beneficial*, used with the same qualifiers of *clearly*, *mostly*, and *somewhat*. This type of measurement was a departure from unipolar scales used in Study 1. It provided an opportunity to see if bipolar scales would produce more pronounced results in risk perceptions in response to safety assurances (e.g., see Slovic, 1987).

Another dependent variable assessed respondents' perceived degree of personal exposure to arsenic in drinking water. The rating was given on a 6-point scale from 0 (no risk at all) to 5 (a lot of risk).

A separate set of dependent variables measured the degree of harm or benefit to Reno and Nevada resulting from the implementation of the new rule and the respondent's perception whether the change will have positive or negative impact on respondents' life. To facilitate certain degree of involvement with the issue, respondents were also asked if they would agree with adopting new standard, were they in charge. The responses were given on the same type 6-point Likert-type scale contrasting *harmful vs. beneficial*, *negative vs. positive*, *no vs. yes* all using the same qualifiers.

The questionnaire contained a comprehension check that asked the participants to recall what was said about the sources of arsenic in drinking water. In hindsight, this formulation of the question targeted only the beginning of the text and served as weak evidence that the participants attended to experimental manipulation.

The perceptions of the speaker were assessed for 3 conditions in terms of perceived competence, honesty, and trustworthiness. These perceptions were assessed only in 3 experimental conditions out of 4, i.e., in those where the speaker was mentioned in the opening text.

As a way to evaluate the effectiveness of the materials in the instrument on the one hand and whether it tapped into target audience on the other hand, a separate item measured participants' perception whether the text was intended for people like them. This variable was not grounded in any of the hypotheses and was measured for exploratory purposes.

In the remaining part of the questionnaire, I measured a number of variables identified in the literature in order to test that the outcomes on dependent variables were not significantly influenced by them. These variables included: the degree of familiarity with the topics of arsenic and of water regulations (again, on a continuum from clearly unfamiliar to clearly familiar), and students' major and minor specializations.

Results

Preliminary analyses

Comprehension check. To assess whether respondents adequately comprehended materials of the questionnaire, three coders (the author and two assistants) evaluated the recall of the sources of arsenic in drinking water and coded it into 'acceptable' and 'problematic' (intercoder reliability = .972). Out of 153 participants, 102 were found 'acceptable' and 51 (33.3%) were coded 'problematic.' Among the problematic, the majority, 46 participants, skipped the question altogether, and only 5 did not provide sufficient information. However, after conducting two-way analysis of variance, just like in Study 1, no significant interaction effects were found between experimental condition and the recall evaluation variable, indicating that the outcome of the comprehension check did not qualify the substantive results reported below. Based on this finding, I included all participants in the final analyses.

Formation of indices. The two variables assessing perceived benefit or harm to Reno and benefit or harm to Nevada life were highly correlated ($r = .91$) and were thus collapsed into a single 'benefit' index. Items measuring perception of speaker's competence, honesty, and trustworthiness were found to significantly correlate as well (average inter-item correlation $r = .75$, Cronbach's $\alpha = .90$). I therefore combined the

three speaker perception variables into a 'speaker' index.

Two items that measured respondent's degree of familiarity with the topic of arsenic and with the topic of drinking water regulations were also significantly correlated ($r = .70$). These were combined into 'familiarity' index.

Length of residency. On average, respondents had lived an average of 11.23 years in Northern Nevada (median = 13 years). Examination of the data revealed a bimodal distribution, with the point separating the two distributions falling at about the 50th percentile. Hence, I performed a median split and divided participants in a group of short-term ($M = 3.47$ years) and long-term ($M = 18.89$ years) residents. Again, this variable was used to assess a degree of possible common ground between the speaker in the text and the respondents.

Main analyses

All dependent variables were submitted to a 4 (experimental condition) x 2 (length of residency) x 2 (sex) ANOVA. For perceived safety variables, there were no significant interactions between experimental condition, length of residency and sex, all $F_s < 1.3$. However, there was a significant two-way interaction between sex and the length of residence for the perceived safety of water 3 years in the future, $F(1,122) = 5.87, p = .017, \eta_p^2 = .05$, for the perceived harmfulness of arsenic to humans $F(1,122) = 4.03, p = .047, \eta_p^2 = .03$, and for the perception of personal exposure to arsenic through daily consumption of water, $F(1,122) = 5.21, p = .024, \eta_p^2 = .04$. Further analyses showed, that among long-term residents, women perceived arsenic significantly more harmful than men, $p = .010$. They also showed, that long-term resident women also perceived the water to be less safe in the future, compared to short-term resident women,

Table 2

Perceived benefit from change in arsenic standard as a function of experimental condition and length of residency (Study 2)

	No assurance	Expert statement	Expert safety assurance	Non-Expert safety assurance
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
<i>Length of residency</i>				
Short-term residents	4.90 ^a (0.85)	4.63 ^a (1.01)	5.17 ^a (0.91)	4.67 ^a (0.65)
Long-term residents	4.58 ^a (1.07)	4.96 ^a (1.32)	3.79 ^b (1.37)	4.60 ^a (1.01)

Note: Adjacent means that do not share the same superscript differ at $p < .05$.

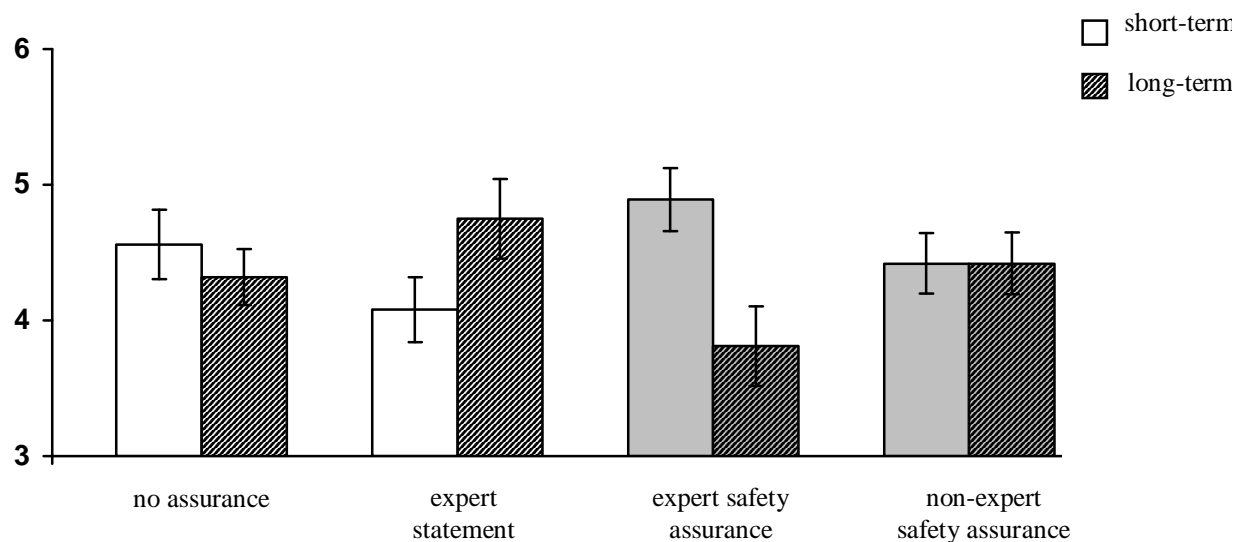
Responses were given on bipolar scale from 1 to 6, where 1 to 3 meant 'clearly/mostly/somewhat harmful', and 4 to 6 meant 'somewhat/mostly/clearly beneficial'.

$p = .015$. Finally, long-term resident men perceived less risk from personal exposure to arsenic in drinking water, compared to short-term resident men, $p = .030$.

Experimental conditions did show a significant interaction with the length of residency for the perceived benefit index $F(3,135) = 3.88$, $p = .011$, $\eta_p^2 = .08$ (see Table 2). Diagnosing this two-way interaction, I determined that for short-term residents, the experimental conditions did not alter perceptions of benefit, $F < 1$, while for long-term residents, they did, $F(3,135) = 3.70$, $p = .013$, $\eta_p^2 = .08$. Pairwise analyses showed that, for long-term residents, hearing a safety assurance about current state of drinking water from an expert produced lower levels of perceived benefit from change than in any of the other experimental conditions, all $p < .022$. The analysis of the main effects did not show any significant differences, except a trend for long-term residents to perceive slightly

Figure 1

Perceived positive impact of arsenic rule change on respondent's life as a function of experimental condition and length of residency (Study 2)

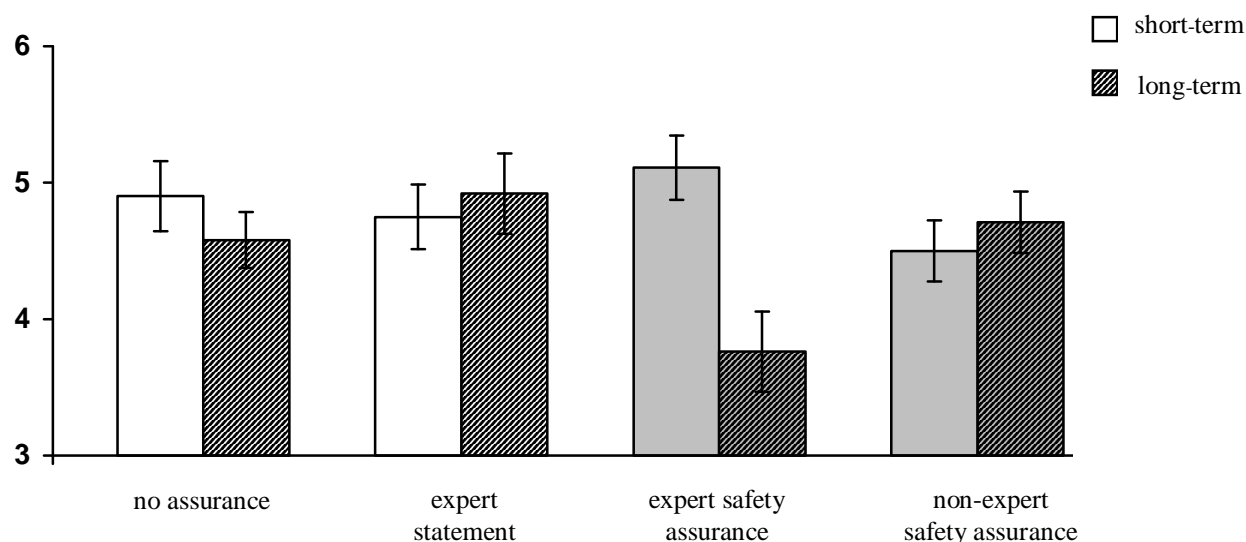


lower levels of benefit ($M = 2.16$, $SD = 0.90$ vs. $M = 2.57$, $SD = 1.23$), $F(1, 135) = 3.62$, $p = .059$, $\eta_p^2 = .03$.

Among other dependent variables submitted to the same three-way ANOVA, there was a significant interaction between experimental condition and the length of residency for the perceived impact on the respondent's life, $F(3, 134) = 3.74$, $p = .013$, $\eta_p^2 = .08$. When diagnosing this interaction, it became clear that, for short-term residents, a safety assurance provided by an expert produced greater perceived positive impact on the respondent's life compared to merely an expert statement ($M = 4.89$, $SD = 0.83$ vs. $M = 4.08$, $SD = 1.14$), $p = .024$. However, among long-term residents, the same comparison was significant in the opposite direction, such that the same expert-issued safety

Figure 2

Willingness to implement arsenic rule change as a function of experimental condition and length of residency (Study 2)



assurance led to lower levels of perceived positive impact on their life compared to the expert statement ($M = 4.75$, $SD = 1.29$ vs. $M = 3.81$, $SD = 1.29$), $p = .018$ (See Figure 1). No other effects emerged.

The same condition by length of residency two-way interaction also emerged for participants' response as to whether they would agree with the adoption of the new standard, if they were in charge, $F(3,135) = 2.81$, $p = .042$, $\eta_p^2 = .06$. Further analyses showed that among long-term residents, those that received a safety assurance from an expert would be less likely to agree to the adoption of the new standard compared to long-term residents in all other conditions, $ps < .04$ (See Figure 2).

Perceptions of speaker

Because the control condition did not involve a speaker, I did not include it in the

analysis. Instead, I used a 3 (conditions with speaker) x 2 (length of residency) design to analyze perceptions of speaker index. No interactions or main effects produced significant differences, all $F_s < 1$. Therefore, it can be concluded that the experimental manipulations did not affect the respondent's perceptions of speaker.

After that I tested whether perceptions of speaker moderated the perceptions of water safety by performing a median split on high and low perception of speaker trustworthiness and running the 4 (experimental condition) x 2 (perception of speaker) ANOVA design. No significant interactions were found, all $F_s < 2.3$.

Miscellaneous variables

First, using a three-way ANOVA design, I examined whether experimental condition had any impact on perceived familiarity with arsenic and drinking water regulations (familiarity index). There were no significant interactions and no significant main effects found, all $F_s < 1.1$. This meant that I could then include the familiarity index as a moderating variable to see whether respondents' reported degree of familiarity with the topic of arsenic and water regulations had any impact on their perceptions of risk from arsenic. After performing a median split of the variable into high and low degree of familiarity, I ran 4 (experimental condition) x 2 (degree of familiarity) ANOVA design. No effects were significant, all $F_s < 1.4$.

Using the same design, I tested the perception whether the text that announced change in water regulations was meant for people like the respondent or not. No interactions or main effects were significant here either, all $F_s < 1.4$.

Discussion

The results of Study 2 showed that experimental manipulation of safety assurances did not significantly impact the perceptions of water safety among the participants. However, the safety assurances did make a difference in that the long-term residents of the community who read an announcement of an upcoming change in water regulations requiring 5-time decrease in maximum level of arsenic in drinking water perceived the change as less beneficial when they received a safety assurance from an expert speaker that water was already safe compared to when they received no safety assurances or they received the same safety assurance from a non-expert. Consistent with that, the long-term residents who received a safety assurance from the expert were also less likely to agree to the adoption of the new standard if they were they in charge.

These results are open to multiple interpretations. On the one hand, there is a similar pattern that emerges in Study 2 as in Study 1. First of all, the experimental manipulation did not produce significant differences on items assessing safety of transports or drinking water in either study. Secondly, the significant differences emerged in the items assessing the attitudes to prospective change, namely that a provision of safety assurance resulted in lower perceived benefit / higher perceived harm of the future event among respondents.

On the other hand, there is an important difference between Study 1 and Study 2 in that the “change” is bringing a potential problem into community in Study 1, while, in Study 2, it removes a potential problem. Moreover, the safety assurance in Study 1 was given concerning the mining transports themselves – the carriers of the potentially harmful mining wastes. The safety assurances in Study 2, however, were given regarding

the safety of water as it was at the time, while also stating the State of Nevada was determined to comply with a new rule. The long-term residents may have been less inclined to see the benefit in implementing new rule and would be less likely to implement it themselves, on the grounds that it would not make much difference to the already safe state of affairs.

The perceived harm from mining transports in Study 1 could involve accidents and environmental pollution that would result in exposure of the local community to toxic elements. The perceived harm from implementing 5-time reduction of arsenic in water could involve unnecessary spending on technological upgrades with minimal return on investment.

There was also, in my opinion – a less likely, possibility that adopting of the new arsenic rule would be an official acknowledgment of current inadequate safety of water, and the long-term residents may have indicated less benefit from implementing the change as an expression of misplaced aversion for the possibility of risk that this change would acknowledge (e.g., see Longeway, 1990 on self-deception).

There were significant sex differences in perceived risk in that among long-term residents, women perceived more risk from arsenic in water than men did. This difference is consistent with sex differences established in research literature, although the role of the length of residency in the community needs to be identified more clearly.

Role of the speaker

The perception of the expertise of the speaker plays an important role in drawing inferences from unwarranted safety assurances. Under the condition where safety assurances regarding drinking water were provided by a biologist with a Ph.D. working

for EPA the perceptions of benefit from change in arsenic rules were the lowest, comparing to the same assurances provided by a Chief Information Officer of the Governor's Office, and even more different when compared to no assurances condition. When the safety assurance was given by a Chief Information Officer from the Governor's office, the long-term residents did not give it as much consideration to the same degree due to the lack of speaker's expertise on the subject.

On the other hand, speakers were generally considered reasonably competent and trustworthy; thus warranting the applicability of conversational logic. Surprisingly, I did not find any variation regarding *perceived competence* between the expert and non-expert speaker conditions. This may partially be attributed to the fact that both speakers were considered as competent in relation to their specific positions, whereas the study intended that the participants assessed their competence in relation to the topic of arsenic in drinking water. In the future, questions have to be formulated in the way that they tap into participants perceptions of each speaker's expertise on the hazardous subject.

The length of residence and the common ground

People who resided in Northern Nevada sufficiently long time (over 13 years) showed significant differences in their assessments of safety of water compared to short-term residents. Among men, long-term residents felt safer about current exposure to arsenic in drinking water, compared to more recent arrivals. These differences illustrate the role of background knowledge in that compared to short-term residents, long-term residents may have had more personal experience to be able to evaluate the validity of safety assurance. More importantly, long-term residents may have perceived more common ground with the representative of local water authority, which contributed to the

persuasion effect. Interestingly, however, among women, long-term residents expected water to be less safe in the future, compared to women who lived in the area for shorter time.²⁶

It may appear puzzling, why the degree of common ground was expected to play differential role in Study 2, while in the Study 1 it was simply assumed to be equally shared across all conditions. The results of Study 2 potentially imply that had the length of residency been measured in Study 1 (which it was not), I would have likely found the majority of research participants to be long-term Nevada residents, but this will remain an untested hypothesis.

Because government officials figured prominently in this study as the sources of information, there may have been additional factors that influenced participants' perceptions of speaker in terms of trustworthiness, competence, and honesty. This may be especially the case with the Chief Information Officer from the Governor's administration can be seen as a political appointee rather than a best qualified professional for his job. Depending on the political affiliation of the participant, which was not measured, the ratings may have been different. The data, however, was collected during the last year of Mr. Kenneth Guinn as the Governor of the State of Nevada, in the period where his approval ratings were $62 \pm 4.1\%$ (www.surveymusa.com).

In Study 1, I tested a general mechanism of inferring higher risk from safety assurances, while assuming that all participants shared the same degree of common ground. In Study 2, I extended the scope of examination to include variations in a speaker

²⁶ A certain limitation of the study was that it did not assess where the short-term residents relocated from and what water issues they may have dealt with in their previous places of residence. This, however, was the acceptable unaccounted variation for the current design of the study.

expertise and varying degree of common ground between the speaker and the participants as factors that facilitate the unintended effect of safety assurances. In the remaining part of the dissertation, I report on two more studies that aimed to replicate the results of Study 1 on the one hand, and, on the other, to examine conditions under which the unwarranted safety assurances effect could be eliminated and safety assurances would, in fact, lead to lower perceptions of risk.

Recall that earlier I have suggested that provision of safety assurances requires a situation that calls for such an assurance. I hypothesized that a crucial feature of such situation is an apparent safety concern among the people that the speaker is then trying to address by providing a safety assurance. Continuing to explore the nature of the unintended assurances effect, observed in Study 1 and 2, Study 3 and 4 were designed to explore the mechanics of this effect by testing if safety assurances can result in lower perceptions of risk when a safety concern is introduced. In Study 3, the safety concern was introduced explicitly within the context of the same discourse. The study 4 tested whether implicit introduction of safety concern in one discourse would make a safety assurance in a different discourse result in lower risk perceptions.

CHAPTER VI

STUDY 3: HOW CAN SAFETY ASSURANCES RESULT IN LOWER RISK
PERCEPTIONS?

In the initial analysis of safety assurances from the perspective of conversational logic (see p. 19), I proposed that assurances regarding the safety of the paper that I gave in the foreword were out of order and, therefore, unexpected. The main objective for Study 3 was finding out whether initially creating conditions where safety assurance is logically expected, and then following it up with safety assurances, would result in lower perceptions of risk. In terms of Searle (1969) this would be a *preparatory condition* for the success of a safety assurance.

What preparatory condition would generate expectations for safety assurance? If the reader recalls the definition of safety assurance adopted for this paper was “an act of making a person certain that he/she is or will be safe from harm.” The provision of safety assurance therefore would presuppose the perception or awareness of possible harm. I decided to use the phrase “safety concern” to refer to this pre-condition. In other words, the recipient of safety assurance has to have a safety concern of sorts that a safety assurance would consequently address and, ideally, neutralize. The purpose of Study 3 was twofold: 1) to replicate the unintended effect of safety assurances from Study 1, and 2) to examine whether provision of safety assurance that follows an expressed safety concern would result in lower perceptions of risk compared to when no safety concern is raised. Thus, in addition to testing Hypothesis 1 (see p. 69) I formulated a new hypothesis to be tested in Study 3:

Hypothesis 3a: H1 will not hold when safety assurances are provided in response to an expressed safety concern.

In daily life, safety concern may already exist among members of the audience as a result of prior events, in which case, when the audience entertains a safety concern, the speaker is required to address it. Providing safety assurance after a safety concern has been raised by the audience is one way to do it. On the other hand, a speaker can anticipate the audience's reactions, and to proactively raise safety concern and "disarm" it by providing a safety assurance. I was therefore interested in exploring if the source of concern, i.e. the speaker or the audience, had any significant impact on the effectiveness of safety assurances in lowering risk perceptions. This was not the matter of central concern; therefore, no separate hypothesis was formulated.

To test Hypothesis 3a, I relied on the same scenario as in Study 1, but with several additions to the text used for experimental manipulation and the list of measured variables. Thus, in the light of findings from Study 2, in order to facilitate more pronounced differences, the safety assurances had to come from an expert speaker. Considering that Study 1 produced significant effects, the CEO of a mining company must have been perceived as having sufficient expertise regarding the subject of assurances. To make the effects more pronounced, the speaker was presented as a Chief Engineer of the mining company. Some versions of the text also included an expression of safety concern either by the speaker or by an audience member.

In addition to testing conditions for proper operation of safety assurances, I had a chance to examine whether addressing possible safety concerns of the public proactively, by bringing them up and then addressing them openly, could result in lower perceptions

of risk, compared to when communication is minimal and no assurances of any kind are given. This interest was driven by the present-day orientation toward transparency and community participation in the risk communication process, which was addressed in the earlier review. This study provided me with an opportunity to examine whether this orientation can receive empirical support as a more effective risk management strategy.

In this study I also attempted to attend to the differences in common ground between the speaker and the audience that may have existed among the participants. In Study 2, I assumed that when the issue involved the change in environmental regulations administered by the local government, the length of a participant's residence in the area could reflect the degree of one's communal common ground with the local authorities. This common ground then could be utilized in the interpretation of the environmental rule change and its implications. In Study 3, however, the scenario involved a mining company that was planning to transport mining wastes through local populated communities. Since there was no local government agencies mentioned in the scenario, and the mining company was unknown (in actuality, it was fictitious), one could argue that the length of residence should not have any effect at all in this study. Nevertheless, given that the risks in Study 3 had to do with potential environmental pollution of the local community and given the important role of mining companies in the economy of Nevada, I included the length of residence as an important factor that would provide some background knowledge on environmental issues facing local community.

Study 3 also tapped into the respondents' background knowledge of the environmental issues by looking at their degree of involvement in local affairs and attitudes to environmental movement. An important caveat was that, higher levels of

involvement in local affairs could lead to different reactions to risk messages concerning local community simply because people with a greater investment in the community would also have greater perceptions of risk overall, through the convergent perceptions of risk toward self and toward the community (see Park et al., 2001). Regardless, whether the degree of involvement of local affairs tapped into background knowledge or increased through internalizing community risks, it was important to measure first whether this factor had any comparable differential influence on reactions to safety assurances. Using common ground theory as a departure point, I anticipated that due to additional background knowledge that allowed for inference making, people with higher degree of involvement in local affairs would perceive higher risks in response to safety assurances. Hence, the following hypothesis was formulated:

Hypothesis 3b: H1 will hold among community residents with a higher degree of community involvement compared to community residents with a lower degree of community involvement.

Given the wider presence of mining companies in rural communities (in Nevada), participants were asked to indicate whether they grew up in rural, suburban, or urban area. This was done in order to account for additional demographic factor that may have influenced the participant's attitudes toward mining companies and their activities.

As I already mentioned, Study 3 utilized the original scenario from Study 1 involving the transportation of mining wastes from Northern Nevada through Reno, NV to a processing plant in California. On the basis of this scenario, *four* separate conditions were created. In addition to baseline no assurance condition, and safety assurance condition, the study included speaker-initiated safety concern + safety assurance condition, and hearer-initiated safety concern + safety assurance condition to test whether

provision of assurances in response to a safety concern raised by a speaker or a safety concern raised by a member of an audience would lead to lower perceptions of risk.

I would like to clarify what kind of differences I expected to see in accordance with my hypotheses. In order for the central Hypothesis 1 to be supported, I expected significantly higher perceptions of risk in safety assurance condition compared to no safety assurance condition. For the Hypothesis 3a to be supported, there should be significantly lower perceptions of risk in two conditions with raised safety concern followed by a safety assurance compared to the safety assurance only condition. Finally, for Hypothesis 3b to be supported, participants in the safety assurance condition with higher degree of community involvement should display higher perceptions of risk.

Method

Design

Study 3 utilized a number of designs, alternating number of experimental conditions, and using sex and either length of residency or degree of community involvement as moderating variables. Testing Hypotheses 1 and 3b required comparing baseline and safety assurance conditions, for which I used two designs. The first design was a 2 (baseline vs. safety assurance experimental condition) x 2 (short-term vs. long-term residency) x 2 (sex) factorial design and the second was 2 (baseline vs. safety assurance experimental condition) x 2 (higher vs. lower degree of community involvement) x 2 (sex) factorial design. Testing Hypothesis 3a involved comparing all experimental conditions. The two designs used were 4 (experimental conditions) x 2 (short-term vs. long-term residency) x 2 (sex) factorial design and a 4 (experimental conditions) x 2 (higher vs. lower degree of community involvement) x 2 (sex) design.

Participants

The participants in Study 3 were a convenience sample of 486 undergraduate and graduate university students at the University of Nevada, Reno. They included 290 women and 196 men, which constituted 59.7 and 40.3 percent of participants respectively. Their mean age was 21.37 years ($SD = 5.57$). In terms of racial/ethnic identification (participants could check multiple categories), 78.2% marked Caucasian, 12.7% – Hispanic/Latino, 6.6% – Asian American, 3.1% – Pacific Islander, 3.3% – African American, 1.5% – Native American. There were 122 participants in no concern – no assurance (base-line) condition, 121 in no concern + safety assurance condition, 126 in speaker-initiated concern + safety assurance condition, and 117 in hearer-initiated concern + safety assurance condition.

Procedure and materials

The experimenter addressed students in regular classes in a variety of liberal arts as well as natural sciences, following the permission of instructors in these classes. The study was introduced as an investigation into “how we deal with public information and make decisions based on it.” Students were asked for 10 minutes of their time. No extra credit or other rewards were given for taking part in the study. Students’ agreement to participate in the study was an indicator of their consent. The experimenter distributed questionnaires and by doing so, randomly assigned the participants to one of the four experimental conditions.

The questionnaire first asked the participants to carefully read a short text and then answer a series of questions regarding respondent’s perceptions of the text content. The core of the text included a transcript of a fictitious press-conference, utilized in Study

1, with slight modifications. In all conditions, the speaker was changed from a CEO to a Chief Engineer to present him as an expert speaker. In *baseline condition* (no concern – no assurance), the transcript included an announcement by the Chief Engineer of a WestOrb mining company to an unspecified audience that described a transportation campaign of mining wastes. In the *no concern + safety assurance condition*, it was supplemented by an absolute safety assurance: “The WestOrb Mining Corporation assures all concerned citizens of the above counties that these transports will present absolutely no risk to their communities.” In the *speaker-initiated concern + safety assurance condition*, the speaker justified the provision of safety assurance as follows: “I imagine there are people out there who are worried when they hear about trains with contaminated mining wastes passing through their communities... However, the WestOrb Mining Corporation assures all concerned citizens of the above counties that these transports will present absolutely no risk to their communities.” In the *hearer-initiated concern + safety assurance condition*, the concern was raised and addressed as follows: “Q: Reno Gazette-Journal²⁷...Can you tell us about the safety of these transports?” – “WestOrb Mining Corporation assures all concerned citizens of the above counties that these transports will present absolutely no risk to their communities.”

Study 3 utilized the safety assurance in the form that was used in ‘absolute safety assurance’ condition in Study 1, even though it did not produce significantly different risk perceptions then, compared to a qualified safety assurance. This was done to further test safety assurance in its basic form, without confounding factors such as ‘necessary safety measures’ used in qualified safety assurance.

²⁷ Reno-Gazette Journal is the actual name of the main periodical in Reno/Tahoe area.

Measures

The main independent variable was the experimental condition, i.e., presence or absence of safety assurance. The second independent variable was presence or absence of expressed safety concern. I also found it necessary to examine possible moderating role of the sex of the respondents, their length of residence in local area, and the degree of respondents' involvement in local affairs.

The length of residence was self-reported and measured in years and month. The degree of involvement in local affairs was measured by the self-reported degree of involvement in the community affairs of the Reno/Tahoe area as well as how often the participants read local newspapers and watched local news. Responses were given on 6-point Likert-type scale with answers ranging from 1 – completely inactive / never to 6 – very active / daily. The move from 5-point Likert scale to 6-point Likert scale was done to avoid the participants' choosing a middle point (neither agree nor disagree).

The primary dependent variables were perceptions of danger (to self), harm to Reno, harm to Nevada, as well as perceived benefits to Reno and benefits to Nevada. On two separate items, respondents also indicated their perceptions of positive or negative impact from mining transports on their lives.

To increase the degree of personal involvement, respondents had to agree or disagree with allowing transports to pass through the local county, if they were in charge. The transportation campaign was also rated in terms of its catastrophic potential.

All perceptions were measured as a degree of agreement with a number of affirmative statements, such as “the transports are safe” or “the campaign will be harmful to Reno.” Participants responded to all items using a 5-point Likert-type scale rating from

1 'strongly disagree' to 5 'strongly agree.'

Additional alternative variables included the degree of familiarity with the topics of mining and the topic heavy metals, measured on 6-point scale, students' major and minor specializations and the natural science courses that they took at UNR, measured through open-ended questions. The questionnaire contained a comprehension check to provide some evidence that the participants actually read the original text to the end and had a chance to be exposed to different experimental conditions. The comprehension check was an open-ended question asking the participants to recall what was said about the route of the transports, without going back to the press conference transcript.

To be consistent with Study 1, an additional set of dependent variables measured respondents' perceptions of the speaker's credibility and motivations. This was done to account for potential moderating variables, such as distrust toward the speaker, that could influence the resulting perceptions of risk. Specifically, respondents had indicate to what degree the speaker appeared to be honest, interested in informing the public, trustworthy, deceptive, dishonest, and pursuing his own agenda. Here also, participants indicated their responses on a 5-point Likert-type scale rating from 1 'strongly disagree' to 5 'strongly agree' in relation to assessments of the speaker.

In addition to variables from Study 1, two new items measured participants' opinions on whether the speaker understands the common people and their concerns and on whether The WestOrb Mining Corporation has the best interest of the public in mind. The two variables were used to measure perceived degree of common ground between the speaker from the mining company and the general public, and the respondents' background attitudes toward a mining company. Because of the placement of the

questions in the questionnaire, answers to the last two variables were given on a 6-point Likert-type scale from 1 – *does not understand / have best interest at all* to 6 – *understand very well / completely has best interest*.

Results

Preliminary analyses

Comprehension check. The recall of the press-conference material were coded into ‘acceptable’ and ‘problematic’, based on subjective evaluation whether the participant showed enough evidence of having read the experimental condition text to the end.²⁸ Out of 486 participants, 411 were found ‘acceptable’ and 75 were coded ‘problematic.’ Out of 75 participants with problematic recall, 47 skipped the question altogether, and 28 did not provide adequate information. Many of the 28 indicated that they did not know the answer or that they did not read the material, and some provided information that was too brief or incorrect.

After conducting two-way analysis of variance, I found that interactions between experimental condition and the recall evaluation variable were approaching statistical significance on the following items: ‘transports are safe’, $F(3, 474) = 2.51, p = .058, \eta_p^2 = .02$, ‘campaign will be harmful’ to Reno $F(3, 474) = 2.54, p = .056, \eta_p^2 = .02$, and ‘speaker appeared to be interested in informing the public about their activities’ $F(3, 467) = 2.62, p = .05, \eta_p^2 = .02$. Based on this finding, I decided to include into further analyses only the participants whose recall was coded as ‘acceptable.’

²⁸ For forty five percent of the questionnaires, recall was coded by 3 coders (the author and 2 assistants, intercoder reliability = .951). The rest of the questionnaires were coded by the author only.

There were 243 female and 168 male participants in the final selection, which constituted 59.1 and 40.9 percent of 411 participants respectively. The mean age for the sample was 23.50 years ($SD = 6.54$). In terms of racial/ethnic identification, 81.4% marked Caucasian, 12.3% – Hispanic/Latino, 5.4% – Asian American, 2.5% – Pacific Islander, 2.5% – African American, 1.5% – Native American, again, several categories could be marked at the same time. There were 104 participants in *no concern – no safety assurance* condition, 98 participants in *no concern + safety assurance* condition, 110 in *speaker-initiated concern + safety assurance* condition, and 99 in *hearer-initiated concern + safety assurance* condition.

Formation of indices. Items measuring perception harm to Reno, harm to Nevada, perceived benefits to Reno and benefits to Nevada were found to substantially correlate (Cronbach's $\alpha = .79$). I therefore combined them into a perceived harm index by taking an average of scores of harm variables and reversed scores of benefit variables.

Items measuring perceptions of safety of transports, degree of willingness to allow the transports to pass through local county, and perception of high potential for catastrophe from the transportation campaign were found to correlate (Cronbach's $\alpha = .78$). I combined three variables into perceived safety index by taking an average of safety and willingness to allow transports to pass through and reversed scores on catastrophic potential.

Items measuring perception of speaker's honesty, interest in informing the public, trustworthiness, deceptiveness and dishonesty were found to cohere as well (Cronbach's $\alpha = .89$). I combined all five variables into a distrust index, reverse-coding the first three of the variables.

Length of residency. Based on participants reporting, they had lived an average of 13.10 years in Northern Nevada / Tahoe area (median = 13.71 years). Examination of the data revealed a bimodal distribution, with the point separating the two distributions falling at about the 50th percentile. I performed a median split and divided participants in a group of short-term residents ($M = 5.14$ years) and long-term residents ($M = 21.05$ years).

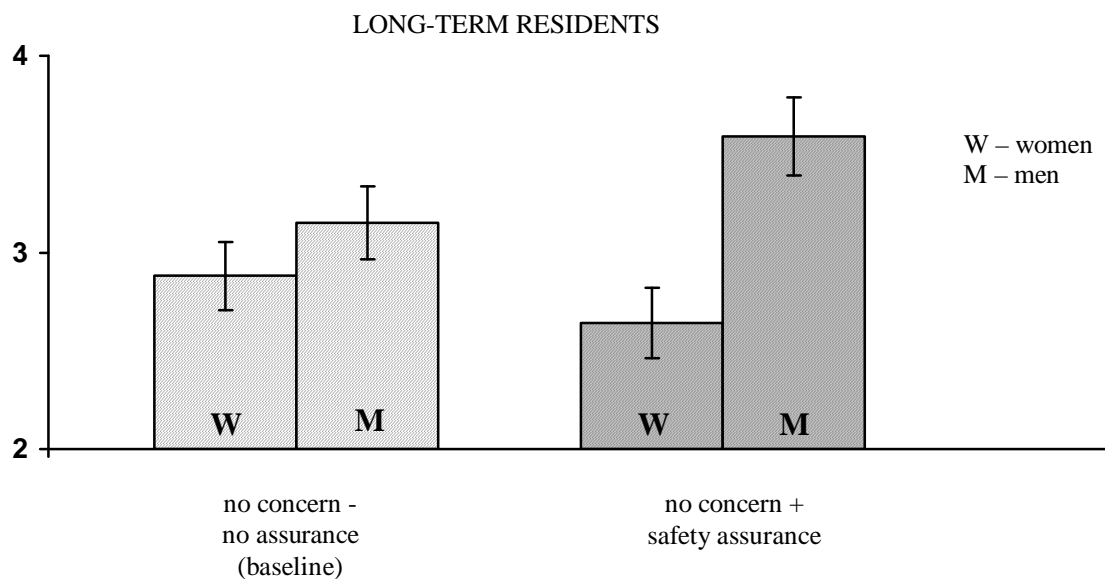
Degree of involvement in local affairs. Degree of involvement in local affairs, such as frequency of reading local newspapers and watching local news correlated significantly (Cronbach's $\alpha = .69$). The three variables were combined into local involvement index. I also performed a median split and divided participants in a group of low-degree local involvement ($M = 2.36$) and high-degree local involvement ($M = 4.03$, on a scale from 1 to 6).

Main analyses

To address the Hypothesis 1, central to this series of studies, I only compared the baseline condition and the safety assurance condition. Specifically, I submitted the four critical dependent variables (harm index, perceived safety index, and perceived degrees of positive impact and negative impact) to a 2 (baseline vs. safety assurance condition) x 2 (length of residency) x 2 (sex) factorial ANOVA. This analysis produced limited support for Hypothesis 1. For the perceived safety index, I found a significant three-way interaction, $F(1, 191) = 5.55, p = 0.02, \eta_p^2 = .03$. Diagnosing this interaction, I found that, among long-term residents, female respondents perceived transports significantly less safe than male respondents in response to a safety assurance, $p = .001$ (see Figure 3). This is consistent with sex differences in risk perceptions established in the literature.

Figure 3

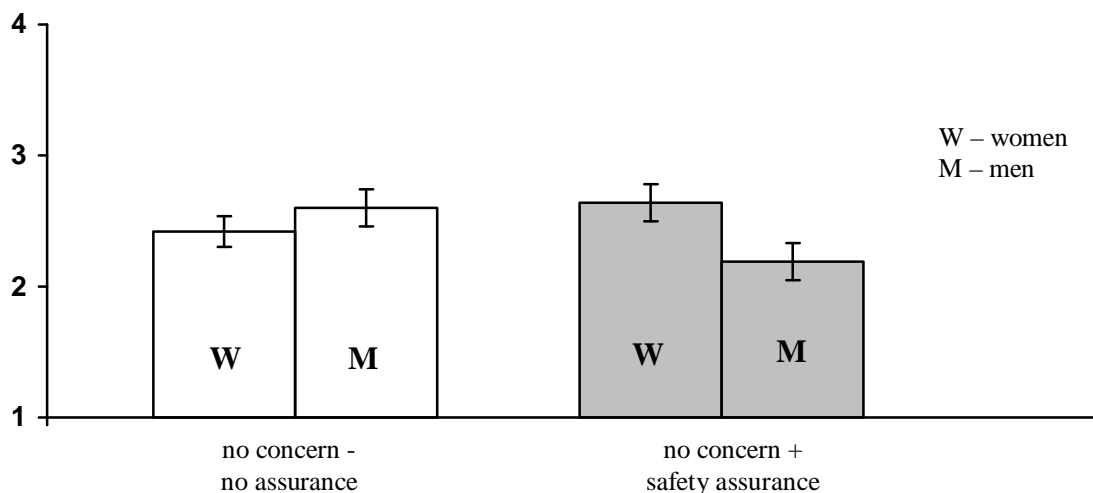
Perceived safety of transports as a function of experimental condition, length of residency, and sex (Study 3)



Concerning the perceived positive impact on respondent's life, there was a significant two-way interaction involving experimental condition and sex, $F(1, 191) = 6.30, p = 0.01, \eta_p^2 = .03$. A simple effects analysis indicated that male respondents in the safety assurance condition perceived significantly less positive impact than females in the same condition, $p = .02$. The same significant difference also held between male respondents in safety assurance condition and males in the no assurance condition, $p = .03$ (see Figure 4). No other effect in the analysis of the four dependent variables reached significance.

Figure 4

Perceived positive impact from transportation campaign as a function of experimental condition and sex (Study 3)



To test the Hypothesis 3b, I subjected the 4 dependent variables to 2 (baseline vs. safety assurance experimental condition) x 2 (higher vs. lower degree of community involvement) x 2 (sex) factorial design. In none of the analyses was there a three-way interaction, which did not support Hypothesis 3b.

To test Hypothesis 3a, I then submitted the four dependent variables to a 4 (experimental conditions) x 2 (short-term vs. long-term residency) x 2 (sex) factorial design. These analyses produced somewhat complex results. First, for perceived safety of transports I found a significant three-way interaction between experimental condition, length of residence and sex, $F(3, 391) = 2.70, p = 0.05, \eta_p^2 = .02$. Among long-term resident women, those who received expressed safety concern by the speaker and then were given a safety assurance thought the transports to be significantly safer than those

Table 3

Perceived safety of transports a function of experimental condition, length of residency and sex of respondents (Study 3)

	No concern - no assurance	No concern + safety assurance	Speaker- initiated concern + safety assurance	Hearer- initiated concern + safety assurance
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
<i>Perceived safety of transports</i>				
Short-term residents	3.18 (0.98)	3.27 (1.02)	3.17 (0.96)	3.31 (0.98)
Female	3.00 (1.02)	3.31 (0.95)	2.91 ^a (0.93)	3.33 (1.11)
Male	3.52 (0.83)	3.21 (1.13)	3.51 ^b (0.90)	3.29 (0.84)
Long-term residents	3.01 (0.95)	3.06 (0.98)	3.21 (0.91)	3.11 (0.97)
Female	2.88 (0.93)	2.64 ^a (0.82)	3.14 ^b (0.90)	2.97 (0.98)
Male	3.15 (0.97)	3.59 ^b (0.92)	3.43 (0.93)	3.32 (0.93)

Note: Adjacent means that do not share the same superscript differ at $p < .05$.

Responses were given on bipolar scale from 1 to 6, where 1 to 3 meant 'clearly/mostly/somewhat unsafe', and 4 to 6 meant 'somewhat/mostly/clearly safe'.

who only received a safety assurance, $p = .04$. This finding is consistent with the prediction of Hypothesis 3a, even though it emerged only among women who were long-term residents. There was also a significant difference between short-term residents, where women perceived transports as less safe in response to speaker-initiated safety concern + safety assurance condition compared to men (see Table 3).

Miscellaneous

To examine the moderating role of the trust toward speaker on risk perceptions, first I conducted 2 (experimental condition) x 2 (length of residence) x 2 (sex) ANOVA and found a significant main effect for experimental condition $F(1,189) = 3.23, p = .035, \eta_p^2 = .02$. Further analyses showed that participants in safety assurance condition perceived significantly higher distrust toward the speaker compared to participants in no safety assurance condition ($M = 2.72, SD = 0.83$ vs. $M = 2.46, SD = 0.85$).

The role of students' major and minor specializations were examined, but no significant interactions with answers on risk perception items were found between those students who specialized in science-related majors and those who did not. Similarly, no significant differences were shown by students who took natural science courses versus those who did not.

Discussion

Overall, the results of Study 3 did not replicate the results of Study 1. Partly this can be attributed to the changes in the design, i.e., the *qualified safety assurance* condition was purposefully not utilized this time to overcome potential confounding factors identified as a limitation in Study 1. Interestingly, however, the results were consistent with central prediction of the conversational framework and provided partial evidence in support of the Hypothesis 2b from Study 2. That hypothesis stated that higher perceptions of risk in response to safety assurances would occur among long-term residents compared to short-term residents. In Study 3, among long-term residents, women perceived transports to be less safe compared to men after they were given a safety assurance. Possible mechanism for this would be that only long-term residents

responded to the implications of safety assurance, which, according to the framework proposed in this dissertation, would have led them to revise their safety presuppositions and increase their awareness of risks. Once the risk awareness had been increased, the sex differences in risk perceptions manifested themselves, just in the way that was established in the literature. The short-term residents, on the other hand, took safety assurance at the face value and maintained perceptions of a safe state of affairs. This could be interpreted as an evidence for the differential role of communal common ground (measured through the length of residency in the local area) in the participants' ability to draw inferences regarding safety assurances.

The additional importance to the partial support for Hypothesis 2b in Study 3 was added by the fact that the differences in risk perceptions were produced by the 'absolute' safety assurance, which did not produce significantly different results in Study 1. A possible explanation for this could be larger sample size used in Study 3.

When it comes to Hypothesis 3a, that the introduction of a safety concern followed by the provision of a safety assurance would result in lower perceptions of risk, the results again showed only a partial support, i.e., among women participants who were long-term residents in the area. This becomes almost a pattern, in that only the group of women participants, who were long-term residents, acted in accordance with the predictions of the conversational framework for Study 3. Further investigation would need to examine the nature of sex differences in response to safety assurances more in detail (including varying the sex of the speaker). Another line of investigation could examine whether there are systematic differences between women and men in the utilization of conversational rules.

Among short-term residents, there were sex differences between men and women in that women perceived higher risks in response to expressed safety concern followed by a safety assurance than men did. Here, the sex differences in risk perceptions (in response to expressed safety concern) also paralleled the sex differences in perceptions of risk established in the literature.

The degree of involvement in local community affairs showed itself as less successful predictor of risk perceptions, compared to the length of residence in the local community. Because the item measuring the degree of involvement did not examine potential differences in how this concept was understood, further investigation will require more detailed examination of the nature of involvement (e.g., organizations, activities, etc.) and, possibly, the regularity of involvement.

To summarize, those results of Study 3 that approached statistical significance, were consistent with the predictions formulated on the basis of conversational framework. Introduction of safety concern as a preparatory condition for the provision of safety assurances eliminated counterintuitive effect of safety assurances for the long-term resident women. In the next chapter, Study 4 will examine whether raising a safety concern in interactions prior to the one in which safety assurances are given would have a similar neutralizing effect.

CHAPTER VII

STUDY 4: DOES HAVING A PRIOR SAFETY CONCERN

MAKE A DIFFERENCE?

Study 4 had two objectives: 1) to replicate the results of Study 1 in a different domain, and 2) to explore further the effects of having a safety concern as a pre-condition to receiving safety assurances. In Study 3, the goal was to test whether the expressing a safety concern prior to the provision of a safety assurance would create an expectation for the safety assurance, after which if safety assurance were given it would result in lower perceptions of risk. While Study 3 examined this effect in relation to an immediate and explicitly expressed safety concern, in Study 4 focused on whether similar effect may occur when a safety concern already exists among members of the audience as a result of prior events. In addition, Study 4 explored whether a safety concern would have an effect on operation of a safety assurance even if this concern is *not directly related* to the object of the safety assurance.

How would the safety concern about one subject, for example, pollution of environment with excessive lighting at night, become relevant to the safety regarding another subject, e.g., food? Research in cognitive science (e.g., Collins & Quillian, 1969; Collins & Loftus, 1975) has long established that semantic concepts are organized in a hierarchical fashion, such that a more specific instance of a category (e.g., robin, penguin) is included in the broader category of birds, which by themselves are but one member of the category of animals. Whereas many semantic hierarchies are readily available, such as those referring to our everyday lexicon, but rarely can one object only be part of a single hierarchy. For instance, a robin can easily belong to the larger category

of “things that fly” (which also includes airplanes) or, possibly, pets (which also include Dobermans) (e.g., Barsalou, 1983). Similarly, a report about light pollution might fit into multiple hierarchies, including “contamination” and “food contamination.”

Cognitive psychology has also established that semantic concepts are often activated by a process referred to as “spreading activation” (Collins & Loftus, 1975). According to this process if one semantic concept is activated, e.g., because a person thinks of a robin, other concepts that are immediately associated with the first one, are also activated—including the category that is superordinate to bird. In other words, “robin” will activate “bird,” and, in parallel fashion, a story about environmental pollution should activate general concept of health risks. The consequence is that the indirectly activated concept will be more likely and more easily spring to mind if the person encounters or thinks about a relevant semantic context at latter point. In other words, a story about environmental pollution encountered at one point may “prime” or “make readily available” the general concept of health risks at a subsequent point in time.

In Study 4, I proposed that a safety concern raised in one particular domain would create a general expectedness of a safety assurance. If this were the case, then the unintended effect of safety assurances should disappear. However, if this prediction were not supported, a specific safety concern communicated in a different yet related context would not create a general expectation for a safety assurance — and hence the unintended effect of safety assurances would still be present.

Based on this logic, the following general hypothesis was formulated:

Hypothesis 4: H1 will not hold when a recipient entertains a safety concern from prior interactions.

Study 4 utilized a scenario in which research participants received two versions of the same text about upcoming event, one containing a safety assurance and one not. The study utilized a conceptual priming technique to implicitly introduce a safety concern prior to this text (see, e.g., Bargh & Chartrand, 2000; Erb, Bioy & Hilton, 2002). The priming procedure involved a preliminary task with a short text which was seemingly unrelated to the risk assessment part. The priming texts varied in that they contained material intended to implicitly introduce safety concern in the same domain as the safety assurance in a later text, in a different domain than a later text, or not to introduce a safety concern at all.

Regarding the first objective of Study 4, replication of unintended effect, I expected Hypothesis 1 to hold in the condition when no safety concern factors were introduced. Specifically, among all participants in no safety concern priming condition, those that received a safety assurance were expected to have higher risk perceptions compared to those who received no safety assurance. Regarding the second objective, for Hypothesis 4 to hold, I expected that among all participants that received safety assurances, those where were primed with a safety concern would have lower risk perceptions compared to those primed with no safety concern. When entertained safety concern is followed up by a safety assurance, because the latter is expected, it should result in lower perceptions of risk.

Method

Participants

Participants for the study were 516 undergraduate and graduate students from a variety of disciplines. There were 354 female, and 160 male participants, which

constituted 68.6 and 31 percent of participants respectively (two respondents did not indicate their sex). The overall mean age was 21.6 years ($SD = 4.97$). In terms of racial/ethnic identification, 78.8 percent marked Caucasian, 11.5 percent – Hispanic / Latino, 5.8 percent – Asian American, 4.9 percent – African American, 2.9 percent – Native American, 3.5 – percent – Pacific Islander. Note, that participants could mark several categories at the same time.

There were 83 participants in the related safety concern + safety assurance condition, 87 participants in the related safety concern – no safety assurance condition; 85 participants in unrelated safety concern + safety assurance condition, and 85 in unrelated safety concern – no safety assurance condition. Finally, there were 90 in no safety concern + safety assurance condition and 86 in no safety concern – no safety assurance condition.

Design

The study utilized two designs to test each hypothesis. For Hypothesis 1, I used 2 (assurance vs. no assurance) x 2 (length of residency) x 2 (sex) factorial design. To recreate the design similar to Study 1 and to Study 3, among experimental conditions, I only used the pair of conditions (safety assurance vs. no safety assurance) that did not have any priming with safety concern. To test Hypothesis 4, I used 3 (priming) x 2 (assurance) x 2 (length of residency) x 2 (sex) factorial design.

Development of an instrument

Study 4 turned to the domain of food safety to provide further evidence for the generalizability of the effect of safety assurances regardless where they are used. In this case, the speaker providing safety assurances was an owner of a restaurant. The nature of

risk assessment shifted from environmental impact on a community to making personal consumer choices.

The core of the instrument consisted of a text followed by a series of questions. The text was presented as fragment of “Food & Drink” column from an unidentified newspaper which contained a description of a restaurant set to open in Reno within a month. Apart from the description, the article contained an assurance by the restaurant owner that their food was safe (no assurance in the control condition) and an invitation to the general public to come and enjoy what establishment has to offer. The article was then followed by questions designed to assess the attitudes of the participants toward a new restaurant, its owners, and perceptions of food quality and safety.

To implicitly introduce a safety concern prior to this article, and moreover, to vary the domains in which the safety concern was introduced, the questionnaire about the restaurant was placed among what was presented as set of 3 different studies, all addressing their own set of issues. The priming with safety concern in a related domain, unrelated domain, and providing no safety concern was done in a first one-page questionnaire which asked the participants to read and evaluate the quality of a newspaper article, allegedly written by a journalism student. The domain-related article talked about risk of mad cow disease in Northern Nevada and pre-cautions regarding meat consumption that one should take. In the domain-unrelated priming condition, the article talked about the phenomenon of light pollution and its ambiguous impact on humans, animals, and plants. In the control condition, the priming text described Great Basin National Park. The priming articles texts were designed to be of similar in length and complexity, and several follow-up questions were provided to ensure whether

respondents rated the texts similarly.

To separate a priming condition from the main part of the questionnaire, in the second one-page questionnaire, participants were given a short survey on preferred music sources and music formats. This second part was not related to any safety concerns and merely served as a filler to make the connection between the priming and the main part of the study less obvious. Also, all three parts of the questionnaire used different font and formatting to create additional impression of unrelated studies.

Finally, three questionnaires were followed by a general demographic section and a comprehension check regarding the restaurant scenario. Comprehension check was included to ensure the participants attended to all parts of the experimental manipulation in the main part of the instrument.

The instrument was set in its final form after a pre-test ($N = 59$) of an original version of the instrument, and a number of modifications of priming texts and filler questionnaire. For example, light pollution text replaced an originally used report on West Nile virus, in order to separate the domain of the first safety concern (mad cow disease) and the domain of the second safety concern further apart. The filler questionnaire on music sources replaced originally used assertiveness questionnaire, to avoid potential confounding factors.

Procedure

The experimenter addressed students in regular classes in liberal arts and natural sciences and introduced the materials as a set of separate studies each addressing its own set of issues. Partial disclosure was used to avoid biasing the participants' answers. Students were asked to volunteer 12-15 minutes of their time total and to follow the

instructions for completing each questionnaire. The experimenter distributed questionnaires and by doing so, randomly assigned the participants to one of the 6 experimental conditions.

The questionnaire introduced the participants to three unrelated studies, combined in a short questionnaire. Study I was presented as evaluation of the quality of writing of journalism students and included a 'typical' 200+words article and questions about respondents' opinions on it. Study II was about where respondents obtain their music and in what media they normally use to listen to their music. Study III was presented as a study on how we make decisions based on public announcements, and offered to read a newspaper article about a soon-to-open restaurant and agree or disagree with a series of statements following the article. The questionnaire concluded with questions about respondent background, including demographics and familiarity with the topic of food safety, vegetarian preferences, major/minor in studies, natural science courses taken at the university. Finally, the comprehension check asked respondents to list 3 facts about the restaurant that they could recall.

Measures

The main independent variable was the presence or absence of safety assurance. The second independent variable was priming with safety concern. I also examined the role of sex as a significant variable in risk perception literature. An additional variable included into consideration was the length of residence, which showed its importance in Study 2 and Study 3. The participants were asked how long they lived in Northern Nevada, measured in years and months.

The primary dependent variables were the respondents' perceptions of food safety, food quality, and personal willingness to eat at the restaurant. The format of the responses was similar to that in Study 1 and Study 3, where participants had to indicate on a Likert-type scale from 1 to 5, to what degree they agree with the statements listed, e.g., 'The food at the Big Pine Grill will be of good quality,' where 1 was *strongly disagree* and 5 was *strongly agree*.

Additional alternative variables included: the degrees of familiarity with the topics of food safety, participants' major and minor specializations, and their personal adherence to vegetarian diet. Regarding the latter, respondents had to decide whether they considered themselves a vegetarian or not, in which case discussion of safety of meat products was not expected to generate a safety concern for those who did. Participants were also asked what natural science courses they had taken at the local university, if any.

The questionnaire also contained items assessing whether the restaurant owner appeared trustworthy or dishonest, and the general attitude to the quality of food safety monitoring done by the Health Department of the local county. These items provided more contextual information on respondent's perceived trust toward the speaker and attitude toward the authorities.

The questionnaire contained a comprehension check that asked the participants to recall three facts about the restaurant or its owners. This recall was later used as evidence that the participants attended to experimental manipulation.

The first part of the questionnaire, which varied the priming condition, contained several measurements of the perceptions of the article. Respondents had to rate, on three

separate items, the degree to which they found the article informative, easy to understand, and well written. These measures were used to ensure that the priming conditions were comparable in their processing effort and impact. The respondents could also suggest improvements to the article in open-ended format.

Results

Preliminary analyses

Comprehension check. The recall of three facts about the restaurant and its owners were coded into ‘acceptable’ and ‘problematic’, based on a subjective evaluation whether the participant showed enough evidence of having read the experimental condition text to the end. Out of 516 participants, 461 (89.3%) were found ‘acceptable’ and 55 (10.7%) were coded ‘problematic.’²⁹ Out of 55 participants with problematic recall, 42 skipped the question altogether, and 13 did not provide sufficient information.. After conducting a 6 (experimental condition) x 2 (recall evaluation) x 2 (sex) factorial analysis of variance, I found no significant interactions between the experimental condition, recall evaluation, and sex for respondent’s perceptions of risk. Based on this finding, I decided to include into all participants further analyses.

Formation of indices. Items measuring likelihood that respondent will eat at the restaurant, likelihood that respondent will not eat at the restaurant, and perceptions that the restaurant will be successful, perception that the restaurant will not be successful where found to substantially correlate (Cronbach’s $\alpha = .80$). I therefore combined them

²⁹ For forty six percent of the questionnaires, recall was coded by 3 coders (the author and 2 assistants, intercoder reliability = .967). The rest of the questionnaires were coded by the author only.

into *unlikely success index* by taking an average of scores on negative statements and reversed scores of affirmative statements.

Items measuring perception that the chance of contracting food poisoning at the restaurant is low and the perception that the restaurant has problems with food safety significantly correlated, $r(514) = .46, p < .01$. I combined them into safety problem index by averaging score on perceived food safety problem and reversed score on low chance of food poisoning.

Two separate items measuring perceptions whether quality of food at the restaurant will be of good quality or of poor quality were found to significantly correlate, $r(507) = -.68, p < .01$. I combined them into quality problem index by averaging score on perceived poor quality of food and reversed score on perceived good quality of food.

Items measuring perception of restaurant owners' trustworthiness and dishonesty were found to significantly correlate, $r(515) = .62, p < .01$. I combined these variables into a distrust index, reverse-coding the perceived trustworthiness.

Length of residency. On average, respondent had lived 11.13 years in Northern Nevada (median = 10.67 years). Examination of the data revealed a bimodal distribution. Utilizing the 13 year mark used in previous two studies for grouping respondents into short-term and long-term residents, in the length of residence, 254 participants were assigned to short-term ($M = 3.77$) and 207 were assigned to long-term residents ($M = 20.19$). Given that the speaker providing safety assurances was not representing local government, this variable was used in Study 4 to assess the general background knowledge on the issues of safety in the local context, where the study was conducted.

Tests of priming conditions. It was important to check if participants evaluated the

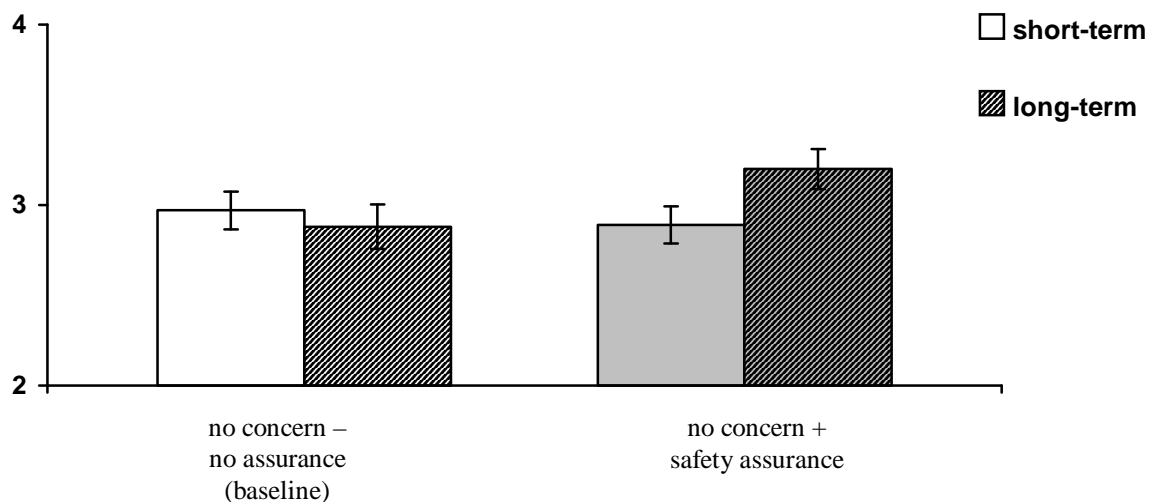
three priming stimuli differently to make sure that they differed only with regard to the extent to which they induced concerns about food safety. To examine this, I submitted the respondents' ratings of the priming story to a unifactorial ANOVA. Priming texts differed with regard to how easy to understand participants thought they were, $F(2, 508) = 5.74, p = .003$, how well-written, $F(2, 506) = 9.67, p < .001$, and how informative $F(2, 507) = 4.79, p = .009$, they were perceived to be. Pairwise comparisons showed that the mad cow disease story was less informative than the text about Great Basin National Park, $p = .01$, and the light pollution story was easier to understand than both the mad cow disease story, $p = .023$, and the Great Basin National Park story, $p = .005$. Further, the quality of the mad cow disease story was lower than both the light pollution story, $p < .000$, and the Great Basin National Park story, $p = .008$. In other words, in spite of having been pilot tested, any effects of priming condition on risk perceptions can only be interpreted with great caution as the concern-inducing quality of a story was confounded with other characteristics.

Main analyses

To test Hypothesis 1, I only compared safety assurance condition and no safety assurance conditions within the condition that had no safety concern priming (Great Basin National Park story). Specifically, I submitted the five dependent variables (unlikely success index, quality problem index, safety problem index, and two variables measuring likelihood trying restaurant out first and waiting for friends to try it out first) to a 2 (baseline vs. safety assurance condition) x 2 (length of residency) x 2 (sex) factorial ANOVA.

Figure 5

Perceived problems with food quality as a function of experimental condition and the length of residency (Study 4)



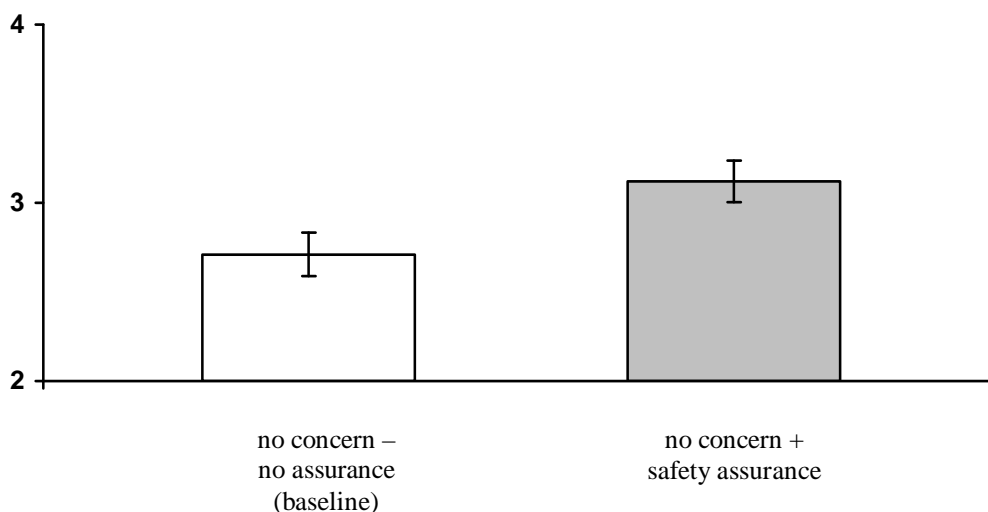
There was a significant two-way interaction between experimental condition and length of residency for quality problem index, $F(1, 166) = 4.28, p = 0.04, \eta_p^2 = .03$. The follow-up contrast revealed that, among the long-term residents, those who received a safety assurance scored significantly higher on food quality problem index than those who did not receive a safety assurance, $p = .021$ (see Figure 5). This provided additional support to Hypothesis 2 regarding the differential role of the length of residence in the effect of safety assurances.

There was also a significant main effect for experimental condition on safety problem index, where those who received a safety assurance scored significantly higher on perceived food safety problem index than those who did not receive a safety assurance

($M = 3.12$, $SD = .83$ vs. $M = 2.71$, $SD = .66$), $p < .001$ (see Figure 6). This evidence provided reasonable support to Hypothesis 1.

Figure 6

Perceived problems with food safety as a function of experimental condition (Study 4)

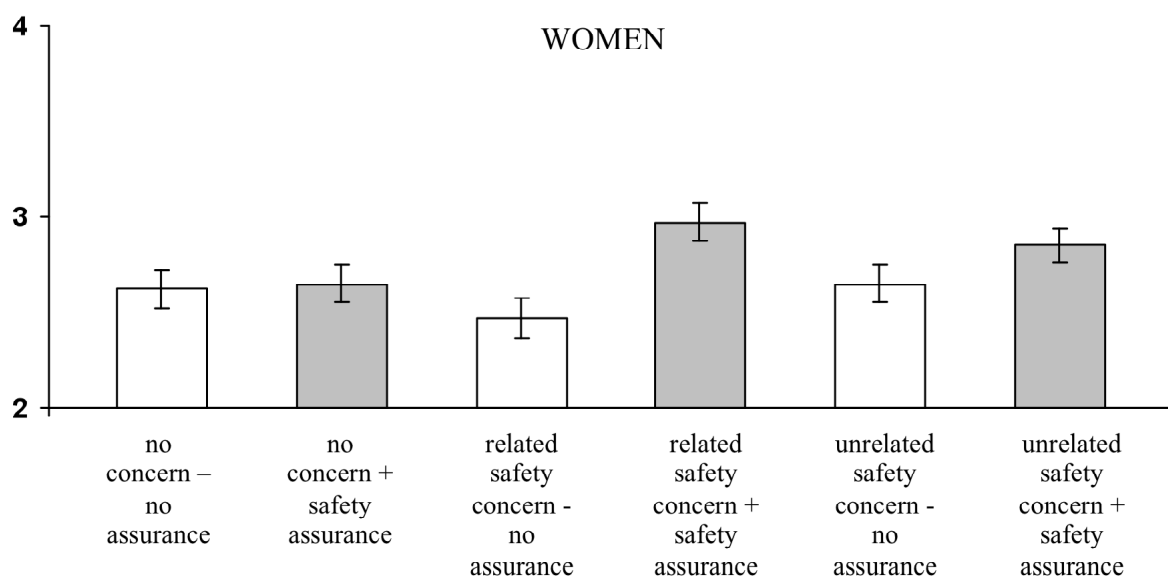


To test Hypothesis 4, I submitted the five dependent variables to a 3(priming) x 2(assurance) x 2(residency) x 2(sex) design. No significant 4-way interaction was found. There was, however, a significant 3-way interaction between priming, assurance, and sex of the respondent for unlikely success index, $F(2, 485) = 4.89$, $p = .008$, $\eta_p^2 = .02$. The pairwise comparisons revealed that, among female respondents in safety assurance condition, those who were primed with the mad cow disease story scored significantly higher on the unlikely success of the restaurant index, compared to those who were primed with the national park story, $p = .03$ (see Figure 7). This evidence did not support the Hypothesis 4. In addition, comparing women participants primed with mad cow

disease story, those who received a safety assurance scored significantly higher on the unlikely success of the restaurant, compared to those who did not receive a safety assurance, $p = .001$ (see Figure 7). This was also against the prediction of Hypothesis 4.

Figure 7

Perceived unlikely success of the restaurant as a function of priming, assurance condition, and sex (Study 4)



Among male respondents who did not receive a safety assurance, those primed with the mad cow disease scored significantly higher on unlikely success than those who were primed with the national park story, $p = .04$. This provided a limited illustration that the domain-relevant priming condition could introduce a safety concern that manifested itself in later assessments of risks.

Miscellaneous tests were performed to ensure that alternative factors were not responsible for some of the observed effect. Participants' major and minor

specializations, natural science courses they took at the university, vegetarian preference, degree of familiarity with food safety did not produce any significant interactions neither with priming condition, nor with assurance condition in perceptions of risk, all $F_s < 3$.

Discussion

Overall, the results of Study 4 provided partial support for the central prediction of this research. The significant differences in perceived problems with food safety and in perceived problems with food quality were all found in response to receiving an assurance from restaurant owners that the food was safe.

The significance of replicating some of the results from Studies 1 and 3 was augmented by the fact that the study utilized the scenario in a new domain, with different event and participants. This provides additional evidence for the generalizability of the phenomenon of unintended effects of safety assurances.

Hypothesis 1, predicting higher perceptions of risk in response to safety assurance, was supported in the no-concern priming conditions, where the presence or absence of safety assurance produced significant main effects. This result is promising and puzzling at the same time, due to unstable role of moderating factors, such as length of residency or sex, as there were no significant interactions with these factors in this case. Still, Hypothesis 2 received support in case with perceived problems with food quality, where the safety assurance resulted in higher perceptions of risk only for the long-term residents.

The objectives of Study 4, however, were more ambitious. I attempted to further investigate some of the conditions under which the safety assurances would result in *lower* perception of risk, in this case – the respondents' entertaining a safety concern

prior to the interaction. The introduction of this prior safety concern was carried out using priming technique. One of the goals was to keep all factors constant, except the domain of introduced safety concern. However, in spite of adjustments after original pre-test, the priming conditions were found to substantially differ in terms of how informative, easy to understand, and well written they appeared to the respondents. Therefore the obtained results have to be viewed with caution, as potentially confounded with other factors in addition to the presence or absence of safety concern inducing content.

Based on this limited evidence, it appears that provision of safety assurance did not reduce but in fact increased perceptions of unlikely success of the restaurant for women who were primed with related safety concern (mad cow disease story). More thorough pre-tests of priming conditions will be required in the future to create adequate set up for testing Hypothesis 4. Alternative ways for introducing safety concern also will need to be explored.

The fact that the safety assurance effect was found in alternating interactions with either with sex of the respondent or with the length of residency appeared promising and puzzling at the same time. The promising part was that the differences in risk perceptions based on sex of the respondents were consistent with the differences identified in the prior risk research literature, namely, that women in general tend to perceive higher risks from the events compared to men. This in part positively reflects on the validity of the instrument developed for this study, in that the questionnaire managed to tap into the same set of issues that other studies in risk perception literature did. The puzzling part was that the role of sex of the respondent did not consistently manifest itself in risk assessments throughout the statistic tests in Study 4.

The length of residency in a local area has shown itself to be a significant factor moderating the unintended safety assurance effect. The fact that the long-term residents tend to infer the latent implications of safety assurances is consistent with how the safety assurances would be interpreted on the basis of existing common ground between the interactants. Specifically, the presence of common ground would allow interactants to interpret the implicatum behind the provision of safety assurance, and it is precisely the unintended implicature that is responsible for the unintended effect of safety assurances. It remains unclear however, whether the length of residency can serve as an adequate indicator for general background knowledge of local issues or the actual perceived shared context between the local community members, such as residents and authorities.

CHAPTER VIII

GENERAL DISCUSSION

The reported series of studies aimed to explore the phenomenon of perceiving a higher degree of risk in response to receiving a safety assurance. These studies began from an observation that assuring a safe state of affairs regarding any common object, the safety of which is normally taken for granted, leads to confusion and a heightened degree of uncertainty about the safety of this object.

In the context of an informal one-on-one conversation, one possible way to resolve such uncertainty is to ask the speaker, who gave a safety assurance, clarification questions, e.g., “Why are you telling me this (something that I already know)?” or “Is there something that I do not know (that you think I should)?” Note that such questions normally attempt to get at the speaker’s intention behind providing a safety assurance. With the help of clarification questions, the initial uncertainties can be relatively quickly cleared up.

However, if one comes across a public notice saying that the materials in the building are safe, or if there is a TV sound bite assuring the nation that tomatoes are perfectly safe to eat, or that water is safe to drink, or that air is safe to breathe, there are often limited or no opportunities to ask clarification questions or to receive clear enough or complete information. Where opportunities for feedback and clarification are limited the uncertainties about safety status of objects or events remain unresolved and may produce unintended effects, such as increased perceptions of risk.

This initial observation translated into a series of studies, which aimed to verify, using experimental design, whether safety assurances indeed can result in higher

perceptions of risk. The theoretical framework developed for the empirical investigation of this effect was based on the theories of linguistic pragmatics, which focus on dynamic interactional processes in the construction and negotiation of meaning in speech.

Safety assurance can be conceptualized as an act that involves transfer of a mental state of safety from the speaker to the hearer. Since the act of assuring safety is accomplished (with variable success) through speaking, speech act theory was a logical departure point in the analysis of safety assurances using a conversational approach. Speech act theory explained how saying something represents an action that elicits a reaction from the hearer. As a next step, conversational logic theory was used to explain how additional meanings can be implicated and inferred on the basis of the Cooperative Principle and conversational rules. Finally, using common ground theory, I examined the process of continuous construction and revision of common knowledge base between interactants that underlies the process of communication.

The conversational framework thus provided me with conceptual tools to explain the mechanism of how safety assurances can result in higher perceptions of risk. Specifically, due to the assumption of the Cooperative Principle and the adherence to conversational maxims on the part of the speaker, when a hearer receives a safety assurance about something that he presumed to be safe, he treats it as a meaningful contribution to the exchange. To facilitate this meaningfulness, the hearer may revise his own background notions about the object from 'safe' to 'risky.' Given the status of an object as 'risky,' the safety assurance then becomes meaningful. However, due to this awareness of possible risks, overall perceptions of risks may increase.

The conversational rules are such that average speakers of any language use them

with fine proficiency on a daily basis. When the communication process fails to adhere to some of the conversational rules, for example when communication becomes constrained by institutional regulations, hearers, by not being aware of such constraints, can infer meanings that were not intended by the speaker. The review of empirical evidence on the operation of conversational rules in the context of behavioral research clearly illustrated that.

In Chapter 2, the reviewed studies, in which conversational rules were not fully adhered to, could be divided into two kinds. In the studies of the first kind, e.g., Kahneman and Tversky (1973), the non-adherence to conversational rules was unintentional, as a result of failure to recognize that rules of interaction in interpersonal settings also apply to the context of institutional communication, such as behavioral experiments. The main outcome of this failure was the misinterpretation of the ability of research participants to adhere to the rules of formal logic. The second kind of studies, e.g., Singer et al. (1992) on assurances of confidentiality, or Kemmelmeier et al. (2004) on unwarranted rewards, involved deliberate misrepresentation of the speaker's intention. These elicited normally anticipated responses for speech acts that they tried to portray. Overall, both types of studies provided impressive evidence for the ubiquitous operation of conversational rules and the Cooperative Principle in communication between intentional speakers.

The practices that were prevalent in the field of risk communication for some time could also be characterized as a lack of consideration toward conversational rules. Due to the assumption that institutional risk communication must follow its own set of technical rules in generating and exchanging of information, risk communicators consequently

experienced significant difficulties in sharing risk information with members of the general public. Under conditions of limited opportunities for feedback and clarification, well-intended risk communication often backfired (e.g., National Research Council, 1989).

After the general mechanism of unintended effects of safety assurances was theoretically derived, the series of studies described in this dissertation aimed to provide empirical evidence for the unintended effect of safety assurances. The experimental studies, first of all, aimed to establish the reality of the effect in the field of risk communication. To accomplish that, I investigated the effect of safety assurances by using simulation scenarios of plausible risk communication situations, with limited opportunities for feedback and clarification for the participants. Such conditions made it necessary for the participants to rely on inferences and contextual clues in interpreting the purpose of safety assurances. Their interpretations were expected to manifest themselves in the measurements of perceived risks regarding a future event that was assured to be safe.

The design of studies followed the approach of the second type of studies from Chapter 2, which were built on the principle of purposeful misrepresentation of a speech act with the goal of eliciting a typical response. This, however, was done with the larger goal of demonstrating and explaining the outcomes of unintentional “misconduct” of a speech act, characteristic of Kahneman and Tversky’s type of approach.

Study 1 demonstrated evidence in support of the central hypothesis that the provision of safety assurances would result in higher perceptions of risk compared to

when no safety assurances had been provided. Safety assurances in this case were unsuccessful in eliciting an intended response, i.e. lower perceptions of risk.

Following speech act theory, this finding meant that certain necessary conditions for the provision of safety assurances were not met. Both Austin (1962) and Searle (1969) outlined a number of necessary conditions that have to be met in order for an illocutionary speech act to be performed successfully. An exhaustive empirical test of these analytically derived conditions was beyond the purpose of this study. However, the logic of Searle's (1969) argument, that a particular speech act is based on a specific set of perceptions regarding the opposite party in the interaction, undoubtedly influenced the logic of the present line of research.

After Study 1 established that the speech act of a safety assurance may work unsuccessfully, Studies 3 and 4 were designed with the goal of finding out some of the conditions when safety assurances would work as intended. The main condition proposed for the investigation was the presence of a safety concern that would make provision of safety assurance expected.

In addition to the central hypothesis, studies also selectively examined a number of potential moderating variables that, according to the risk literature, had been found to play a differential role in risk perceptions. Key moderating variables that influenced perceptions of risk in current studies were sex of the respondent and the length of residency in local community.

To summarize, across four studies, the following hypotheses had been tested:

Hypothesis 1: Providing safety assurance will lead to higher perceptions of risk compared to when no safety assurances have been provided.
(Safety assurance and risk perceptions concern the same subject).

Hypothesis 2a: H1 will hold in a condition where the speaker providing safety assurance is an expert on the subject.

Hypothesis 2b: H1 will hold among long-term community residents compared to short-term community residents.

Hypothesis 3a: H1 will not hold when safety assurances are provided in response to an expressed safety concern.

Hypothesis 3b: H1 will hold among community residents with a higher degree of community involvement compared to community residents with a lower degree of community involvement.

Hypothesis 4: H1 will not hold when a recipient entertains a safety concern from prior interactions.

In the following sections, I will address methodological issues that emerged in the process of investigation, review to what degree each hypothesis was supported or not, and will talk about some of the implications of the findings for the conversational framework and risk perception literature.

Simulation scenarios

The scenarios developed for these studies addressed both the societal level risks, such as environmental pollution, and individual level risks, such as food poisoning. Specifically, in one case, the scenario involved safety assurances about railway transports with mining wastes scheduled to go through the local community and, in another case, the scenario contained assurances concerning food safety in a soon-to-be-opened restaurant in the local area. Study 2 used a scenario based on real-life event: the implementation of a new environmental regulation requiring a five-fold reduction of the permissible amount of arsenic in drinking water that came in effect nationwide at the time when the studies were conducted. It is remarkable that the unintended safety assurances

effect was observed for both levels of risks, which contributes to the external validity of the results.

Scenarios were presented in the form of a transcript of a press conference or as a newspaper article. This format permitted a significant reduction of extraneous variables that would have to be accounted for otherwise, such as features of the setting, social categorization of the speaker, non-verbal communication variables, and other. This allowed for a better control over experimental conditions and contributed to the internal validity of the studies. Importantly, according to the speech act theory, participants reading the press conference transcript were essentially overhearers. The theory of informative speech acts provided an explanation for how overhearers could interpret safety assurances that were provided to a different audience as if they were directed at them. The theory of informative speech acts addressed the conceptual challenge of inference making by overhearers.

Examining the common features of the simulation scenarios used in four studies, in addition to absent opportunities for grounding, two more factors could be identified as contributors to the safety assurances effect. These included conditions of uncertainty and insufficient background knowledge about the object of safety assurances. These two features were identified as characteristic aspects of a typical interaction between a risk managing agency and the general public.

Conditions of uncertainty were purposefully generated. In Study 1 and 3, this was done by introducing potential risk element: use of protected rail cars to transport mining wastes that were designed to withstand Type 3 hazards on a fictitious five-point Federal Hazard Scale. In Study 2, this was achieved by announcing the change in arsenic

maximum contaminant level. In Study 4 it was done through an introduction of a new restaurant, that had not yet been open, and could not have been known to any participants (because it was fictitious). A small pre-test for Study 1 indicated that the removal of the “Federal Hazard Scale” from the scenario eliminated differences in risk perceptions between experimental conditions. This could mean that providing safety assurances under conditions of *certainty* would result in lower perceptions of risk. If further empirical investigation confirms this possibility, its applicability would be limited, as in real life situations, uncertainty is an *essential* feature of risk assessment and risk communication (Jaeger, Renn, Rosa & Webler, 2001).

Another important element was choosing a subject matter for safety assurances that was relatively unknown. This created favorable conditions for an easy revision of assumptions about the safety of the subject matter, such was the case with mining wastes. In Study 1 and 3 participants were not very unfamiliar with this topic (e.g., mean rating in Study 3 of $M = 2.42$ on a scale from 1 ‘clearly not familiar’ to 5 ‘clearly familiar’). The *absence* of significant differences in perceived safety of water in Study 2 might be attributed to personal daily exposure to water and participants’ relying on personal sensory experience. Pertaining to Study 4, although 70% of respondents marked some degree of familiarity with the subject of food safety ($M = 3.85$ out of 5) I argue that food safety is much more unpredictable compared to the safety of public drinking water; therefore safety information is more carefully attended to on a continuous basis.

Experimental manipulation

The central experimental manipulation primarily involved providing or not providing a safety assurance in a simulation scenario. Several challenging decisions had

to be made about the format of the safety assurance and its integration into the simulation scenario, so that everything except presence or absence of safety assurance was kept constant across conditions.

A safety assurance had to include: 1) “[subject] assure(s)” clause, e.g. “I assure that...” or “<Company name> assures that...” 2) the object of assurance, predicated with some characteristic of safety. This solution, however, still left considerable room for variation. Future studies will need to address the form of safety assurance in a more rigorous fashion.

Apart from the provision of safety assurances, Study 3 and 4 also introduced a safety concern in order to test the prediction that only in the presence of such a concern, a safety assurance would indeed result in lower perceptions of risk. There was no established way to adequately introduce a safety concern, and the safety concern itself was used as an umbrella term for general awareness of possible harm. The limited evidence, so far, suggests that the presence of a safety concern results in higher perceptions of risk regardless of the presence or absence of safety assurance. Thus, the proposed design of introducing a safety concern, followed up by a safety assurance, needs further development before these issues can adequately be addressed.

Measures of perceived risk

Perceptions of risk were measured along several dimensions, such as perceived safety or dangerousness of an event, perceived benefit or harm to self, to Reno, and to Nevada. Also, informed by the pertinent literature, dimensions such as catastrophic potential of an event or object and the voluntariness of risk were also assessed.

The results of the present studies suggest that perceptions of safety may not be a highly sensitive measure of subjective risk. Overall, in the field of risk communication, there appears to be a characteristic bias toward defining situations in terms of presence or absence of risk, rather than presence or absence of safety. Even at the outset of this dissertation, I defined a safety assurance as “an act of making a person certain that he/she is or will be safe from harm.” In this light, the parameters of safety essentially become derivative from the parameters of harm. This creates certain methodological challenges not just in terms of assuring the safe state of affairs, but also in terms of the analysis of a safe state of affairs.

In the attempt to establish generalizability of unintended effect of safety assurances, the use of multiple scenarios introduced different types of risks, which in turn introduced variability in the dimensions along which risks were measured, e.g., compare “Transports are dangerous” vs. “The Big Pine Grill has some problems with food safety.” In spite of this fact and in spite of using scales of multiple formats, the patterns in risk perceptions in reaction to safety assurances were overall consistent, thus pointing to the robustness of the effect.

The status of hypotheses

Across the four studies reported here, the findings provided somewhat mixed support for the tested hypotheses. I return to the specific hypotheses once more to discuss their overall status in this chapter.

Hypothesis 1, stating that providing safety assurance will lead to higher perceptions of risk compared to when no safety assurances have been provided, received direct evidence in Study 1 and in Study 4. A number of findings *indirectly* supported

Hypothesis 1 as they examined several conditions under which Hypothesis 1 should hold.

Hypothesis 2a, stating that H1 will hold when a safety assurance is given by an expert on the subject, received partial support in Study 2. An expert speaker significantly differed in his impact on the audience from a non-expert speaker. However, the nature of the impact concerned not the Hypothesis 1, but rather, the persuasiveness of the arguments, such as that ‘the water is already safe.’ Consequently, the respondents were less inclined to see the benefits of change when it was announced by an expert. Part of the problem in interpreting this finding had to do with the design of the study, whereby the change in the water standards rather than the safety of the water became the focus of attention.

Hypothesis 2b, stating that H1 would hold among long-term community residents compared to short-term community residents, received partial support in Study 2 and substantial support in Studies 3 and 4. In Study 2, the length of residence played a differential role in the perceptions of benefit from the arsenic rule change and the willingness to implement the rule change. In Study 3, the length of residency played a differential role in reaction to safety assurances and manifestation of sex differences in perceptions of safety of the transports. Possible mechanism for this would be that only long-term residents responded to the implications of safety assurance, which, according to the framework proposed in this dissertation, would have led them to revise their safety presuppositions and increase their awareness of risks. Once the risk awareness had been increased, the sex differences in risk perceptions manifested themselves, just in the way that was established in the literature. The short-term residents, on the other hand, took safety assurance at the face value and maintained perceptions of a safe state of affairs. In

Study 4, only long-term residents scored significantly higher on perceived problems with food quality in response to a safety assurance.

Hypothesis 3a, stating that H1 will not hold when safety assurances are provided in response to an expressed safety concern, received partial support as predicted differences emerged only for women who were long-term residents in the area. These women perceived mining transports significantly safer when the safety assurance was preceded by an expression of safety concern.

Hypothesis 3b, stating that H1 will hold among community residents with a higher degree of community involvement compared to community residents with a lower degree of community involvement, did not receive any support in Study 3. One possible explanation could be the inadequate operationalization of the community involvement in terms of following the media on local issues and the self-reported degree of involvement in local community affairs. Specifying more precise parameters for community involvement, including the regularity of activities, would allow for a more reliable testing of this hypothesis.

Hypothesis 4, stating that H1 will not hold when a recipient entertains a safety concern from prior interactions, did not receive any support in Study 4. Moreover, there was partial evidence that the introduction of a safety concern through priming may lead to increase rather than decrease of perceived risks following the provision of safety assurances. As mentioned above, additional mechanisms for the introduction of safety concern need to be explored in the future research.

Implications for conversational framework

The results of the studies reported in this dissertation add to the body of empirical

evidence for the operation of conversational logic in institutional contexts. They also provide additional clarification of problematic aspects of institutional-public interface. Considering that, originally, Austin, Searle, and Grice developed their theories based on one-on-one conversation, the present work contributes to the development of applications of the conversational framework to the interactions with multiple participants (e.g., Clark & Carlson, 1982).

The design of Studies 3 and 4, with all their limitations, provided an initial step in the empirical investigation of preparatory conditions for the speech act of safety assurance. Following examples of Searle (1969), I had proposed that having a pre-existing safety concern was a necessary condition for the successful provision of a safety assurance. At the present moment, however, this hypothesis has not received substantial empirical support. Future research needs to develop further the promising findings from Study 3.

Reported studies also included attempts to operationalize Clark's (1996) concept of common ground in the context of public communication. The studies provide additional empirical evidence concerning the role that a larger situational context plays in interpretation of the meaning of a discourse. In reported studies, common ground has been conceptualized as the length of residency in local community and as a degree of involvement in community affairs. So far, only the length of residency in local community had shown itself as a suitable operationalization of communal common ground. This was especially relevant to the issues that dealt with environment, in which both participating parties resided, and when such issues were handled by local authorities. Another measurement of common ground, in terms of presuppositions brought to an

interaction, was the degree of familiarity with topics addressed in communication.

However, no significant differences in reaction to safety assurances emerged based on the reported degree of familiarity with the subject matter.

One of the findings was that the unintended effects of safety assurances often co-occurred with the perceived distrust toward the speaker. In this light, the concept of Cooperative Principle requires analytical expansion in order to account for the utilization of conversational logic under conditions of perceived distrust toward the speaker. If a hearer draws inferences that lead to increased distrust toward the speaker, it becomes problematic to conceptually argue that both participants continuously adhere to the Cooperative Principle, as that is what allows the hearer to draw inferences in the first place. Future research could examine the impact of the variable degree of perceived trustworthiness of the speaker on the operation of the Cooperative Principle and conversational rules in the interpretation of meaning of communication (also, see Davies, 2007 on reinterpretation of the meaning of Cooperative Principle).

Implications for risk perception literature

At present, federal mandates for transparency and the requirement to provide annual safety reports do not take into consideration the operation of conversational rules among general public and even experts. The risk communication field can, without a doubt, benefit from recognizing the important role of the conversational context in which individuals process and assess risk information. Studies by Kahneman and Tversky (e.g., 1972, 1974) had a fundamental impact on experts' notions about how general public assesses risks. However, as the review in Chapter 2 illustrates, such analyses were often based on inadequate assumptions about participants' cognitive processes. Conversational

processes were generally omitted from the analyses with the consequence that sensible responses in the context of a presumably cooperative interaction were mistaken for cognitive limitations. Experts in the field of risk communication may be in danger of making the same mistake as unexpected or even seemingly irrational responses may indicate, above all, that the conversational context between risk communicators and the public has to be examined more fully.

The unintended effects of safety assurances can also contribute to the social amplification of risk framework. The inferential model of communication, together with conversational logic, provides an explanatory mechanism for the increase in perceptions of risk through a communicative process. The social amplification of risk framework was developed to explain how, sometimes, minor risk events (according to experts) can produce exaggerated public concern. At the individual level, according to this framework, each recipient can amplify or attenuate risk messages in the process of decoding and processing of risk information. The framework attributed the key role in these processes to the use of cognitive heuristics in drawing inferences. The findings reported here expand on the cognitive mechanisms that could lead to the amplification of risk at an individual level.

The concept of the signal in social amplification of risk framework refers to the implications that the occurrence of each hazardous event carries for the future perceptions of risk among the people involved. There are certain parallels between the processes involved in the interpretation of the signal value of a hazardous event as proposed by the framework and the drawing of inferences in the course of interpretation of conversational

implicature in the process of risk communication. Further exploration of these similarities may further enhance the utility of the social amplification of risk framework.

Limitations

The findings in the studies rely on the validity of self-reports of risk perceptions provided by college students in response to simulation scenarios. Though several measures were taken to increase the realism of the scenarios and the degree of personal involvement, these data should be treated as a rough approximation of how the actual perceptions of risk would manifest themselves in the 'field.'

With regard to the lack of representation of general population among college students, arguably the unique nature of studying language phenomena eliminates this concern. The very fact of understanding something in language by a native speaker makes it a valid linguistic phenomenon (see Searle, 1969). In this case, the interpretation of safety assurances by college students can be considered representative of any other language users in this society.

The characteristic feature of the findings in the four studies is that the patterns predicted by the hypotheses were not consistent across all conditions in all four studies. In part, this may be due to the changes in the research instruments used. It could also be due to unexamined variables that changed the dynamic in each experiment. Nevertheless, even with all the limitations, the present investigation does clearly show that safety assurances do have unintended effects.

Future research

One possible direction for future research would be to empirically test the specific mechanisms derived on the basis of the conversational framework regarding how

unintended safety assurances work. Specifically, it would be important to generate direct evidence for the assumption that hearers revise their background presuppositions in order to make unexpected safety assurances meaningful.

To further understand the conditions under which safety assurances produce lower or higher risk perceptions, it would also be interesting to examine the perceived motivations for why a speaker provides a safety assurance. Perhaps this would allow risk communications to be designed so that assurances do indeed have an assuring effect—without producing the unintended increase in risk perceptions that I have demonstrated in this dissertation.

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APPENDICES

Appendix A

*Study 1: No safety assurance (baseline) condition***1. Please read the following excerpt from a transcript of a press conference carefully.****Transcript of Press Conference of the Newforb Mining Corporation**

Tue Jun 14, 2005

West Coast Mining Products Association Headquarters

San Francisco, CA

Mr. Wright: Ladies and gentlemen, good afternoon. I am Phillip D. Wright, Chief Executive Officer of the Newforb Mining Corporation and I would like to welcome all of you to this press briefing... We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology has enabled the extraction of heavy metals with their consequent utilization in chemical industry, while leaving the gravel suitable for use in construction. On October 1, 2005 we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California. The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties.: Mineral, Churchill, and Washoe in the State of Nevada, and ...Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2005... Now I will take some of your questions...

<...>

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = strongly agree 4 = somewhat agree 3 = neither agree nor disagree 2 = somewhat disagree 1 = strongly disagree</p>
--

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
- ___ 2. The transports are safe.
- ___ 3. The transports are dangerous.
- ___ 4. The campaign will be beneficial to Reno.
- ___ 5. The campaign will be harmful to Reno.
- ___ 6. The campaign will be beneficial to Nevada.
- ___ 7. The campaign will be harmful to Nevada.
- ___ 8. The campaign will have positive impact on my life.
- ___ 9. The campaign will have negative impact on my life.
- ___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
- ___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

5 = strongly agree
4 = somewhat agree
3 = neither agree nor disagree
2 = somewhat disagree
1 = strongly disagree

- honest
 interested in informing the public about their activities
 trustworthy
 deceptive
 dishonest
 pursuing his own agenda

4. Without going back to the press conference transcript, please recall what it said about the safety of these transports?

5. The following questions deal with your personal approaches to processing information. Using the same scale, please indicate to what degree you agree or disagree with the following statements.

5 = strongly agree
4 = somewhat agree
3 = neither agree nor disagree
2 = somewhat disagree
1 = strongly disagree

1. I would prefer complex to simple problems.
 2. I like to have the responsibility of handling a situation that requires a lot of thinking.
 3. Thinking is not my idea of fun.
 4. I find satisfaction in deliberating hard and for long hours.
 5. I only think as hard as I have to.
 6. I like tasks that require little thought once I've learned them.
 7. I really enjoy a task that involves coming up with new solutions to problems.
 8. Learning new ways to think doesn't excite me very much.
 9. I prefer my life to be filled with puzzles that I must solve.
 10. The notion of thinking abstractly is appealing to me.
 11. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.
 12. It's enough for me that something gets the job done; I don't care how or why it works.

DEMOGRAPHICS (this is for statistical purposes only)

6. What is your gender? female male

7. What is your age? _____ years

8. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

9. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

Thank you very much for your time!

Study 1: Absolute safety assurance condition

1. Please read the following excerpt from a transcript of a press conference carefully.

Transcript of Press Conference of the Newforb Mining Corporation

Tue Jun 14, 2005

West Coast Mining Products Association Headquarters

San Francisco, CA

Mr. Wright: Ladies and gentlemen, good afternoon. I am Phillip D. Wright, Chief Executive Officer of the Newforb Mining Corporation and I would like to welcome all of you to this press briefing... We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology has enabled the extraction of heavy metals with their consequent utilization in chemical industry, while leaving the gravel suitable for use in construction. On October 1, 2005 we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California. The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties...: Mineral, Churchill, and Washoe in the State of Nevada, and ...Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2005... The Newforb Mining Corporation assures all concerned citizens of the above counties that these transports will present absolutely no risk to their communities. Now I will take some of your questions...

<...>

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = strongly agree 4 = somewhat agree 3 = neither agree nor disagree 2 = somewhat disagree 1 = strongly disagree</p>
--

- | | |
|-----|--|
| ___ | 1. The transportation of wastes through Washoe County is a necessary measure. |
| ___ | 2. The transports are safe. |
| ___ | 3. The transports are dangerous. |
| ___ | 4. The campaign will be beneficial to Reno. |
| ___ | 5. The campaign will be harmful to Reno. |
| ___ | 6. The campaign will be beneficial to Nevada. |
| ___ | 7. The campaign will be harmful to Nevada. |
| ___ | 8. The campaign will have positive impact on my life. |
| ___ | 9. The campaign will have negative impact on my life. |
| ___ | 10. If I were in charge, I would allow the transports to pass through Washoe County. |
| ___ | 11. The transportation campaign has a very high potential for catastrophe. |

3. Using the same scale, please indicate to what degree the speaker appeared to be:

5 = strongly agree
4 = somewhat agree
3 = neither agree nor disagree
2 = somewhat disagree
1 = strongly disagree

- honest
 interested in informing the public about their activities
 trustworthy
 deceptive
 dishonest
 pursuing his own agenda

4. Without going back to the press conference transcript, please recall what it said about the safety of these transports?

5. The following questions deal with your personal approaches to processing information. Using the same scale, please indicate to what degree you agree or disagree with the following statements.

5 = strongly agree
4 = somewhat agree
3 = neither agree nor disagree
2 = somewhat disagree
1 = strongly disagree

1. I would prefer complex to simple problems.
 2. I like to have the responsibility of handling a situation that requires a lot of thinking.
 3. Thinking is not my idea of fun.
 4. I find satisfaction in deliberating hard and for long hours.
 5. I only think as hard as I have to.
 6. I like tasks that require little thought once I've learned them.
 7. I really enjoy a task that involves coming up with new solutions to problems.
 8. Learning new ways to think doesn't excite me very much.
 9. I prefer my life to be filled with puzzles that I must solve.
 10. The notion of thinking abstractly is appealing to me.
 11. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.
 12. It's enough for me that something gets the job done; I don't care how or why it works.

DEMOGRAPHICS (this is for statistical purposes only)

6. What is your gender? female male

7. What is your age? _____ years

8. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

9. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

Thank you very much for your time!

Study 1: Qualified safety assurance condition

1. Please read the following excerpt from a transcript of a press conference carefully.

Transcript of Press Conference of the Newforb Mining Corporation

Tue Jun 14, 2005

West Coast Mining Products Association Headquarters

San Francisco, CA

Mr. Wright: Ladies and gentlemen, good afternoon. I am Phillip D. Wright, Chief Executive Officer of the Newforb Mining Corporation and I would like to welcome all of you to this press briefing... We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology has enabled the extraction of heavy metals with their consequent utilization in chemical industry, while leaving the gravel suitable for use in construction. On October 1, 2005 we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California. The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties...: Mineral, Churchill, and Washoe in the State of Nevada, and ...Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2005... The Newforb Mining Corporation assures all concerned citizens of the above counties that it will take all necessary measures to ensure the safety of these transports. As a result, these transports will present absolutely no risk to the communities... Now I will take some of your questions...

<...>

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

5 = strongly agree
4 = somewhat agree
3 = neither agree nor disagree
2 = somewhat disagree
1 = strongly disagree

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
- ___ 2. The transports are safe.
- ___ 3. The transports are dangerous.
- ___ 4. The campaign will be beneficial to Reno.
- ___ 5. The campaign will be harmful to Reno.
- ___ 6. The campaign will be beneficial to Nevada.
- ___ 7. The campaign will be harmful to Nevada.
- ___ 8. The campaign will have positive impact on my life.
- ___ 9. The campaign will have negative impact on my life.
- ___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
- ___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- honest
 interested in informing the public about their activities
 trustworthy
 deceptive
 dishonest
 pursuing his own agenda

4. Without going back to the press conference transcript, please recall what it said about the safety of these transports?

5. The following questions deal with your personal approaches to processing information. Using the same scale, please indicate to what degree you agree or disagree with the following statements.

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

1. I would prefer complex to simple problems.
 2. I like to have the responsibility of handling a situation that requires a lot of thinking.
 3. Thinking is not my idea of fun.
 4. I find satisfaction in deliberating hard and for long hours.
 5. I only think as hard as I have to.
 6. I like tasks that require little thought once I've learned them.
 7. I really enjoy a task that involves coming up with new solutions to problems.
 8. Learning new ways to think doesn't excite me very much.
 9. I prefer my life to be filled with puzzles that I must solve.
 10. The notion of thinking abstractly is appealing to me.
 11. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.
 12. It's enough for me that something gets the job done; I don't care how or why it works.

DEMOGRAPHICS (this is for statistical purposes only)

6. What is your gender? female male

7. What is your age? _____ years

8. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

9. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

Thank you very much for your time!

Appendix B

*Study 2: No safety assurance (baseline) condition***I. Please read the following text carefully.**

Arsenic is one of the most ubiquitous and paradoxical substances on Earth. In very small amounts, it is essential to life. In large amounts, it is poisonous. Arsenic is an element that occurs naturally in rocks and soil, water, air, plants, and animals. While organic forms of arsenic are benign, its inorganic forms are toxic. In most drinking water sources, the inorganic forms of arsenic tend to be more predominant. The contamination of drinking water sources by arsenic can result both from natural processes, e.g., volcanic eruptions, erosion of rocks and minerals, and forest fires, and from human activities, e.g., the use of arsenic in industrial production, mining, and agriculture.

The current maximum contaminant level for arsenic of 50 parts per billion (ppb) was set by the U.S. Public Health Service in 1942. This standard was reaffirmed by the U.S. Environmental Protection Agency (EPA) in the Safe Drinking Water Act of 1975.

On November 17, 2005, the EPA adopted a new federal standard for arsenic. This standard changes the permitted maximum contaminant level for arsenic from 50 ppb to only 10 ppb. All public water systems are required to comply with the new arsenic rule by January, 2009.

II. Please answer the following questions by circling the number that comes closest to your personal opinion:

1. Will the adoption of the new standard be beneficial or harmful to Reno?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

2. Will the adoption of the new standard be beneficial or harmful to Nevada?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

3. Will this change have a positive or negative impact on your life?

Clearly negative	Mostly negative	Somew hat negative	Somew hat positive	Mostly positive	Clearly positive
---------------------	--------------------	--------------------------	--------------------------	--------------------	---------------------

4. If you were in charge, would you agree to the adoption of this new standard?

Clearly No	Mostly no	Somew hat no	Somew hat yes	Mostly yes	Clearly yes
---------------	--------------	--------------------	---------------------	---------------	----------------

5. Is the drinking water in Nevada safe *today*?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly Safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

6. Will the drinking water in Nevada be safe in the near future, that is, in three years from now (2009)?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly Safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

7. How harmful or beneficial is arsenic to humans?

Clearly Harmful	Mostly harmful	Somewhat harmful	Somewhat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	---------------------	------------------------	----------------------	-----------------------

III. Without going back to the text, please recall what it said about the sources of arsenic in drinking water?

IV. Think about your daily consumption of drinking water. Do you think you are personally exposed to any risk resulting from arsenic contained in the water? Please rate it on a scale from 0 to 5

0	1	2	3	4	5
Not at all, no risk					Very much, a lot of risk

Va. After reading the text, to what extent, do you think it was intended for people like you?

Clearly not for people like me	Mostly not for people like me	Somewhat not for people like me	Somewhat for people like me	Mostly for people like me	Clearly for people like me
---	-------------------------------------	---------------------------------------	-----------------------------------	---------------------------------	----------------------------------

DEMOGRAPHICS (this is needed for statistical purposes only)

VI. What is your gender? female male

VII. What is your age? _____ years

VIII. How would you describe yourself? (check all that apply)

African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

IX. What is the highest degree of education you have achieved?

some high school some college some graduate school
 high school bachelor's graduate degree

X. Please indicate how familiar you are with the topic of arsenic:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XI. Please indicate how familiar you are with the topic of drinking water regulations:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XII. Please indicate your major / minor: _____

XIII. How long have you lived in Northern Nevada? _____ years and _____ months

Thank you very much for your time!

Study 2: Expert statement condition

I. Please read the following text carefully.

Arsenic is one of the most ubiquitous and paradoxical substances on Earth. In very small amounts, it is essential to life. In large amounts, it is poisonous. Arsenic is an element that occurs naturally in rocks and soil, water, air, plants, and animals. While organic forms of arsenic are benign, its inorganic forms are toxic. In most drinking water sources, the inorganic forms of arsenic tend to be more predominant. The contamination of drinking water sources by arsenic can result both from natural processes, e.g., volcanic eruptions, erosion of rocks and minerals, and forest fires, and from human activities, e.g., the use of arsenic in industrial production, mining, and agriculture.

The current maximum contaminant level for arsenic of 50 parts per billion (ppb) was set by the U.S. Public Health Service in 1942. This standard was reaffirmed by the U.S. Environmental Protection Agency (EPA) in the Safe Drinking Water Act of 1975.

On November 17, 2005, the EPA adopted a new federal standard for arsenic. This standard changes the permitted maximum contaminant level for arsenic from 50 ppb to only 10 ppb. All public water systems are required to comply with the new arsenic rule by January, 2009.

In conjunction with the EPA announcement of the new arsenic rule, the Department of Safe Drinking Water of the Nevada Division of Environmental Protection issued an official statement, in which Executive Director James Merton, Ph.D., said: "Nevada is determined to comply with the new rule by the specified deadline." (December 2, 2005).

II. Please answer the following questions by circling the number that comes closest to your personal opinion:

1. Will the adoption of the new standard be beneficial or harmful to Reno?

Clearly Harmful	Mostly harmful	Somewhat harmful	Somewhat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	---------------------	------------------------	----------------------	-----------------------

2. Will the adoption of the new standard be beneficial or harmful to Nevada?

Clearly Harmful	Mostly harmful	Somewhat harmful	Somewhat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	---------------------	------------------------	----------------------	-----------------------

3. Will this change have a positive or negative impact on your life?

Clearly negative	Mostly negative	Somewhat negative	Somewhat positive	Mostly positive	Clearly positive
---------------------	--------------------	----------------------	----------------------	--------------------	---------------------

4. If you were in charge, would you agree to the adoption of this new standard?

Clearly No	Mostly no	Somewhat no	Somewhat yes	Mostly yes	Clearly yes
---------------	--------------	----------------	-----------------	---------------	----------------

5. Is the drinking water in Nevada safe today?

Clearly Unsafe	Mostly Unsafe	Somewhat unsafe	Somewhat safe	Mostly safe	Clearly safe
-------------------	------------------	--------------------	------------------	----------------	-----------------

6. Will the drinking water in Nevada be safe in the near future, that is, in three years from now (2009)?

Clearly Unsafe	Mostly Unsafe	Somewhat unsafe	Somewhat safe	Mostly safe	Clearly safe
-------------------	------------------	--------------------	------------------	----------------	-----------------

7. How harmful or beneficial is arsenic to humans?

Clearly Harmful	Mostly harmful	Somewhat harmful	Somewhat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	---------------------	------------------------	----------------------	-----------------------

III. Without going back to the text, please recall what it said about the sources of arsenic in drinking water?

IV. Think about your daily consumption of drinking water. Do you think you are personally exposed to any risk resulting from arsenic contained in the water? Please rate it on a scale from 0 to 5

0	1	2	3	4	5
Not at all, no risk					Very much, a lot of risk

V. Please indicate your perceptions of the speaker on the following characteristics:

His competence:

Clearly incompetent	Mostly incompetent	Somewhat incompetent	Somewhat competent	Mostly competent	Clearly competent
------------------------	-----------------------	-------------------------	-----------------------	---------------------	----------------------

His honesty:

Clearly dishonest	Mostly dishonest	Somewhat dishonest	Somewhat honest	Mostly honest	Clearly honest
----------------------	---------------------	-----------------------	--------------------	------------------	-------------------

His trustworthiness:

Clearly deceptive	Mostly deceptive	Somewhat deceptive	Somewhat trustworthy	Mostly trustworthy	Clearly trustworthy
----------------------	---------------------	-----------------------	-------------------------	-----------------------	------------------------

Va. After reading the text, to what extent, do you think it was intended for people like you?

Clearly not for people like me	Mostly not for people like me	Somewhat not for people like me	Somewhat for people like me	Mostly for people like me	Clearly for people like me
---	-------------------------------------	---------------------------------------	-----------------------------------	---------------------------------	----------------------------------

DEMOGRAPHICS (this is needed for statistical purposes only)

VI. What is your gender? female male

VII. What is your age? _____ years

VIII. How would you describe yourself? (check all that apply)

<input type="checkbox"/> African American	<input type="checkbox"/> Asian American	<input type="checkbox"/> Caucasian	<input type="checkbox"/> Hispanic / Latino
<input type="checkbox"/> Native American	<input type="checkbox"/> Pacific Islander	<input type="checkbox"/> Other (specify) _____	

IX. What is the highest degree of education you have achieved?

<input type="checkbox"/> some high school	<input type="checkbox"/> some college	<input type="checkbox"/> some graduate school
<input type="checkbox"/> high school	<input type="checkbox"/> bachelor's	<input type="checkbox"/> graduate degree

X. Please indicate how familiar you are with the topic of arsenic:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XI. Please indicate how familiar you are with the topic of drinking water regulations:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XII. Please indicate your major / minor: _____

XIII. How long have you lived in Northern Nevada? _____ years and _____ months

Thank you very much for your time!

Study 2: Expert safety assurance condition

I. Please read the following text carefully.

Arsenic is one of the most ubiquitous and paradoxical substances on Earth. In very small amounts, it is essential to life. In large amounts, it is poisonous. Arsenic is an element that occurs naturally in rocks and soil, water, air, plants, and animals. While organic forms of arsenic are benign, its inorganic forms are toxic. In most drinking water sources, the inorganic forms of arsenic tend to be more predominant. The contamination of drinking water sources by arsenic can result both from natural processes, e.g., volcanic eruptions, erosion of rocks and minerals, and forest fires, and from human activities, e.g., the use of arsenic in industrial production, mining, and agriculture.

The current maximum contaminant level for arsenic of 50 parts per billion (ppb) was adopted by the U.S. Public Health Service in 1942. This standard was reaffirmed by the U.S. Environmental Protection Agency (EPA) in the Safe Drinking Water Act of 1975.

On November 17, 2005, the EPA adopted a new federal standard for arsenic. This standard changes the permitted maximum contaminant level for arsenic from 50 ppb to only 10 ppb. All public water systems are required to comply with the new arsenic rule by January, 2009.

In conjunction with the EPA announcement of the new arsenic rule, the Department of Safe Drinking Water of the Nevada Division of Environmental Protection issued an official statement, in which Executive Director James Merton, Ph.D., said: "Nevada is determined to comply with the new rule by the specified deadline. But I assure all Nevadans that, right now, the water in Nevada is safe," (December 2, 2005).

II. Please answer the following questions by circling the number that comes closest to your personal opinion:

1. Will the adoption of the new standard be beneficial or harmful to Reno?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

2. Will the adoption of the new standard be beneficial or harmful to Nevada?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

3. Will this change have a positive or negative impact on your life?

Clearly negative	Mostly negative	Somew hat negative	Somew hat positive	Mostly positive	Clearly positive
---------------------	--------------------	--------------------------	--------------------------	--------------------	---------------------

4. If you were in charge, would you agree to the adoption of this new standard?

Clearly No	Mostly no	Somew hat no	Somew hat yes	Mostly yes	Clearly yes
---------------	--------------	--------------------	---------------------	---------------	----------------

5. Is the drinking water in Nevada safe today?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

6. Will the drinking water in Nevada be safe in the near future, that is, in three years from now (2009)?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

7. How harmful or beneficial is arsenic to humans?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

III. Without going back to the text, please recall what it said about the sources of arsenic in drinking water?

IV. Think about your daily consumption of drinking water. Do you think you are personally exposed to any risk resulting from arsenic contained in the water? Please rate it on a scale from 0 to 5

0	1	2	3	4	5
Not at all, no risk					Very much, a lot of risk

V. Please indicate your perceptions of the speaker on the following characteristics:

His competence:

Clearly incompetent	Mostly incompetent	Somewhat incompetent	Somewhat competent	Mostly competent	Clearly competent
------------------------	-----------------------	-------------------------	-----------------------	---------------------	----------------------

His honesty:

Clearly dishonest	Mostly dishonest	Somewhat dishonest	Somewhat honest	Mostly honest	Clearly honest
----------------------	---------------------	-----------------------	--------------------	------------------	-------------------

His trustworthiness:

Clearly deceptive	Mostly deceptive	Somewhat deceptive	Somewhat trustworthy	Mostly trustworthy	Clearly trustworthy
----------------------	---------------------	-----------------------	-------------------------	-----------------------	------------------------

Va. After reading the text, to what extent, do you think it was intended for people like you?

Clearly not for people like me	Mostly not for people like me	Somewhat not for people like me	Somewhat for people like me	Mostly for people like me	Clearly for people like me
---	-------------------------------------	---------------------------------------	-----------------------------------	---------------------------------	----------------------------------

DEMOGRAPHICS (this is needed for statistical purposes only)

VI. What is your gender? female male

VII. What is your age? _____ years

VIII. How would you describe yourself? (check all that apply)

<input type="checkbox"/> African American	<input type="checkbox"/> Asian American	<input type="checkbox"/> Caucasian	<input type="checkbox"/> Hispanic / Latino
<input type="checkbox"/> Native American	<input type="checkbox"/> Pacific Islander	<input type="checkbox"/> Other (specify) _____	

IX. What is the highest degree of education you have achieved?

<input type="checkbox"/> some high school	<input type="checkbox"/> some college	<input type="checkbox"/> some graduate school
<input type="checkbox"/> high school	<input type="checkbox"/> bachelor's	<input type="checkbox"/> graduate degree

X. Please indicate how familiar you are with the topic of arsenic:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XI. Please indicate how familiar you are with the topic of drinking water regulations:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XII. Please indicate your major / minor: _____

XIII. How long have you lived in Northern Nevada? _____ years and _____ months

Thank you very much for your time!

Study 2: Non-expert safety assurance condition

I. Please read the following text carefully.

Arsenic is one of the most ubiquitous and paradoxical substances on Earth. In very small amounts, it is essential to life. In large amounts, it is poisonous. Arsenic is an element that occurs naturally in rocks and soil, water, air, plants, and animals. While organic forms of arsenic are benign, its inorganic forms are toxic. In most drinking water sources, the inorganic forms of arsenic tend to be more predominant. The contamination of drinking water sources by arsenic can result both from natural processes, e.g., volcanic eruptions, erosion of rocks and minerals, and forest fires, and from human activities, e.g., the use of arsenic in industrial production, mining, and agriculture.

The current maximum contaminant level for arsenic of 50 parts per billion (ppb) was set by the U.S. Public Health Service in 1942. This standard was reaffirmed by the U.S. Environmental Protection Agency (EPA) in the Safe Drinking Water Act of 1975.

On November 17, 2005, the EPA adopted a new federal standard for arsenic. This standard changes the permitted maximum contaminant level for arsenic from 50 ppb to only 10 ppb. All public water systems are required to comply with the new arsenic rule by January, 2009.

In conjunction with the EPA announcement of the new arsenic rule, the Department of Communications for the Office of the Governor of the State of Nevada issued an official statement, in which Chief Information Officer James Merton said: "Nevada is determined to comply with the new rule by the specified deadline. But I assure all Nevadans that, right now, the water in Nevada is safe," (December 2, 2005).

II. Please answer the following questions by circling the number that comes closest to your personal opinion:

1. Will the adoption of the new standard be beneficial or harmful to Reno?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

2. Will the adoption of the new standard be beneficial or harmful to Nevada?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

3. Will this change have a positive or negative impact on your life?

Clearly negative	Mostly negative	Somew hat negative	Somew hat positive	Mostly positive	Clearly positive
---------------------	--------------------	--------------------------	--------------------------	--------------------	---------------------

4. If you were in charge, would you agree to the adoption of this new standard?

Clearly No	Mostly no	Somew hat no	Somew hat yes	Mostly yes	Clearly yes
---------------	--------------	--------------------	---------------------	---------------	----------------

5. Is the drinking water in Nevada safe *today*?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

6. Will the drinking water in Nevada be safe in the near future, that is, in three years from now (2009)?

Clearly Unsafe	Mostly Unsafe	Somewh at unsafe	Somew hat safe	Mostly safe	Clearly safe
-------------------	------------------	------------------------	----------------------	----------------	-----------------

7. How harmful or beneficial is arsenic to humans?

Clearly Harmful	Mostly harmful	Somew hat harmful	Somew hat beneficial	Mostly beneficial	Clearly beneficial
--------------------	-------------------	-------------------------	----------------------------	----------------------	-----------------------

III. Without going back to the text, please recall what it said about the sources of arsenic in drinking water?

IV. Think about your daily consumption of drinking water. Do you think you are personally exposed to any risk resulting from arsenic contained in the water? Please rate it on a scale from 0 to 5

0	1	2	3	4	5
Not at all, no risk					Very much, a lot of risk

V. Please indicate your perceptions of the speaker on the following characteristics:

His competence:

Clearly incompetent	Mostly incompetent	Somewhat incompetent	Somewhat competent	Mostly competent	Clearly competent
------------------------	-----------------------	-------------------------	-----------------------	---------------------	----------------------

His honesty:

Clearly dishonest	Mostly dishonest	Somewhat dishonest	Somewhat honest	Mostly honest	Clearly honest
----------------------	---------------------	-----------------------	--------------------	------------------	-------------------

His trustworthiness:

Clearly deceptive	Mostly deceptive	Somewhat deceptive	Somewhat trustworthy	Mostly trustworthy	Clearly trustworthy
----------------------	---------------------	-----------------------	-------------------------	-----------------------	------------------------

Va. After reading the text, to what extent, do you think it was intended for people like you?

Clearly not for people like me	Mostly not for people like me	Somewhat not for people like me	Somewhat for people like me	Mostly for people like me	Clearly for people like me
---	-------------------------------------	---------------------------------------	-----------------------------------	---------------------------------	----------------------------------

DEMOGRAPHICS (this is needed for statistical purposes only)

VI. What is your gender? female male

VII. What is your age? _____ years

VIII. How would you describe yourself? (check all that apply)

African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

IX. What is the highest degree of education you have achieved?

some high school some college some graduate school
 high school bachelor's graduate degree

X. Please indicate how familiar you are with the topic of arsenic:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XI. Please indicate how familiar you are with the topic of drinking water regulations:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

XII. Please indicate your major / minor: _____

XIII. How long have you lived in Northern Nevada? _____ years and _____ months

Thank you very much for your time!

Appendix C

*Study 3: No concern - no assurance condition***1. Please read the following excerpt from a transcript of a press conference carefully.**

Transcript of Press Conference of the WestOrb Mining Corporation

Tue March 18, 2008

WestOrb Mining Corporation Headquarters, San Francisco, CA;

live video feed to Sacramento, CA, Auburn, CA, and Reno, NV.

ROTHMAN: Ladies and gentlemen, good afternoon. I am Phillip Rothman, Chief Engineer of the WestOrb Mining Corporation and I would like to welcome all of you to this press briefing.

We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology allows us to extract the heavy metals from the wastes and to use them in chemical industry. The remaining rock can be used in construction. On October 1, 2008, we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California.

The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties: Mineral, Churchill, and Washoe in the State of Nevada, and Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2008.

Now I will take some of your questions...

<...>

**WITHOUT GOING BACK IN THE QUESTIONNAIRE,
PLEASE ANSWER THE QUESTIONS BELOW**

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
___ 2. The transports are safe.
___ 3. The transports are dangerous.
___ 4. The campaign will be beneficial to Reno.
___ 5. The campaign will be harmful to Reno.
___ 6. The campaign will be beneficial to Nevada.
___ 7. The campaign will be harmful to Nevada.
___ 8. The campaign will have positive impact on my life.
___ 9. The campaign will have negative impact on my life.
___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ honest
___ interested in informing the public about their activities
___ trustworthy
___ deceptive
___ dishonest
___ pursuing his own agenda

QUESTIONS ABOUT YOU (this is needed for statistical purposes only)

4. What is your gender? female male

5. What is your age? _____ years

6. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

7. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

8. Please indicate how familiar you are with the subject of mining wastes (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

9. Please indicate how familiar you are with the subject of heavy metals (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

10. Please indicate your major / minor: _____

11. What natural science courses have you taken at UNR? have not taken any yet

12. How long have you lived in Northern Nevada / Tahoe area? _____ years and _____ months

13. Did you grow up in rural or urban area? (choose one) urban suburban rural

14. How often do you read local newspapers? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

15. How often do you watch local news? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

16. How active are you in the community affairs of the Reno/Tahoe area? (circle one)

Completely inactive Mostly inactive Somewhat inactive Somewhat active Mostly active Very active

17. How would you describe yourself in relation to the environmental movement? (circle one)

Very anti-environmental Mostly anti-environmental Somewhat anti-environmental Somewhat pro-environmental Mostly pro-environmental Very pro-environmental

18. Do you think the speaker understands the common people and their concerns? (circle one)

Does not understand at all Mostly does not understand Somewhat does not understand Somewhat understands Mostly understands Understands very well

19. To what extent do you believe that WestOrb Mining Corporation has the best interest of the public in mind when they make public announcements like the one you read about in the transcript? (circle one)

Does not have at all Mostly does not have Somewhat does not have Somewhat does have Mostly does have Completely has best interest

20. Without going back to the press conference transcript, please recall what it said about the route of these transports?

Thank you very much for your time!

Study 3: No concern + safety assurance condition

1. Please read the following excerpt from a transcript of a press conference carefully.

Transcript of Press Conference of the WestOrb Mining Corporation

Tue March 18, 2008

WestOrb Mining Corporation Headquarters, San Francisco, CA;
live video feed to Sacramento, CA, Auburn, CA, and Reno, NV.

ROTHMAN: Ladies and gentlemen, good afternoon. I am Phillip Rothman, Chief Engineer of the WestOrb Mining Corporation and I would like to welcome all of you to this press briefing.

We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology allows us to extract the heavy metals from the wastes and to use them in chemical industry. The remaining rock can be used in construction. On October 1, 2008, we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California.

The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties: Mineral, Churchill, and Washoe in the State of Nevada, and Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2008.

WestOrb Mining Corporation assures all concerned citizens that these transports will present absolutely no risk to their communities.

Now I will take some of your questions...

<...>

**WITHOUT GOING BACK IN THE QUESTIONNAIRE,
PLEASE ANSWER THE QUESTIONS BELOW**

3. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
___ 2. The transports are safe.
___ 3. The transports are dangerous.
___ 4. The campaign will be beneficial to Reno.
___ 5. The campaign will be harmful to Reno.
___ 6. The campaign will be beneficial to Nevada.
___ 7. The campaign will be harmful to Nevada.
___ 8. The campaign will have positive impact on my life.
___ 9. The campaign will have negative impact on my life.
___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ honest
___ interested in informing the public about their activities
___ trustworthy
___ deceptive
___ dishonest
___ pursuing his own agenda

QUESTIONS ABOUT YOU (this is needed for statistical purposes only)

4. What is your gender? female male
5. What is your age? _____ years
6. How would you describe yourself? (check all that apply)
- | | | | |
|---|---|--|--|
| <input type="checkbox"/> African American | <input type="checkbox"/> Asian American | <input type="checkbox"/> Caucasian | <input type="checkbox"/> Hispanic / Latino |
| <input type="checkbox"/> Native American | <input type="checkbox"/> Pacific Islander | <input type="checkbox"/> Other (specify) _____ | |
7. What is the highest degree of education you have achieved?
- | | | |
|---|---------------------------------------|---|
| <input type="checkbox"/> some high school | <input type="checkbox"/> some college | <input type="checkbox"/> some graduate school |
| <input type="checkbox"/> high school | <input type="checkbox"/> bachelor's | <input type="checkbox"/> graduate degree |
8. Please indicate how familiar you are with the subject of mining wastes (circle one):
- | | | | | | |
|----------------------------|---------------------------|-----------------------------|----------------------|--------------------|---------------------|
| Clearly
not
familiar | Mostly
not
familiar | Somewhat
not
familiar | Somewhat
familiar | Mostly
familiar | Clearly
familiar |
|----------------------------|---------------------------|-----------------------------|----------------------|--------------------|---------------------|
9. Please indicate how familiar you are with the subject of heavy metals (circle one):
- | | | | | | |
|----------------------------|---------------------------|-----------------------------|----------------------|--------------------|---------------------|
| Clearly
not
familiar | Mostly
not
familiar | Somewhat
not
familiar | Somewhat
familiar | Mostly
familiar | Clearly
familiar |
|----------------------------|---------------------------|-----------------------------|----------------------|--------------------|---------------------|

10. Please indicate your major / minor: _____

11. What natural science courses have you taken at UNR? have not taken any yet

12. How long have you lived in Northern Nevada / Tahoe area? _____ years and _____ months

13. Did you grow up in rural or urban area? (choose one) urban suburban rural

14. How often do you read local newspapers? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

15. How often do you watch local news? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

16. How active are you in the community affairs of the Reno/Tahoe area? (circle one)

Completely inactive Mostly inactive Somewhat inactive Somewhat active Mostly active Very active

17. How would you describe yourself in relation to the environmental movement? (circle one)

Very anti-environmental Mostly anti-environmental Somewhat anti-environmental Somewhat pro-environmental Mostly pro-environmental Very pro-environmental

18. Do you think the speaker understands the common people and their concerns? (circle one)

Does not understand at all Mostly does not understand Somewhat does not understand Somewhat understands Mostly understands Understands very well

19. To what extent do you believe that WestOrb Mining Corporation has the best interest of the public in mind when they make public announcements like the one you read about in the transcript? (circle one)

Does not have at all Mostly does not have Somewhat does not have Somewhat does have Mostly does have Completely has best interest

20. Without going back to the press conference transcript, please recall what it said about the route of these transports?

 Thank you very much for your time!

Study 3: Speaker-initiated concern + safety assurance condition

1. Please read the following excerpt from a transcript of a press conference carefully.

Transcript of Press Conference of the WestOrb Mining Corporation

Tue March 18, 2008

WestOrb Mining Corporation Headquarters, San Francisco, CA;
live video feed to Sacramento, CA, Auburn, CA, and Reno, NV.

ROTHMAN: Ladies and gentlemen, good afternoon. I am Phillip Rothman, Chief Engineer of the WestOrb Mining Corporation and I would like to welcome all of you to this press briefing.

We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology allows us to extract the heavy metals from the wastes and to use them in chemical industry. The remaining rock can be used in construction. On October 1, 2008, we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California.

The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties: Mineral, Churchill, and Washoe in the State of Nevada, and Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2008.

I imagine there are people out there who are worried when they hear about trains with contaminated mining wastes passing through their county.

However, WestOrb Mining Corporation assures all concerned citizens that these transports will present absolutely no risk to their communities.

Now I will take some of your questions...

<...>

**WITHOUT GOING BACK IN THE QUESTIONNAIRE,
PLEASE ANSWER THE QUESTIONS BELOW**

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
___ 2. The transports are safe.
___ 3. The transports are dangerous.
___ 4. The campaign will be beneficial to Reno.
___ 5. The campaign will be harmful to Reno.
___ 6. The campaign will be beneficial to Nevada.
___ 7. The campaign will be harmful to Nevada.
___ 8. The campaign will have positive impact on my life.
___ 9. The campaign will have negative impact on my life.
___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ honest
___ interested in informing the public about their activities
___ trustworthy
___ deceptive
___ dishonest
___ pursuing his own agenda

QUESTIONS ABOUT YOU (this is needed for statistical purposes only)

4. What is your gender? female male

5. What is your age? _____ years

6. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

7. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

8. Please indicate how familiar you are with the subject of mining wastes (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

9. Please indicate how familiar you are with the subject of heavy metals (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

10. Please indicate your major / minor: _____

11. What natural science courses have you taken at UNR? have not taken any yet

12. How long have you lived in Northern Nevada / Tahoe area? _____ years and _____ months

13. Did you grow up in rural or urban area? (choose one) urban suburban rural

14. How often do you read local newspapers? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

15. How often do you watch local news? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

16. How active are you in the community affairs of the Reno/Tahoe area? (circle one)

Completely inactive Mostly inactive Somewhat inactive Somewhat active Mostly active Very active

17. How would you describe yourself in relation to the environmental movement? (circle one)

Very anti-environmental Mostly anti-environmental Somewhat anti-environmental Somewhat pro-environmental Mostly pro-environmental Very pro-environmental

18. Do you think the speaker understands the common people and their concerns? (circle one)

Does not understand at all Mostly does not understand Somewhat does not understand Somewhat understands Mostly understands Understands very well

19. To what extent do you believe that WestOrb Mining Corporation has the best interest of the public in mind when they make public announcements like the one you read about in the transcript? (circle one)

Does not have at all Mostly does not have Somewhat does not have Somewhat does have Mostly does have Completely has best interest

20. Without going back to the press conference transcript, please recall what it said about the route of these transports?

Thank you very much for your time!

Study 3: Hearer initiated concern + safety assurance condition

1. Please read the following excerpt from a transcript of a press conference carefully.

Transcript of Press Conference of the WestOrb Mining Corporation

Tue March 18, 2008

WestOrb Mining Corporation Headquarters, San Francisco, CA;
live video feed to Sacramento, CA, Auburn, CA, and Reno, NV.

ROTHMAN: Ladies and gentlemen, good afternoon. I am Phillip Rothman, Chief Engineer of the WestOrb Mining Corporation and I would like to welcome all of you to this press briefing.

We are pleased to announce the beginning of a new phase in our company's history. In our continuing efforts to improve the mining industry's environmental performance, we are initiating a recycling program at the Pentoe Peak Mine in Nevada that will utilize wastes from holes PO4-309 and PO3-352, previously discarded as unusable... These wastes, in the form of gravel, contain high percentage of heavy metal contaminants, and, as in many mines around the world, have been previously stored on site...

Now, the latest development in recycling technology allows us to extract the heavy metals from the wastes and to use them in chemical industry. The remaining rock can be used in construction. On October 1, 2008, we will begin transporting the contaminated gravel from its current location at the Pentoe Peak Mine, South-East of Fallon, Nevada, to a processing plant near Oakland, California.

The wastes will be transported by train using secure covered railcars designed to withstand Class III hazards on the five-point Federal Hazard Scale. The transports will follow the routes through the following counties: Mineral, Churchill, and Washoe in the State of Nevada, and Nevada, Placer, Sacramento, San Joaquin, and Alameda in the State of California. We are expecting for the transports to be completed by November 30, 2008.

Now I will take some of your questions...

Q: Reno Gazette-Journal...Can you tell us about the safety of these transports?

ROTHMAN: WestOrb Mining Corporation assures all concerned citizens that these transports will present absolutely no risk to their communities...

<...>

**WITHOUT GOING BACK IN THE QUESTIONNAIRE,
PLEASE ANSWER THE QUESTIONS BELOW**

2. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the following scale:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ 1. The transportation of wastes through Washoe County is a necessary measure.
___ 2. The transports are safe.
___ 3. The transports are dangerous.
___ 4. The campaign will be beneficial to Reno.
___ 5. The campaign will be harmful to Reno.
___ 6. The campaign will be beneficial to Nevada.
___ 7. The campaign will be harmful to Nevada.
___ 8. The campaign will have positive impact on my life.
___ 9. The campaign will have negative impact on my life.
___ 10. If I were in charge, I would allow the transports to pass through Washoe County.
___ 11. The transportation campaign has a very high potential for catastrophe.

3. Using the same scale, please indicate to what degree the speaker appeared to be:

<p>5 = <i>strongly agree</i> 4 = <i>somewhat agree</i> 3 = <i>neither agree nor disagree</i> 2 = <i>somewhat disagree</i> 1 = <i>strongly disagree</i></p>
--

- ___ honest
___ interested in informing the public about their activities
___ trustworthy
___ deceptive
___ dishonest
___ pursuing his own agenda

QUESTIONS ABOUT YOU (this is needed for statistical purposes only)

4. What is your gender? female male

5. What is your age? _____ years

6. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

7. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

8. Please indicate how familiar you are with the subject of mining wastes (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

9. Please indicate how familiar you are with the subject of heavy metals (circle one):

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
----------------------------	---------------------------	-----------------------------	----------------------	--------------------	---------------------

10. Please indicate your major / minor: _____

11. What natural science courses have you taken at UNR? have not taken any yet

12. How long have you lived in Northern Nevada / Tahoe area? _____ years and _____ months

13. Did you grow up in rural or urban area? (choose one) urban suburban rural

14. How often do you read local newspapers? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

15. How often do you watch local news? (circle one)

Never Seldom Somewhat seldom Somewhat often Often Daily

16. How active are you in the community affairs of the Reno/Tahoe area? (circle one)

Completely inactive Mostly inactive Somewhat inactive Somewhat active Mostly active Very active

17. How would you describe yourself in relation to the environmental movement? (circle one)

Very anti-environmental Mostly anti-environmental Somewhat anti-environmental Somewhat pro-environmental Mostly pro-environmental Very pro-environmental

18. Do you think the speaker understands the common people and their concerns? (circle one)

Does not understand at all Mostly does not understand Somewhat does not understand Somewhat understands Mostly understands Understands very well

19. To what extent do you believe that WestOrb Mining Corporation has the best interest of the public in mind when they make public announcements like the one you read about in the transcript? (circle one)

Does not have at all Mostly does not have Somewhat does not have Somewhat does have Mostly does have Completely has best interest

20. Without going back to the press conference transcript, please recall what it said about the route of these transports?

 Thank you very much for your time!

Appendix D

Study 4: Related safety concern + safety assurance condition

Dear participant,

Thank you for agreeing to take part in this research. Below we have three short unrelated studies which we have combined in this questionnaire. Please fill them out to the best of your ability.

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Ranchers hear update on mad cow

By ANGELA CARDING

ELKO - Nevada ranchers are feeling less impact from the mad cow disease discovery in eastern Washington than expected. Chances that any Nevada cattle are infected are very slim.

That was the word at the Cattlemen's Update Wednesday at the Elko Convention Center. The state veterinarian, Dr. David Thain of the Nevada Department of Agriculture, said an important point for consumers to hear is that any cows that "look ill are condemned and never go into the food chain."

Mad cow disease, also known as Bovine Spongiform Encephalopathy (BSE), is a disease that destroys the brain. It is caused by tiny infectious particles, Thain said. The particles get into nerve cells and accumulate, killing cells and spreading to others "until you see a critical illness," he said.

"There is a very, very long incubation period," of about 2-8 years for BSE and 8-20 years in humans. But it is only during the last 4 months of the disease that the scientists can identify the infectious particles. In humans, the illness is called variant Creutzfeldt-Jakob disease. "It's progressive. It's fatal," Thain said.

As for how consumers should react, a little common sense plays a big role.

"A person shouldn't eat cow brains or the spinal cord," Thain said. He added, however, that the top of the T on a T-bone steak is spinal cord. Hot dogs and sausage could have nervous tissue, but they wouldn't have brain or spinal cord parts because those have been banned, Thain also said in answer to a question from the audience.

a. Did you find the article informative? (circle one)

Very informative	Mostly informative	Somewhat informative	Somewhat uninformative	Mostly uninformative	Very uninformative
---------------------	-----------------------	-------------------------	---------------------------	-------------------------	-----------------------

b. Did you find the article easy to understand? (circle one)

Very easy to understand	Mostly easy to understand	Somewhat easy to understand	Somewhat difficult to understand	Mostly difficult to understand	Very difficult to understand
-------------------------------	---------------------------------	-----------------------------------	--	--------------------------------------	------------------------------------

c. How would you evaluate the quality of writing? (circle one)

Very good	Good	Somewhat good	Somewhat poor	Poor	Very poor
-----------	------	------------------	------------------	------	--------------

d. Is there anything you would change about this article to make it more effective?

Thank you very much!

Study II

The following questions ask about your preferences concerning *music media of today*. Please respond quickly without thinking too much.

1. How do you get your music? Please respond in two steps:

Step 1: Check all sources on the list that you normally use.

Step 2: Rank your sources in order of importance. Use “1” for your most important source, “2” for your second most important etc. (Do not rank the sources that you do not use.)

1. Check 2. RANK



- _____ buy CDs in stores and online
- _____ buy iTunes
- _____ buy individual songs (mp3s and other formats) from internet retailers (e.g., Amazon.com, Beatport.com)
- _____ download files through peer-to-peer networks
- _____ copy music from friends
- _____ buy vinyl records
- _____ buy tapes

2. How do you normally listen to music? Please respond in two steps:

Step 1: Check all devices on the list that you normally use.

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1. Check 2. RANK



- _____ Stereo system (car, home, etc.)
- _____ Personal CD player
- _____ iPod
- _____ Mp3 player (like Zune etc.; non-iPod)
- _____ Phone with a digital player (all digital formats, mp3, iTunes, etc.)
- _____ Radio
- _____ Internet radio
- _____ Satellite radio

Thanks!

Study III

We often receive numerous public announcements and are expected to make decisions based on the information we got. This study looks at how we make some of these decisions. Please read the following blurb and answer the questions below.

New restaurant set to open in Reno

By SAM JEFFRIES, "Food & Drink" columnist

Reno, NV – Visitors and locals alike will have a new choice for dining Downtown when the Big Pine Grill opens in Reno next month.

Brian Hoy, who co-owns Big Pine Grill with David Ables, said the Grill will have a full lunch and dinner menu, champion a full bar, and offer the patrons various activities such as pool, darts, video games, and trivia.

The Big Pine Grill, which will be at 101 W. Second St., also can accommodate groups who want to rent the large back dining room for meetings, seminars, product launches, or other occasions. The room can hold up 100 guests live and has the capacity to serve another 100 via conference call and/or webinar.

"First of all, I assure you that our food is completely safe," Ables said.

"Book us for your special events or simply join us for lunch, happy hour, dinner, and any time in between and after," Hoy said.

Ables said Big Pine also will have a takeout menu and will deliver within a 10 mile radius of Downtown.

<...>

1. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the scale below:

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- | | |
|-----|--|
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| ___ | 4. I don't think this restaurant will be successful in Reno. |
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| ___ | 9. The restaurant owners appear to be trustworthy. |
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| ___ | 12. The Big Pine Grill has some problems with food safety. |
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QUESTIONS ABOUT YOU (this is needed for statistical purposes, very important to fill out)

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16. How would you describe yourself? (check all that apply)

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- Native American Pacific Islander Other (specify) _____

17. What is the highest degree of education you have achieved?

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- high school bachelor's graduate degree

18. Please indicate how well you are familiar with the topic of food safety:

- | | | | | | |
|-------------------------|------------------------|--------------------------|----------------------|--------------------|---------------------|
| Clearly
not familiar | Mostly not
familiar | Somewhat
not familiar | Somewhat
familiar | Mostly
familiar | Clearly
familiar |
|-------------------------|------------------------|--------------------------|----------------------|--------------------|---------------------|

19. Do you consider yourself a vegetarian? no yes

20. Please indicate your major / minor: _____

21. What natural science courses have you taken at UNR? have not taken any yet

22. How long have you lived in Northern Nevada (or Truckee/Tahoe)? _____ years and _____ months

23. One measure of the quality of newspaper articles is how easily readers remember their content. Without going back in the questionnaire, write down three facts about the restaurant or its owners.

Thank you very much for your time!

Study 4: Related safety concern - no safety assurance condition

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a. Did you find the article informative? (circle one)

Very informative Mostly informative Somewhat informative Somewhat uninformative Mostly uninformative Very uninformative

b. Did you find the article easy to understand? (circle one)

Very easy to understand Mostly easy to understand Somewhat easy to understand Somewhat difficult to understand Mostly difficult to understand Very difficult to understand

c. How would you evaluate the quality of writing? (circle one)

Very good Good Somewhat good Somewhat poor Poor Very poor

d. Is there anything you would change about this article to make it more effective?

Thank you very much!

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The following questions ask about your preferences concerning *music media of today*. Please respond quickly without thinking too much.

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1. Check 2. RANK



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1. Check 2. RANK



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- _____ iPod
- _____ Mp3 player (like Zune etc.; non-iPod)
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- _____ Radio
- _____ Internet radio
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Thanks!

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The Big Pine Grill, which will be at 101 W. Second St., also can accommodate groups who want to rent the large back dining room for meetings, seminars, product launches, or other occasions. The room can hold up 100 guests live and has the capacity to serve another 100 via conference call and/or webinar.

"Book us for your special events or simply join us for lunch, happy hour, dinner, and any time in between and after," Hoy said.

Ables said Big Pine also will have a takeout menu and will deliver within a 10 mile radius of Downtown.

<...>

1. Based on the excerpt that you have just read, please read the following statements and decide whether or not you agree with each one. Place a number in the blank line next to each statement using the scale below:

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--

- | | |
|--------------------------|--|
| <input type="checkbox"/> | 1. I will likely eat at the Big Pine Grill. |
| <input type="checkbox"/> | 2. It is unlikely that I will eat at the Big Pine Grill. |
| <input type="checkbox"/> | 3. I think this restaurant will be successful in Reno. |
| <input type="checkbox"/> | 4. I don't think this restaurant will be successful in Reno. |
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| <input type="checkbox"/> | 11. The chance that someone will contract food poisoning at the Big Pine Grill is low. |
| <input type="checkbox"/> | 12. The Big Pine Grill has some problems with food safety. |
| <input type="checkbox"/> | 13. The Washoe County Health Department does an adequate job of monitoring food safety in the restaurants around the county. |

QUESTIONS ABOUT YOU (this is needed for statistical purposes, very important to fill out)

14. What is your sex? female male

15. What is your age? _____ years

16. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
 Native American Pacific Islander Other (specify) _____

17. What is the highest degree of education you have achieved?

- some high school some college some graduate school
 high school bachelor's graduate degree

18. Please indicate how well you are familiar with the topic of food safety:

Clearly not familiar	Mostly not familiar	Somewhat not familiar	Somewhat familiar	Mostly familiar	Clearly familiar
-------------------------	------------------------	--------------------------	----------------------	--------------------	---------------------

19. Do you consider yourself a vegetarian? no yes

20. Please indicate your major / minor: _____

21. What natural science courses have you taken at UNR? have not taken any yet

22. How long have you lived in Northern Nevada (or Truckee/Tahoe)? _____ years and _____ months

23. One measure of the quality of newspaper articles is how easily readers remember their content. Without going back in the questionnaire, write down three facts about the restaurant or its owners.

Thank you very much for your time!

Study 4: Unrelated safety concern + safety assurance condition

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By Daniel Clark

It is difficult to believe at first – how could something so simple and harmless as light be considered a pollutant? After all, the day is full of light, so how could a little light at night be so bad? The answer is simply that artificial light at night is out of place, so even small amounts of light can have a big impact on environment. Artificial light is a powerful tool that has become common only with the invention of the light bulb in 1879. If you look on our planet from space today, the first noticeable environmental change is the light from the cities at night.

It was the astronomers who were the first to sound the alarm, when the view of the night sky through telescopes and by naked eye literally disappeared as city lights grew brighter. Stray light increases the brightness of the night sky by making space appear light grey or pale yellow. The stars and faint objects are then lost by reduced contrast. Light pollution also prevents the human eye from fully adapting to dark.

For nocturnal animals stray light means the disruption of habitat. Animals often depend on darkness in order to hunt, conceal their location, navigate, or reproduce. This is made worse by the fact that many species have vision far more sensitive than human vision. Plants too can be affected by artificial light – you may have noticed that a tree beneath a bright streetlight will lose its leaves in autumn after all the other nearby trees have.

a. Did you find the article informative? (circle one)

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c. How would you evaluate the quality of writing? (circle one)

Very good Good Somewhat good Somewhat poor Poor Very poor

d. Is there anything you would change about this article to make it more effective?

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Thanks!

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|-------------------------|------------------------|--------------------------|----------------------|--------------------|---------------------|
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- ___ 13. The Washoe County Health Department does an adequate job of monitoring food safety in the restaurants around the county.

QUESTIONS ABOUT YOU (this is needed for statistical purposes, very important to fill out)

14. What is your sex? female male

15. What is your age? _____ years

16. How would you describe yourself? (check all that apply)

- African American Asian American Caucasian Hispanic / Latino
- Native American Pacific Islander Other (specify)_____

17. What is the highest degree of education you have achieved?

- some high school some college some graduate school
- high school bachelor's graduate degree

18. Please indicate how well you are familiar with the topic of food safety:

- | | | | | | |
|-------------------------|------------------------|--------------------------|----------------------|--------------------|---------------------|
| Clearly
not familiar | Mostly not
familiar | Somewhat
not familiar | Somewhat
familiar | Mostly
familiar | Clearly
familiar |
|-------------------------|------------------------|--------------------------|----------------------|--------------------|---------------------|

19. Do you consider yourself a vegetarian? no yes

20. Please indicate your major / minor: _____

21. What natural science courses have you taken at UNR? have not taken any yet

22. How long have you lived in Northern Nevada (or Truckee/Tahoe)? _____ years and _____ months

23. One measure of the quality of newspaper articles is how easily readers remember their content. Without going back in the questionnaire, write down three facts about the restaurant or its owners.

Thank you very much for your time!

Study 4: No safety concern + safety assurance condition

Dear participant,

Thank you for agreeing to take part in this research. Below we have three short unrelated studies which we have combined in this questionnaire. Please fill them out to the best of your ability.

Study I

Journalists need to communicate information concisely and effectively. Below is a typical 200+word article written by a student journalist from UNR and we are interested to know your opinion about it.

Welcome to Great Basin National Park

By Ruth Simmons

Come to Great Basin National Park to experience the solitude of the desert, the smell of sagebrush after a thunderstorm, the darkest of night skies, the beauty of Lehman Caves, and the magnificence of 5,000-old bristlecone pine trees! Far from a wasteland, the Great Basin is a diverse region that awaits your discovery.

Boundaries of Great Basin can be defined three different ways. By looking at the way the water flows, Great Basin is 200,000 square miles area, where all water from rain and snow evaporates, sinks underground or flows into in-land lakes through streams and rivers. None of the water goes to the Pacific Ocean or the Gulf of Mexico.

By looking at the earth structure, Great Basin and Range region is the product of geological forces stretching the earth's crust, creating many north-south trending mountain ranges, separated by flat valleys or basins. These hundreds of ranges make Nevada the most mountainous state in the country. There is almost an 8,000 foot difference in elevation between Wheeler Peak and the valley floor in the Great Basin National Park.

By looking at animals and plants, the Great Basin Desert is defined by communities of species that live here. The individual ranges act as islands isolated by seas of desert vegetation. At every elevation there is a different biological community, from those adapted to the desert to those adapted to forest and alpine environments. The Great Basin Desert a temperate desert with hot, dry summers and snowy winters, affected by the rain shadow of the Sierra Nevada and Cascade Mountains.

a. Did you find the article informative? (circle one)

Very informative Mostly informative Somewhat informative Somewhat uninformative Mostly uninformative Very uninformative

b. Did you find the article easy to understand? (circle one)

Very easy to understand Mostly easy to understand Somewhat easy to understand Somewhat difficult to understand Mostly difficult to understand Very difficult to understand

c. How would you evaluate the quality of writing? (circle one)

Very good Good Somewhat good Somewhat poor Poor Very poor

d. Is there anything you would change about this article to make it more effective?

Thank you very much!

Study II

The following questions ask about your preferences concerning *music media of today*. Please respond quickly without thinking too much.

1. How do you get your music? Please respond in two steps:

Step 1: Check all sources on the list that you normally use.

Step 2: Rank your sources in order of importance. Use “1” for your most important source, “2” for your second most important etc. (Do not rank the sources that you do not use.)

1. Check 2. RANK



- _____ buy CDs in stores and online
- _____ buy iTunes
- _____ buy individual songs (mp3s and other formats) from internet retailers (e.g., Amazon.com, Beatport.com)
- _____ download files through peer-to-peer networks
- _____ copy music from friends
- _____ buy vinyl records
- _____ buy tapes

2. How do you normally listen to music? Please respond in two steps:

Step 1: Check all devices on the list that you normally use.

Step 2: Rank your devices in order of usage. Use “1” for the device you use most often, “2” for the device you use second most often etc. (Do not rank the devices that you do not use.)

1. Check 2. RANK



- _____ Stereo system (car, home, etc.)
- _____ Personal CD player
- _____ iPod
- _____ Mp3 player (like Zune etc.; non-iPod)
- _____ Phone with a digital player (all digital formats, mp3, iTunes, etc.)
- _____ Radio
- _____ Internet radio
- _____ Satellite radio

Thanks!

Study III

We often receive numerous public announcements and are expected to make decisions based on the information we got. This study looks at how we make some of these decisions. Please read the following blurb and answer the questions below.

New restaurant set to open in Reno

By SAM JEFFRIES, "Food & Drink" columnist

Reno, NV – Visitors and locals alike will have a new choice for dining Downtown when the Big Pine Grill opens in Reno next month.

Brian Hoy, who co-owns Big Pine Grill with David Ables, said the Grill will have a full lunch and dinner menu, champion a full bar, and offer the patrons various activities such as pool, darts, video games, and trivia.

The Big Pine Grill, which will be at 101 W. Second St., also can accommodate groups who want to rent the large back dining room for meetings, seminars, product launches, or other occasions. The room can hold up 100 guests live and has the capacity to serve another 100 via conference call and/or webinar.

"First of all, I assure you that our food is completely safe," Ables said.

"Book us for your special events or simply join us for lunch, happy hour, dinner, and any time in between and after," Hoy said.

Ables said Big Pine also will have a takeout menu and will deliver within a 10 mile radius of Downtown.

<...>

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|-----|--|
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| ___ | 12. The Big Pine Grill has some problems with food safety. |
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14. What is your sex? female male

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17. What is the highest degree of education you have achieved?

- some high school some college some graduate school
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18. Please indicate how well you are familiar with the topic of food safety:

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23. One measure of the quality of newspaper articles is how easily readers remember their content. Without going back in the questionnaire, write down three facts about the restaurant or its owners:

Thank you very much for your time!

Study 4: No safety concern - no safety assurance (baseline) condition

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Appendix E

Water Quality Report from Truckee Meadows Water Authority, Reno, NV

Below is an actual sample of federally required annual water quality report. Please note how the provision of technical information creates heightened awareness of risks and is accompanied by the implicit safety assurances (see also the footnote on p.3)

TRUCKEE MEADOWS WATER AUTHORITY

2008 WATER QUALITY REPORT

DATA COLLECTED FOR CALENDAR YEAR 2007

Welcome to our 2008 Water Quality Report

The staff and Board of Directors of Truckee Meadows Water Authority (TMWA) are pleased to provide you with our annual Water Quality Report. This brochure is provided to our customers in accordance with the Safe Drinking Water Act. We are very pleased to report that our system is in compliance with every water quality regulation, meeting all U.S. Environmental Protection Agency (EPA) and State of Nevada drinking water health standards. We go to great lengths to ensure your tap water is safe, clean and reliable. We want to help you understand issues vital to our water supply. If you would like further information, please feel free to contact us at 834-8080, option 2. Our water experts are happy to answer any of your questions. To learn more about your water company, visit us online at www.tmh2o.com.

Yours in good health,

Lori Williams
General Manager



TRUCKEE MEADOWS WATER AUTHORITY
www.tmh2o.com

Your water and its source

More than 85 percent of our drinking water comes from the Truckee River, which originates at Lake Tahoe and is fed by snow melt and rain throughout the northern Sierra Nevada. The remaining 15 percent comes from 32 wells drilled in deep-water aquifers located within TMWA's service area. TMWA's professional staff of scientists, engineers and operators continually monitors our water quality. More than 1,000 laboratory tests are performed each month on over 150 samples taken from various locations in the TMWA distribution system. Testing is performed both at the treatment plants and throughout the distribution system to make sure high-quality water is delivered to our customers.

WHY IS PROTECTING THE TRUCKEE RIVER IMPORTANT?

As the major source of our water supply, the river's environmental health can directly impact human health. Preventing pollution is far less expensive than spending money on water treatment. Protecting this remarkable jewel in our semi-arid region benefits the water supply as well as fish and wildlife habitat and recreation.

ARE TMWA'S FACILITIES AND WATER-TREATMENT METHODS UP TO DATE?

Yes. TMWA treats water at our facilities to meet all regulatory requirements. Two top-notch treatment facilities serve TMWA customers — the Chalk Bluff

Water Treatment Plant in northwest Reno and the Glendale Water Treatment Plant in Sparks. We're also committed to ensuring future water quality by continually improving our water system. Since the inception of TMWA in 2001, we have spent more than \$100 million on repairing and rehabilitating aging infrastructure. Our facilities and capital improvement plan calls for spending an average of \$17.8 million every year over the next ten years to improve aging water mains and facilities.

HOW DOES OUR TAP WATER COMPARE TO BOTTLED WATER?

Tap water is every bit as safe as bottled water. In fact, it's tested more, according to the American Water Works Association (AWWA). To ensure tap water is safe to drink, the EPA develops and sets regulatory standards that limit the amount of contaminants in public water supplies. These water quality standards are among the world's most stringent, requiring water utilities to monitor for more than 100 contaminants. The EPA's standards are enforced by the State of Nevada Division of Environmental Protection and the Washoe County District Health Department.

PHARMACEUTICALS IN SOURCE WATER

For an update and more information on the recent reports regarding possible pharmaceuticals in source water, visit us online at www.tmh2o.com.

Truckee Meadows Water Authority (TMWA) is a not-for-profit, community-owned water utility, overseen by elected officials and citizen appointees from Reno, Sparks and Washoe County.

Treatment process focuses on health

The water delivered to your tap meets all U.S. Environmental Protection Agency (EPA) and State of Nevada drinking water health standards. It undergoes a multi-stage treatment process and is rigorously tested daily. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised people such as people with cancer undergoing chemotherapy, people who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care providers about their drinking water.

The EPA/CDC has guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants. More information about these and other contaminants and potential health effects can be obtained by calling the Safe Drinking Water Hotline at (800) 426-4791. We test for *Cryptosporidium* weekly in both our source water and treated water. *Cryptosporidium* can be present in the Truckee River, but has not been found in the treated water that goes to your tap.

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the

Required Consumer Confidence Report (CCR) statement addressing Lead in Drinking Water

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. TMWA is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

Where Can I Get Water Quality Data?

All water quality data is available free of charge upon customer request. TMWA sends this data to local and state health departments in periodic reports. TMWA has an open door policy on all water quality issues, and customers are encouraged to ask questions regarding any aspect of our water purification system.

The TMWA Web site (www.tmh2o.com) contains information about all aspects of our organization and includes many answers to questions frequently asked by our customers. Our Water Quality section contains a water quality lookup page. This provides basic water quality information for different areas of TMWA's service territory. TMWA maintains a page with informational fact sheets and we also maintain a page with water quality information.

Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791). The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. In addition, the Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Source Water Assessment And Its Availability

The federal Safe Drinking Water Act was amended in 1996 and requires states to develop and implement source water assessment programs to analyze existing and potential threats to the quality of public drinking water throughout the state. A summary of the TMWA susceptibility to potential sources of contamination was initially provided by the State of Nevada in 2003. The summary of this source water assessment was first included in the TMWA 2004 Water Quality Report and now may be accessed online at www.tmh2o.com.

Information pertaining to the initial findings of the source water assessment is available for viewing in person at the offices of the Bureau of Safe Drinking Water, 901 South Stewart St., Ste. 4001, Carson City, NV 89701. Appointments are suggested; please call 687-9520. Office hours are 8 a.m. to 5 p.m., Monday through Friday.

If you do have additional questions, or need more information, please contact any of the following employees:

Kelli Burgess
Senior Water Quality
Microbiologist
(775) 834-8117
kburgess@tmwa.net

Jim Pezonella
Senior Water Quality
Analyst - Microbiology
(775) 834-8177
jpezonella@tmwa.net

Kyle Foss
Assistant WQ Lab Tech
(775) 834-8137
kfoss@tmwa.net

Paul Miller, P.E.
Manager, Operations and
Water Quality
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pmiller@tmwa.net

Max Shen
Senior Water Quality
Chemist
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Will Raymond
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wraymond@tmwa.net

Craig Moyle
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cmoyle@tmwa.net

Chris Erickson
Associate Microbiologist
(775) 834-8186
cerickson@tmwa.net

Dianna Andrews
Assistant WQ Lab Tech
(775) 834-8108
dandrews@tmwa.net

TEST RESULTS: 2007 WATER QUALITY DATA

The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data

presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently.

CONTAMINANTS	MCLG or MRDLG	MCL, TT or MRDL	Your Water	Range Low	Range High	Sample Date	Violation	Typical Source
Disinfectants & Disinfection By-Products (There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.)								
Chlorine (as Cl ₂) (ppm)	4	4	1.2	0.3	1.2	2007	No	Water additive used to control microbes.
Haloacetic Acids (HAA ₅) (ppb)	NA	60	44.8	9.8	44.8	2007	No	By-product of drinking water chlorination.
THMs (Total Trihalomethanes) (ppb)	NA	80	49.8	ND	49.8	2007	No	By-product of drinking water disinfection.
Inorganic Contaminants								
Antimony (ppb)	6	6	3.82	ND	7.26	2007	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder; test addition.
Arsenic (ppb)	0	10	7.57	0.1	15	2007	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
Barium (ppm)	2	2	0.09	ND	0.09	2007	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Chromium (ppb)	100	100	10	ND	10	2007	No	Discharge from steel and pulp mills; Erosion of natural deposits.
Cyanide [as Free CN] (ppb)	200	200	1.8	ND	1.8	2007	No	Discharge from plastic and fertilizer factories; Discharge from steel/metal factories.
Fluoride (ppm)	4	4	0.14	ND	0.14	2007	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Nitrate [measured as Nitrogen] (ppm)	10	10	3	0.52	3	2007	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Microbiological Contaminants								
Total Coliform (% positive samples/month)	0	5	0	NA	-	2007	No	Naturally present in the environment.
Turbidity (NTU): 100% of the samples were below the TT value of 0.3. A value less than 95% constitutes a TT violation. The highest single measurement was 0.08. Any measurement in excess of 1 is a violation unless otherwise approved by the state.						2007	No	Soil runoff.
Radioactive Contaminants								
Alpha emitters (pCi/L)	0	15	7.4	ND	7.4	2007	No	Erosion of natural deposits.
Beta/photon emitters (pCi/L)	0	50	4.5	ND	4.5	2007	No	Decay of natural and man-made deposits.
Radium (combined 226/228) (pCi/L)	0	5	1.38	0.011	1.38	2007	No	Erosion of natural deposits.
Uranium (ppb)	0	30	3.85	ND	8.92	2007	No	Erosion of natural deposits.
Synthetic organic contaminants including pesticides and herbicides								
Hexachlorocyclopentadiene (ppb)	50	50	0.07	ND	0.07	2007	No	Discharge from chemical factories
Volatile Organic Contaminants								
Tetrachloroethylene (ppb)	0	5	4.58	ND	4.58	2007	No	Discharge from factories and dry cleaners.
Trichloroethylene (ppb)	0	5	1.66	ND	1.66	2007	No	Discharge from metal degreasing sites and other factories.
CONTAMINANTS	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source	
Inorganic Contaminants								
Copper - action level at consumer taps (ppm)	1.3	1.3	0.069	2005	0	No	Corrosion of household plumbing systems; Erosion of natural deposits.	
Lead - action level at consumer taps (ppb)	0	15	1	2005	0	No	Corrosion of household plumbing systems; Erosion of natural deposits.	

Notes: PCE/ARSENIC/HAA/ANTIMONY: Compliance for these constituents is determined by calculating the running annual average. Sampling is conducted either on a daily basis or a quarterly basis at designated locations. A corresponding quarterly average is determined from these samples and the running annual average is calculated by using the four most recent quarterly averages. A single sample may show that an individual elevated result is over the MCL but the compliance value remains below the MCL. All water meets all local, state and federal standards and your water is safe to drink.

Source: Truckee Meadows Water Authority (2008)

UNIT DESCRIPTIONS			
Term	Definition	Term	Definition
ug/L	Number of micrograms of substance in one liter of water	% positive samples/month	Percent of samples taken monthly that were positive
ppm	Parts per million, or milligrams per liter (mg/L)	NA	Not applicable
ppb	Parts per billion, or micrograms per liter (ug/L)	ND	Not detected
pCi/L	Picocuries per liter (a measure of radioactivity)	NR	Monitoring not required, but recommended

IMPORTANT DRINKING WATER DEFINITIONS	
Term	Definition
MCLG	Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
NTU	Nephelometric Turbidity Units. Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.
MCL	Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Variances and Exemptions	State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	Maximum Residual Disinfection Level Goal: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	Maximum Residual Disinfectant Level: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	Monitored Not Regulated
MPL	State Assigned Maximum Permissible Level

HEALTH INFORMATION ABOUT WATER QUALITY

RESULTS OF *CRYPTOSPORIDIUM* MONITORING

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly-used filtration methods cannot guarantee 100 percent removal. Our monitoring indicates the presence of these organisms in our source water and/or finished water. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people are at greater risk of developing life-threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Truckee Meadows Water Authority routinely monitors our source water and finished water for *Cryptosporidium*. No *Cryptosporidium* oocysts were detected in the finished water sampled from the Chalk Bluff and Glendale Water Treatment Facilities.

RESULTS OF RADON MONITORING

Radon is a radioactive gas that you can't see, taste, or smell. It is found throughout the U.S. Radon can move up through the ground and into a home through cracks and holes in the foundation. Radon can build up to high levels in all types of homes. Radon can also get into indoor air when released from tap water from showering, washing dishes, and other household activities. Compared to radon entering the home through soil, radon entering the home through tap water will in most cases be a small source of radon in indoor air. Radon is a known human carcinogen. Breathing air containing radon can lead to lung cancer. Drinking water containing radon may also cause increased risk of stomach cancer. If you are concerned about radon in your home, test the air in your home. Testing is inexpensive and easy. Fix your home if the level of radon

in your air is 4 picocuries per liter of air (pCi/L) or higher. There are simple ways to fix a radon problem that aren't too costly. For additional information, call your state radon program or call EPA's Radon Hotline (800-SOS-RADON).

There is no current federal standard for radon in drinking water. Truckee Meadows Water Authority last monitored for radon in our groundwater wells in 2004 showing an average result of 543 pCi/L and a highest detected value of 975 pCi/L.

ADDITIONAL INFORMATION FOR ARSENIC

While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

ADDITIONAL INFORMATION

Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by-products. These by-products include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

Some people who drink water containing trichloroethylene and tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer. Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Source: Truckee Meadows Water Authority (2008)