Risk Policy: Trust, Risk Perception, and Attitudes

Mattias Viklund

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CONTENTS

INTRODUCTION

It is appealing to think of trust as something deeply human. It seems reasonable to imagine that the need to trust other people, and to be trusted, originated as an aspect of human mind and human behavior at least at about the same time as families were first created. Trust between spouses was probably as important then as it is now. Society is obviously more complicated today, and the function of trust extends far outside the immediate family. However, it is logical that it was in psychology, the science occupied with studying the human mind, that a *systematic* study of trust started.

It is also possible to trace aspects of trust to ancient philosophy. Plato and Aristotle were highly influential in their pioneer work within the discipline of philosophy. They dealt with issues concerning the human existence, such as human nature and the organization of societies. Although neither the early Greek philosophers nor their successors in the study of philosophy explicitly discussed trust, it is possible to see a connection in this regard between ancient philosophy and modern social theory.

One issue that ancient philosophers were occupied with was the concept of virtues; positive traits of characters which must be present within separate individuals or in a population as a whole. Plato, for example, discussed four cardinal virtues: wisdom, courage, presence of mind, and justness, while Machiavelli, who lived during the renaissance, focused on political virtues such as faithfulness and honesty (see Malnes & Midgaard, 1994). It was assumed that societies in which such virtues were present within the population were better societies, with different positive qualities. Some modern philosophers – or social theorists – pose the same arguments when it comes to trust. Trust is seen as a social virtue, which contributes to the development of social capital, which in turn may strengthen society by promoting cooperation between people. Cooperation is assumed to improve civic life and the economy, by enabling smoother transactions. Ultimately the society as a whole is also improved. This theory received much attention. It is likely that the attention to a large extent contributed to the fact that trust has been increasingly in focus in various research disciplines, but also increasingly mentioned outside the academy, as an important factor in society and business.

Fukuyama (1995), one of the more well known proponents of the view of trust as an important ingredient in the creation of social capital, argued that social theorists have abandoned the idea of social engineering. He noted that it is a common understanding, at least among "serious observers", that liberal political and economic institutions depend on a healthy and dynamic civil society for their vitality. And whether a strong civic society could be developed depends in turn on whether people are able to form trusting relations. Fukuyama considered trust a social virtue because it allows people to spontaneously organize themselves into innovative institutions.

Putnam (1993) put forth similar arguments for the vast importance of trust. Here too, trust is seen as a main ingredient in the social capital. Social capital makes people together act in a way that can be characterized as a kind of politically active civicness. The idea is that people who are part of a civic community are usually active, civic-minded and equal. They are also helpful and respectful and trust each other, even when their opinions differ.

It is, however, important to note that research on trust originated in the study of psychology, where it was assumed to play a different role than as an ingredient in social capital. Early research was occupied with finding ways to define and measure trust; empirical studies to a large extent treated the concept as a personality trait, noticeable in attitudes and behaviors. One important feature of trust research is the multitude of definitions and measurements; the degree of consensus as to the meaning of trust is low (McKnight & Chervany, 1996).

In the present thesis, the concept of generalized trust is investigated. The focus is on target of trust and it is thus assumed that trust generalizes; that is, the idea that if you trust people in general, you are more likely to trust, for example, institutions, corporations, and family. This notion is based on psychological studies of trust, making the conception of trust different compared to notions of trust as, for example, a social virtue. Furthermore, the focus is also on social trust; that is, people's trust in different groups of individuals in society. As will be shown, there are other possible perspectives in trust research.

Although it has been argued that trust is assumed to play an important role in various contexts and situations, this assumption is not always supported by empirical data (Sjöberg, 1999a). A common idea is that trust should be an important factor to consider in risk policy. If people put high trust in experts and risk management (e.g., politicians and corporations), it is assumed that they will perceive risks as low, thereby increasing the likelihood of popular acceptance of risk projects. One type of project, where trust has been suggested as a key factor, is the siting of nuclear waste repositories. The determinants of people's perceptions of nuclear risks, and the implications for risk policy, are important subjects of study in risk research.

Trust is here studied by relating it to the construct of perceived risk. The focus of the present thesis is on individual processes and the idea is that knowledge of how individuals form judgments of trust and risk could be useful in a risk policy context. It is studied whether and how individuals' levels of trust and perceived risk influence their policy-related attitudes, under the assumption that these attitudes are of importance for policy-makers. *How* decision-makers use information about judgments of trust and risk is, however, not studied.

It is common to study trust by relating it to some other construct or observable behavior, although it might be possible to study trust from a more isolated perspective. Following the second line of thought, one may, for example, argue that trust is good because it gives decision-makers in society a

certain peace and quiet. When they feel support from the population, decision-makers will perhaps not feel the need to always make their decisions legitimate, for example by excessive media exposure or different types of campaigns, more or less related to the issues the decision-makers originally were put to deal with. One might speculate that there is a risk of a vicious circle in a state of low trust, since it is possible that the citizens see through campaigns that are intended to improve the decision-maker's image (and thereby intended to restore people's trust in him or her), which is likely to reduce their trust rather than the opposite (Wasserman, 1998). On the other hand, if people's trust in decision-makers of various kinds is solid, this vicious circle may not become realized (since there is no need for campaigning and media spectacles).

The approach of studying trust from this isolated perspective is based on speculations about effects of trust. In an actual empirical study it is desirable to relate trust to another variable, in order to be able to draw valid conclusions. In the example above, such a variable could possibly be operationalized as "the number of times political leaders participate in media events that are unrelated to their fundamental political function".

In the present thesis, the role of trust in risk policy is based on the assumption that high levels of trust are related to low levels of perceived risk, which most likely increases the likelihood of popular acceptance of risk projects. This is a desirable outcome, based on the assumption that a project is beneficial to society. A rough (and perhaps therefore also tentative) definition of a beneficial project could be one where it is estimated that the expected utility associated with the project is higher than the expected costs. Such beneficial projects are part of progress in society, at least according to the view of a "technology optimist". Few people, however, would appreciate blind trust, which (at least in theory) would result in total acceptance of all kinds of risky projects. In this situation, people trust experts and other decision-makers without arguments. The catch is that experts are human beings, meaning that they have flaws like everybody else. The cognitive traps, which hinder perfectly rational decision-making, are obstacles also for experts. In general, this makes it a bad idea to have blind trust in decision-makers, perhaps particularly in cases of advanced technology. Advanced technology in the wrong hands can have devastating consequences.

In three articles, based on extensive survey data, the role of trust in risk policy is examined from three different perspectives. The first study concerns attitudes and behaviors relevant to energy policy in Sweden. Energy policy can be considered a case of risk policy, due to the important role people's attitudes towards, and perceptions of risks associated with, nuclear power play in Swedish energy policy. The main objective is to examine whether people's perceptions of nuclear risks are strongly related to their attitudes towards various aspects of energy policy (e.g., attitudes towards different energy production systems, electricity saving, and environment). For example, risk was

a prominent issue in the discussions of nuclear power when the future use of this energy source was decided in a national referendum in 1980. It is important to increase the knowledge about the effects of perceived risks on attitudes towards nuclear power and other attitudes related to energy policy. A measure of self-reported electricity saving behavior is also included, providing the basis for a discussion about the relationship between attitude and behavior. The practical possibilities for policy-makers to induce levels of electricity saving, based on insights about psychological determinants of electricity saving attitudes and behavior, are also discussed.

The objective of the second article is to examine the relationship between trust and perceived risk. By using cross-national data (from Sweden, France, Spain, and the UK), it is investigated whether trust is a powerful predictor of perceived risk within countries as well as a significant source of variation in perceived risk across countries. As will be seen, risk is an important factor in theoretical discussions about the nature of trust. It is likely that the alleged importance of trust for perceived risks is at least partially derived from these theoretical considerations.

In the third article, determinants of trust in organizations are studied. Trust is conceptualized as an attitude, determined by people's beliefs about and values assigned to various attributes (e.g., competence and honesty), which are assumed to signal trustworthiness. The main theoretical contribution of the thesis is the conceptualization of trust as an attitude, by application of the Expectancy-Value Model. This type of application of the Expectancy-Value Model is considered to be particularly interesting in a trust context, due to the effects that perceptions of trustworthiness are generally assumed to have on individuals' levels of trust.

Figure 1 shows the three main relations in the present thesis, which are exposed to empirical investigations.

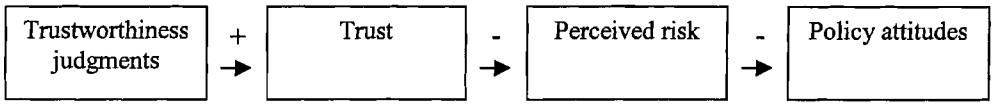

Figure 1. Thesis model

The thesis consists of the following main parts: (1) a presentation of the research perspective of the thesis, (2) a review of earlier research on trust, (3) a presentation of the theoretical and conceptual framework of the thesis, (4) summaries and discussion of the empirical studies (the three articles), and (5) the empirical studies in their original form.

RESEARCH PERSPECTIVE

The present thesis is written in the discipline of economic psychology. Scholars in economic psychology study the psychological processes in economic behavior by using theories and methods from the psychological science (Wärneryd, 1988). A related discipline is behavioral economics, which in contrast to economic psychology has its starting point in economic theory (Andersson, 2001). Trust is in the present thesis considered a psychological construct that may be an important determinant of different aspects of human behavior. Among those aspects is economic behavior. This thesis is also written from a risk research perspective, with a particular focus on the construct of risk perception. The underlying processes of individuals' risk perception could be said to be a part of economic psychology (Antonides, 1996), but it is also common to treat research on risk issues as its own discipline ("risk research"). In this chapter the scientific context in which the present thesis is written is discussed. It will be shown how some of the fundamental assumptions in the study of economic psychology and risk perception disciplines are in line with the theoretical and empirical development within research on judgment and decision-making after World War II. Moreover, these assumptions are clearly related to important aspects of trust and it will be shown on a conceptual level why trust is an important concept to study for social scientists.

It could be argued that research in economic psychology, as well as in risk perception, arose as a reaction to the fundamental assumption of human rationality, which for a long time was prevalent in various lines of social science research. The study of economic psychology to a large extent rests on the criticism of the traditional way of studying economics; that is, attempts to explain a complex reality by means of mathematical models, building on simplified assumptions (Antonides, 1996). Hence, in this respect economic psychology constitutes the psychological foundations of economics. This type of economic-psychological research is most likely the one that has received most attention, since it to a large extent deals with the concept of rationality. As will be shown, some scholars challenging assumptions of rationality, which are the basis in studies in traditional economics, have been very successful in identifying limits to human rationality. Two other definitions of economic psychology have been proposed (Wärneryd, 2002): (a) the science of psychology applied to economic areas, and (b) a separate science. A common application of psychology to economic areas is the study of consumer behavior.

A common concept in the psychological science is "construct". Psychological constructs are not directly observable, but considered important because they are assumed to have an impact on our existence in various (e.g., economic) ways. One such construct is trust. We assume that there exists such a thing as trust and that it is important in different contexts. However, since trust is a psychological construct, we can never know exactly what it is and how it is

being expressed in a given context. We can still study trust. By using, for example, statistical methods of analysis we can create different observable and measurable variables, assumed to be indicators of an underlying construct of trust.[1]

Risk perception research deals with the psychological construct of perceived risk. It can be argued that risk perception research has two important characteristics:

- It is rather practically oriented; a main reason for studying risk perception is the assumption that it has importance for policy (Sjöberg, 1992).

- Although perceived risk is a psychological construct, scholars from many scientific disciplines are active in the field, probably because of its interdisciplinary nature and assumed importance for issues on a macro level.

The profound technological development during the last several decades has been accompanied by the development of new technological hazards. Experts in various fields use risk analysis to assess probabilities for hazardous events to occur and the consequences of these events, should they occur. The majority of citizens, however, rely on intuitive risk judgments, so-called risk perceptions (Slovic, 1987). It has been found that these perceptions often differ greatly from objective risk estimates, which are based on experts' risk analyses. However, although a distinction is often made between perceived and objective risks, it is important to note that, for most new and intricate hazards, even so-called objective risks have a large judgmental component (Fischhoff, Lichtenstein, Slovic, Derby & Keenet, 1981).

Thus, in order to pursue a risk policy that is based on expert as well as public judgment, it is important to understand and explain how people perceive risks. One of the early approaches to this question was based on the idea that perceived risk is mainly a matter of cognition. Based on the work by Tversky and Kahneman (e.g., 1974), dealing with subjective probability, it was hypothesized that people do not form a correct impression of the small probabilities associated with technological risks (such as nuclear power risks) –

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[1] A very common method is simply to ask people about their degree of trust in an individual or a group of individuals. The answers are thought to indicate level of trust. It is important to be aware of the limitations of such an approach. People can mean different things with trust and their answers can be influenced by systematic and random errors (affecting degree of validity and reliability). Under the condition that acceptable levels of validity and reliability can be assured, the aggregated level of ratings of trust could be handled as acceptable indicators of trust. Still, even if these indicators can be explained, it is only by repeated studies – and by studies of different indicators – that reasonably reliable knowledge about (indicators of) trust can be reached.

they need education about *how* small these risks really are. According to this cognitive school of thought, the major challenge in risk perception research was due to the cognitive limits of the public. Sjöberg (2000b) suggested that the failure of the cognitive school to explain perceived risk was due to two fatal mistakes. First, risk is not only a question about probability, even if probability is quite important in accounting for risk. Second, the cognitive school of thought took its basis in calculus problems and was based on counter-intuitive solutions to some problems of that kind. Sjöberg argued that the generalizability of this work to "real world" problems of risk perception is highly tenuous and speculative. It should, furthermore, be noted that, although it has indeed been found that lay people have limits to their cognitive ability, this holds true even for experts. Due to different types of biases, experts can also make irrational judgments (e.g., Lichtenstein, Fischhoff & Philips, 1982).

However, even though the cognitive school of thought did not provide the answer to the question of determinants of perceived risk, it is clear that the existence of (ir)rationality in people's judgments and decision-making is relevant in discussions about risk perception. Indeed, it has been found that real risk is only one of several determinants of perceived risk (Sjöberg, 1992) and that experts' levels of perceived risk, at least in their own domain of responsibility (Sjöberg, 2002a), are much lower than the corresponding levels of the public.

Research in economic psychology and risk perception could thus be argued to share a skepticism against the traditional way of looking at human rationality. There is a focus on the need to take limits of individuals' (lay people as well as experts) knowledge and cognitive ability into consideration. The late Herbert Simon is an appropriate starting point for a discussion about the concept of limits of rationality.

In 1978, Herbert Simon was awarded the Nobel Price for his work on exploring the human mind. Originally, Simon was a psychologist who first received attention for his theory on human choice and decision-making (1947). In this theory, Simon tried to integrate the traditional economists' views on rational choice with psychologists' views on limitations in human decision-making mechanisms. The view represented by many economists is the conception that people are fully rational. The rational, economic man has a complete and consistent system of preferences, which always makes possible a rational choice of available alternatives. He is always fully aware of these alternatives and has no limitations in his computational complexity when evaluating the alternatives. This view had been found useful in approaching areas such as game theory and decisions under uncertainty. Simon, however, criticized this approach on the basis of a lack of realism. On the other extreme, Simon argued, were social psychologists who tried to reduce all cognition into affect. Simon noted that these psychologists tried to show that people are not nearly as rational as they think they are. He suggested that future research

would show that people are far more rational than usually described at the time, but, still, equipped with a rationality less grandiose than that proclaimed by economists. His theory is called the Administrative Theory and instead of an economic man, Simon refers to the more realistic administrative man. Economic man maximizes, that is, he chooses the best of available alternatives, while the administrative man satisfices; he chooses what is "good enough". The economic man handles reality in all its complexity, while the administrative man realizes that the world he perceives is a simplified model of the buzzing, blooming confusion that constitutes the real world.

Simon's work on the limits of human rationality has been an important source of inspiration for other students of decision-making, particularly decision-making in organizations. Simon and March (1958) contributed further to the understanding of decision-making in organizations. They identified some of the problems with the concept of rationality according to the theory of the economic man. They noted that when we first meet the economic man in the decision-making situation, he has already laid out the whole set of alternatives from which he will choose his action. To each alternative a set of consequences is attached; here, three alternative theories are applicable. First, there are theories about decisions under certainty, which assume that the decision-maker has complete and accurate knowledge of the consequences that will follow on each alternative. Second, there are theories about decisions under risk, which assume accurate knowledge of a probability distribution of the consequences of each alternative. Third, there are theories about decision under uncertainty, which assume that the consequences of each alternative belong to some subset of all possible consequences, but that the decision-maker cannot assign definite probabilities to the occurrence of particular consequences. Moreover, at the outset, the economic man has a "utility function" or a "preference-ordering", that ranks all sets of consequences from the most preferred to the least preferred, and he selects the alternative leading to the preferred set of consequences.

A rational choice under certainty is unambiguous. Under risk, the rational choice is to select the alternative for which the expected utility[2] is the greatest. The definition of rationality in the case of uncertainty is more problematic. Simon and March (1958) noted that there are difficulties with this model of a rational, economic, man. First, only in the case of certainty does the model agree well with common-sense notions of rationality. In the other instances, the conceptualization of rationality is much less evident. Second, it is assumed in the model that all alternatives of choice are "given". That is, all the consequences of each alternative are known, and the rational man has a

[2] The average, weighted by the probabilities of occurrence, of the utilities attached to all possible consequences.

complete utility function for each alternative. Simon and March challenged the realism of these assumptions.

Another important contribution in the work on decision-making in organizations was the development of a behavioral theory of the firm (Cyert & March, 1963), which was based upon the notions of a bounded human rationality.

The work discussed above constitutes an important basis for the theoretical framework of the Organizational Decision Theory. This theory is, according to March and Shapira (1982), a cognitive interpretation of organizations; how they make decisions and deal more or less deliberately with questions of information, control, choice, and management.

Another theory that has gained attention during the last several decades, also much because of the findings on limits to human rationality, is the Behavioral Decision Theory. This theory has two interrelated facets, normative and descriptive. The normative theory is concerned with prescribing courses of action that conform most closely to the decision-maker's beliefs and values. The aim of descriptive decision theory is to describe these beliefs and values and the manner in which individuals incorporate them into their decisions (Slovic, Fischhoff & Lichtenstein, 1977).

Students of decision-making within the area of cognitive psychology have during the last three decades largely been occupied with identifying limits to human rationality. Almost every descriptive study of probabilistic thinking during the 1970s attempted to determine how the underlying cognitive processes are molded by the interaction between the demands of the task and the limitations of the thinker (Slovic et al., 1977). The work by Tversky and Kahneman (e.g., 1974) most likely had an important impact on this development. They demonstrated how three judgmental heuristics – representativeness, availability, and anchoring – determine probabilistic judgments in a variety of tasks. As noted by Tversky and Kahneman (1974), many decisions are based on beliefs concerning the likelihood of uncertain events. Occasionally, beliefs concerning uncertain events are expressed in numerical form as subjective probabilities. Tversky and Kahneman showed how people by relying on heuristics (= rules of thumb) can reduce the complex task of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors.

The *representativeness* heuristic is common when people are asked questions of the type: What is the probability that object A belongs to class B? Often, people determine the probability by relying on the extent to which object A is representative of, or similar to, the stereotype of objects belonging to class B. This approach leads to serious errors, because representativeness/similarity is not influenced by several factors that should affect judgments of probability. Consider, for example, a task where people are asked to assess the probability

that a person is engaged in an occupation from a list of possible occupations (e.g., farmer, salesman, airline pilot, librarian, or physician). Moreover, prior to this assessment, people have been provided with a description of the person as "very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail." When only using the representativeness heuristic as decision support, people fail to take into account factors such as prior probability of outcomes. That is, even though the description is very similar to the stereotype of a librarian (the occupation that is usually considered the most probable), it should also be considered that there are many more farmers than there are librarians in the population (at least that was the case in 1974). The *availability* heuristic is used when people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind. However, availability is affected by factors other than frequency and probability and the reliance on availability leads to predictable biases. One of these factors is bias due to the retrievability of instances. Consider the example of subjects who heard a list of well-known personalities of both sexes. The subjects were subsequently asked to judge whether the list contained more names of men than of women. Different lists were presented to different groups of subjects. In some of the lists the men were relatively more famous than the women, and in others the women were relatively more famous than the men. In each of the lists, the subjects erroneously judged that the class (sex) that had the more famous personalities was the more numerous. Thus, when the size of a class is judged by the availability of its instances, a class whose instances are easily retrieved will appear more numerous than a class of equal frequency whose instances are less retrievable. The *adjustment and anchoring* heuristic is used when people make estimates by starting from an initial value that is adjusted to yield the final answer. For example, Tversky and Kahneman (1974) reported about an experiment in which subjects were asked to estimate the percentage of African countries in the United Nations (UN). Students were given starting points as indicators of the percentage. The median estimates of the percentage of African countries in the UN were 25 and 45 for groups that received 10 and 65, respectively, as starting points. Payoffs for accuracy did not reduce the anchoring effect.

Moreover, Tversky and Kahneman (1981) tested assumptions of human rationality by varying the framing of a problem. There is general agreement that rational choices should satisfy some elementary requirements of consistency and coherence. Thus, the preference between options should not reverse with changes of frame. One of the key findings was, however, that risk-taking propensity was dependent on framing of an option with respect to consequences of an event. For example, it was shown that the prospect of certainly saving 200

lives was more attractive than a risky prospect of equal expected value, that is, a one-in-three chance of saving 600 lives.

Another finding with respect to errors in human decision-making is the existence of overconfidence, among lay people as well as experts (e.g., Oskamp, 1982; Alpert & Raiffa, 1982; Lichtenstein et al., 1982). In research on risk perception, the phenomenon of optimistic bias (Weinstein, 1989) has been repeatedly observed. People estimate risks to be much smaller to themselves than to people in general. This is particularly true for so-called lifestyle risks (e.g., alcohol consumption, AIDS), and is probably due to a sense of personal control over one's behavior (Sjöberg, 2000a).

There is also research in social psychology indicating clear limits to human rationality, especially when we are under the influence of other people. The phenomenon of group-think (e.g., Janis, 1972) tends to occur under stressful circumstances in highly cohesive groups that are so committed to reaching consensus that each member suspends his or her critical judgment. An interesting phenomenon that can be observed in social settings as well as in problem-solving tasks is the confirmation bias. That is, people are often unwilling to challenge their cherished beliefs, even when new evidence is presented. People tend to look for evidence that will confirm what they currently believe rather than look for evidence that test their beliefs (Smith, 1993).

One important feature of research within the behavioral decision theory framework is the uncertainty surrounding the decision-maker. As noted above, decisions could be made under conditions of certainty, risk, and uncertainty (for an excellent and extensive review, see Bell, Raiffa & Tversky, 1988). Uncertainty creates ambiguity. Another factor that causes ambiguity is the fact that some consequences depend on actions of other strategic actors; game theory is often used for studying decision-making under these circumstances (March, 1988).

Research on decisions under risk has illustrated several shortcomings of the assumption of the fully rational, economic man. Kahneman and Tversky (1979) criticized the expected utility theory as a descriptive model of decision-making under risk. They developed an alternative model, called prospect theory. This model is argued to be a better reflection of how people actually make decisions than the expected utility model, which might be more useful as a normative model.

Kahneman and Tversky (1979) found two effects in people's decision-making under risk. First, as indicated above, people underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. For example, people were much more likely to choose the option of a one-week tour of England, with certainty, than the option of a 50% chance to win a three-week tour of England, France, and Italy. This *certainty effect*

contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses.

Second, people generally discard components that are shared by all prospects under consideration. Consider a two-stage game. In the first stage, there is a probability of 0.75 (75%) to end the game without winning anything, and a probability of 0.25 (25%) to move into the second stage. If the subject reaches the second stage he or she has the choice between a certain win of 3000 and an 80% chance to win 4000. The choice has to be made before the game starts, i.e., before the outcome of the first stage is known. In this game, one has a choice between 0.25*0.80 = 0.20 chance to win 4000 and a 0.25 * 1.00 = 0.25 chance to win 3000. When this choice is presented in one stage, the dominant preference is the first option. Here, however, the dominant preference was the second option. Apparently, people ignored the first stage of the game, whose outcomes are shared by both prospects, and considered the problem as a choice between a certain win of 3000 and a 80% chance to win 4000.[3] This *isolation effect* thus leads to inconsistent preferences when the same choice is presented in different forms.

Risk taking is a concept that has been studied extensively. A study by Shapira (1995) indicated that there are clear differences between a normative and a descriptive perspective on risk taking. Risk taking is a complex concept, which cannot be completely understood from the perspective of expected value or expected utility theory. Nor can it be fully understood by an approach focusing on personality traits as the main determinants of risk taking. In his study of managerial risk taking, Shapira found that managers perceived risk taking to be a dynamic process. Interestingly enough, they did not feel controlled by the laws of probability; rather, their experience had shown them that, by applying several methods, such as modifying estimates, cutting corners, and putting pressure on subcontractors, they were able to change the odds in their favor.

In summary, the present thesis is written in a context where human behavior is considered to be complex, influenced by a vast array of factors which make the assumption of a fully rational, economic man obsolete and inaccurate.[4] Lay people as well as experts operate in an uncertain world, where their limited knowledge and computational abilities influence their thoughts, feelings, attitudes, and decisions. In order to handle this complex reality, people use rules of thumb, or heuristics, in probability judgments, but most likely also

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[3] And in that problem the certainty effect is illustrated by the finding that the dominant preference is a certain win of 3000.

[4] Here, the focus has been on whether humans are capable of being fully rational and profit-maximizing. Another important question regards whether people, if they had the capability, would actually behave in accordance with the neoclassical paradigm that dominates the study of economics (see, for example, Etzioni, 1988).

in everyday life (Cialdini, 1993). In fact, it has been suggested that the concepts of trust (Kramer, 1999) and perceived risk (Sjöberg, 2000b) are such heuristics.

The role of trust in research on decision-making is often that of a mechanism that enables people to reduce complexity and uncertainty. It prevents cognitive overload. This is a theoretical perspective on trust, but trust has also been considered interesting in empirical studies, for example in the fields of economic psychology and risk research. It is, for example, possible to study the role of trust in transactions, trust as a political attitude, or trust as a state within organizations. Research in organizational behavior suggests that trust is associated with a multitude of benefits in an organizational context (Kramer, 1999). Yamagishi and Yamagishi (1994) combined the perspective of trust as reducing cognitive load with the perspective of trust as yielding a plurality of benefits, because trust was assumed to provide a solution to the problems caused by social uncertainty.

In the next chapter, trust research previously conducted within several different academic disciplines is discussed. Theoretical conceptions of trust as well as empirical findings are presented.

TRUST

Earlier Research

This is not a complete review of earlier research on trust. The intention is to give an overview of the most important areas when it comes to the role of trust in different disciplines and to describe the most important work. Some important reviews on trust will be noted, which may be interesting for readers who want to acquire a more in-depth knowledge of certain issues.

A Growing Interest in Trust

It has been noted that the importance of trust in social, economic, political, legal, and organizational relations has been increasingly recognized. In particular, this occurred during the 1990s (Kramer & Tyler, 1996). As an example of the growing interest in research on trust, it has been found that, between 1974 and 1993, there was a fourfold increase in the number of studies on trust conducted by scholars interested in organizational behavior (Kipnis, 1996). In fact, as early as 1983 it was argued that trust seemed to be a subject of discussion for all types of people (Barber, 1983). Presidential candidates, political columnists, pollsters, social critics, moral philosophers, as well as the man on the street were all said to use the word freely and earnestly. This plurality is indeed a phenomenon that has been discovered during the writing of the present thesis. In the literature review below, there are references from such relatively diverse disciplines as philosophy, economics, sociology, history, and political science.

One probable cause for the growing interest in research on trust is the argument that levels of trust, measured as confidence in institutions, have decreased in many parts of the Western world since the mid-60s. This decrease in trust, covering not only trust in political institutions but also trust in corporations and labor unions, has been argued to be a threat to the political legitimacy of the democratic system. There are many positions on this issue and Lipset and Schneider (1983a) present some of them, together with reasons for the alleged decline in confidence.

It has also been argued that the societal interest in the concept of trust has grown, throughout the 1980s and into the 1990s, partly as a 'communitarian' response to the self-serving materialism of the Reagan and Bush era and as a return to social concern (Creed & Miles, 1996). A related view is that the growing interest in trust is largely due to fundamental changes in the world surrounding us (Misztal, 1996). It is said that there is a widespread consciousness that existing bases for social cooperation, solidarity, and

consensus have been eroded and that there is a need to search for new alternatives.

These are explanations, which tend to look at trust on a macro level, often in a national context. Some of the most important scholars who have studied trust in such a manner are the earlier mentioned Fukuyama and Putnam. Giddens and Luhmann have also made their marks when it comes to the issue of trust on a macro level in social science theory. Luhmann (1979; 1988) is a well-known theorist in the area of trust research, who stated that trust is necessary to reduce uncertainty and complexity. Giddens (1990) has pointed out that technical and abstract systems have become more and more complex and only partially mastered by experts, whom we have to trust without knowing in detail why. In short, these two scholars have argued that trust is important in modern societies because it compensates for our lack of knowledge in handling modern systems.

Trust – a Psychological Construct

It can be argued that one could trace the origins of research on trust to the discipline of psychology. As we will see, how psychologists have conceptualized and interpreted trust has had a tremendous impact on how trust is viewed in other disciplines. The theoretical discussion about the trust concept relies, to a large extent, on theories developed by personality psychologists and social psychologists, but these theories are nevertheless considered to be applicable not only in psychology, but also in an economic and societal context.

Two works – by Stack (1978) and Worchel (1979) – have been very helpful in providing information on trust research in psychology. These articles reflect that a large share of trust research in psychology (at least before 1980) has focused on generalized trust; the feelings people have about the general trustworthiness of others (Stack, 1978). In the present thesis, the focus is on the study of generalized trust, not the study of trust as it varies over transactions. It should be noted that, while Stack defined generalized trust in terms of *feelings* about trustworthiness, others have defined it in terms of, for example, beliefs, expectancies, or attitudes.

Stack (1978) described two measures of generalized trust. Wrightsman (1964; 1974) developed a *Philosophies of Human Nature Scale (PHN)*, in which he included several dimensions of beliefs about human nature. One of the dimensions was referred to as beliefs about the trustworthiness of people in general. It is noteworthy that Wrightsman assumed that these beliefs would be unrelated conceptually to beliefs about altruism, another dimension in PHN. It has been found, however, that there is a strong correlation (approximately 0.7) between the two subscales (Wrightsman, 1974). Thus, people who are considered unreliable and dishonest are also perceived as selfish and

uncooperative. A better known measure of generalized trust is the *Interpersonal Trust Scale (IT)*, which was developed by Rotter (1967). By means of factor-analytic studies, Rotter has tried to clarify the trust construct and to improve the construct's capability of predicting behavior. Two important dimensions have been found to be somewhat successful in these respects: the first factor is trust of peers or other familiar social agents and the second factor is institutional or political trust, or trust in those with whom people have little direct contact (see Stack, 1978).

It is interesting to compare these two measures (PHN and IT). According to Stack (1978), studies have shown that both scales measure the same underlying construct of trust, since correlations between them have been reported to be on the 0.6 - 0.7 level. The strongest area of overlap is in attitudes toward people and society in general. The PHN score reflects a more evaluative attitude toward others, whereas the IT score reflects expectancies about specific interpersonal agents. As will be shown, the IT scale has been more successfully tied to actual behaviors and other validating evidence than the PHN scale.

It is important to discuss the construct validity of trust. This can be done by dividing the discussion into three areas (Stack, 1978): (1) the trust measures' ability to differentiate various groups, (2) the trust measures' ability to discriminate the trust construct from other constructs, and (3) the behavior correlates of trust as well as behavioral trust measures.

When it comes to group differences it has been found that, although men and women tend to score equally high on the IT scale, women score significantly higher than men in the dimension "Trust of Peers" and men significantly higher in "Political Trust". On the PHN scale, women score consistently higher, which according to Stack (1978) could be explained by the fact that PHN carries an evaluative aspect of trust; since females *like* people in general somewhat better than males do, they tend to score higher on this scale. Swedish data have shown quite small gender differences, although women have slightly more confidence in almost all institutions in society (Holmberg & Weibull, 1998). When it comes to trust in people in general, there are no differences between men and women (Rothstein, 1997).

Stack (1978) also discussed socio-economic differences and concluded that evidence for such differences is conflicting. No PHN differences had been detected (at the time Stack was writing) and Rotter's (1967) finding that college students from the more affluent levels of society scored significantly higher in IT trust has been difficult to replicate.

A related variable is level of education. Lipset and Schneider (1983a) proposed two adverse hypotheses: (1) Higher education is associated with higher trust. The reason is that better educated people with higher status have been more successful and have been more rewarded by societal institutions. Moreover, leaders of these institutions are usually well educated. (2) Lower education is associated with higher trust. The reason is that people with low

education, due to a lack of knowledge, are more naïve and more prone to believe that leaders in society know what they are doing.

Neither of the two hypotheses was supported by data and when education, occupational status or family income were tested as possible explanatory variables of trust in societal institutions, correlations were close to zero. Swedish data show that education has a small positive effect on trust in institutions, at least in some cases (Holmberg & Weibull, 1997; 1998). This effect was found for approximately half of the 17 institutions that were investigated (strongest effect for trust in big corporations, courts of law, universities, the parliament, and the political parties). The relationship between level of education and trust in people in general was more clear: 63 percent of people with lower education agreed that most people can be trusted, whereas 71 percent and 84 percent agreed among those with middle and higher education, respectively.

Yet another demographic variable of interest is age. Here too, we could propose two adverse hypotheses. Lipset and Schneider (1983a) stated that older people tend to identify more strongly with institutions simply because they have been tied to them for a longer period of time. Thus, a first hypothesis should be to expect older people to have more trust in institutions than younger people. On the other hand, we could expect younger people to be more naïve and more likely to believe in the goodwill of other people (including those running societal institutions). However, both American (Lipset & Schneider, 1983a) and Swedish data (Holmberg & Weibull, 1997; Holmberg & Weibull, 1998; Rothstein, 1997) show weak and, more importantly, inconsistent relations between age and trust.

Lipset and Schneider (1983a) also studied whether political variables could explain the variation in confidence in institutions. Political ideology could explain very little of the variation, although there was one noteworthy difference based on ideology: extreme liberals had much lower confidence in institutions. The relationship between partisanship and confidence was more curvilinear. Independents who rejected both major American political parties had the lowest level of confidence. The general attitudes towards institutions became more positive as party identification became stronger, in either the Democratic or Republican direction. Thus, Lipset and Schneider found no evidence of a left-right difference; rather, general confidence was associated with partisanship *per se*.

Listhaug and Wiberg (1995) investigated confidence in institutions in 14 Western European countries. Generally, correlations between many of their independent variables and confidence in societal institutions were low. These independent variables, often rather unimportant in explaining confidence, were political interest, religious dogmas, leftist political ideology and rightist political ideology, materialistic values and post-materialistic values, financial satisfaction and life satisfaction. The coefficients of determination (R^2_{adj}) were

low when the independent variables were used in multiple regression analyses of confidence in the following institutions: The Parliament, the Education system, the Legal system, the Civil service, the Press, the Trade unions, the Police, and the major companies. The coefficient of determination was, however, rather high for confidence in the church (0.39) and the armed forces (0.20). Some of the independent variables accordingly correlated quite strongly with confidence in these particular institutions; extreme leftist ideology was important in explaining confidence in both the church and the armed forces (negative relationships) and post-materialistic values correlated negatively with confidence in armed forces. Thus, in the USA as well as in Western Europe, it seems as if people who subscribe to a strong leftist political ideology have less confidence in at least some of the societal institutions.

Other demographic variables that have been tested to explain trust are, for example, religious support (Katz & Rotter, 1969), place of living (Rothstein, 1997) and citizenship (Holmberg & Weibull, 1998). In brief, one could characterize the results from these studies as similar to those reported above: when there are consistent relationships, they are usually fairly weak. Hence, one can conclude that in terms of ability to differentiate between demographic groups, the construct validity of trust is not impressive, although perhaps acceptable.

How about the ability to discriminate the trust construct from other constructs? Stack (1978) referred to three studies, which have shown a relationship between trust and three other constructs.

It has been shown that people who demonstrate a need for social approval also tend to respond in a more trusting fashion. This is indicated by correlations of about 0.3 between the Marlowe-Crowne social desirability scale and both the PHN and the IT trust scale (Stack, 1978).

Furthermore, people who feel that they have personal control over their lives tend to score higher on trust. This has been shown since correlations of about 0.3 have been measured between the Internal-External Locus of Control Scale and both the PHN and the IT trust scale, respectively (Rotter, 1966).

Finally, according to Stack (1978), the construct most related to trust is Machiavellanism. There is a very high correlation (-0.67) between the two constructs, indicating that mistrusting persons are very likely to subscribe to Machiavellian beliefs (such as "It is wise to flatter important people").

When it comes to trust and behavior, it has been repeatedly found that mistrusters behave in a less trustworthy manner than trusters. For example, in experimental games, trusters take less advantage of partners than mistrusters do (Schlenker, Helm, & Tedeschi, 1973). One interesting result is found in the context of sensitivity training groups. In these groups, participants are asked to demonstrate their trust by closing their eyes and falling backwards into the arms of another person who promises to catch them. In a study by Cash, Stack, and Luna (1975), a male catcher was used, who by his strong physics was thought to

be perceived as trustworthy (at least in his function of catcher). It was found that the correlation between trust (measured by the result on the IT scale) and number of seconds to fall was rather high and negative (-0.39). High-trusters did not, thus, take as long time to fall as low-trusters did.

Rotter (1980) reviewed the literature on positive and potentially negative consequences of being a high- or low-truster, as measured by his IT scale, and found that there are several positive things that characterize high-trusters. People who trust more are less likely to lie and their behavior is more pro-social in the sense that they are more likely to give others a second chance and to respect the rights of others. The high-truster is, furthermore, less likely to be unhappy, conflicted, or maladjusted, and is liked more and sought out as a friend more often, both by low-trusting and high-trusting others. One might ask whether nothing bad could be said of a high-truster? Rotter concluded, by means of a review of earlier studies, that not even the seemingly justified claim that high-trusters are more gullible than low-trusters could be supported by data.

Worchel (1979) concluded that although numerous attempts have been made to establish the construct validity of the IT scale, the behavioral evidence is weak. For example, one would expect that high-trusters are more willing to disclose uncomplimentary information about themselves than low-trusters; although there are examples of such findings, they have been difficult to replicate.

The self-disclosure theme has been present in other types of trust research as well (not only in attempts to validate the IT scale). Trust could be studied in the context of an interpersonal or intergroup relationship; often the process of establishing a relationship of mutual trust suggests a sequence of steps involving reciprocal self-exposure and reinforcement. Some interesting empirical findings are that subjects disclose more to another person who discloses more about him- or herself. It has also been shown that the greater the power the subject has relative to the other, the more likely he is to engage in trusting behavior himself (the findings are discussed by Worchel, 1979).

Deutsch (1960b) proposed a cognitive perspective in trust research. Although he believed in general expectancies as the basis for trusting behavior, he suggested that two additional factors must be taken into account in deciding whether to trust or distrust another person in a given situation: (1) the extent of the risk involved, and (2) the probability of harmful consequences. Researchers with this perspective on trust have usually approached the subject by using game theory.

Later psychological research on trust has to a large extent been of another character than the research presented so far. While much of the early research focused on constructing and validating measures of trust, recent research is more concerned with applying trust in different contexts. However, since there is low consensus in trust research as to the meaning of trust, it is important to be cautious in interpreting the results, in particular with respect to their

generalizability. Kramer (1999) wrote a review of recent trust research, with a focus on the role of trust in organization theory, but he also included discussions about the state of psychological trust research at large. Parts of this review consist of a summary of what has been found with regard to the bases of trust within organizations. Six different categories were identified:

- Dispositional trust (individuals differ in their general predisposition to trust other people; this has not been in focus to organizational theorists)
- History-based trust (trust between two or more independent actors thickens or thins as a function of their cumulative interaction)
- Third parties as conduits of trust (by their ability to diffuse trust-relevant information via gossip)
- Category-based trust (predicated on information regarding a trustee's membership in a social or organizational category)
- Role-based trust (predicated on knowledge that a person occupies a particular role in the organization)
- Rule-based trust (predicated on shared understandings regarding the system of rules concerning appropriate behavior)

Recent trust research has also focused on the various benefits of trust. Kramer (1999) argued that trust, from a psychological perspective, could reduce transaction costs by operating as a social decision heuristic. Related to this idea is the suggestion that trust in business relationships can reduce the need for monitoring behavior and increase the speed in decision-making, thereby increasing quality of output and efficiency and flexibility of process (Shapiro, Sheppard & Cheraskin, 1992). Trust can also be an important factor in so-called social dilemmas, by its influence on cooperation. Parks and Hulbert (1995) examined the effects of trust in resource dilemmas (one type of social dilemmas). Kramer discussed this function in terms of spontaneous sociability. This refers to how trust as a form of social capital can contribute to various forms of cooperative, altruistic, and extra-role behavior in which members of a social community engage, which enhances collective well being and further the attainment of collective goals.

There has also been increasing recognition of the other side of the trust coin; the role of distrust and suspicion. Gurtman (1992) examined self-reported interpersonal problems of individuals characteristically high or low in interpersonal trust. He found that extreme distrust was generally related to a

symmetrical pattern of distress. Trust was, for example, negatively correlated with being vindictive (-0.45), too controlling (-0.31) and domineering (-0.29).

On a societal level, there has been a strong focus on the reasons for the alleged decline in trust in government in the USA. Nye, Zelikow and King (1997) made an ambitious attempt to discover the causes for this trend. They divided the main factors shaping people's view of the government into two broad categories: perceptions and expectations. Important long-term perceptions included the traditional antipathy towards government (a part of the American political culture) and relatively new post-materialistic values. Short-term perceptions included performance (evaluation of the effectiveness of governmental action), policy (specific policy options), probity (assessment of the integrity of political leaders and the political process), and denunciation of government (criticism of government by political leaders and the press). Expectations included wants (desire for governmental programs and services) and anticipation (prediction of what government is likely to accomplish).

The extent and basic character of psychological trust research conducted since Kramer's (1999) review was here investigated, by a search of the *PsychINFO* database. There was a massive amount (see Figure 2 below) of research in various contexts (including more unusual examples such as the role of trust in music preferences, Rubin, West & Mitchell, 2000, and trust in leadership within a basketball team, Dirks, 2000b), but some important themes could still be identified.

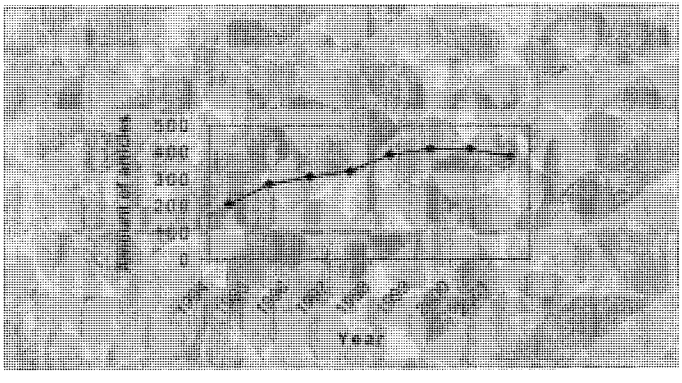

Figure 2. Psychological research on trust 1994-2001 (source: *PsycINFO* database)

Relational trust appears to be a concept receiving much attention. In one article from the early 1990s, Boon and Holmes (1991) discussed implications of trust as they bear upon an understanding of interpersonal relationships, particularly love or romantic relationships. Here, trust was defined as a state involving confident expectations about another's motives with respect to

oneself in situations entailing risk. Close romantic relationships are assumed to involve three stages, with different characteristics and different roles of trust. The first romantic love stage is characterized by strong optimism, where trust and love tend to be strongly related, even though a fragile expression of hope may be the only basis for this sense of trust. In the following evaluative stage, the partner's "imperfections" are gradually revealed. The somewhat "blissful" perceptions of the very positive romantic love stage eventually give way to a greater concern with the underlying realities, motives, intentions, and dispositions of the partner. In the final accommodation stage, partners are concerned with achieving a sense of psychological closure or confidence regarding the other's ultimate designs and the viability of the relationship.

Other themes within the study of trust in close, romantic relationships include how people cope with uncertainty in close relationships (Sorrentino, Holmes, Hanna & Sharp, 1995), sex differences in subjective distress to violations of trust (Cramer, Manning-Ryan, Johnson & Barbo, 2000), and the effects of past partner experience on current relationship quality, in terms of positive love and trust (Zak et al., 2000).

Students of relational trust are not only concerned with romantic partners. Trust has, for example, also been studied in medical (e.g., Thom, Ribisl, Stewart & Luke, 1999; Rosser & Kasperski, 2001) and educational (e.g., Adams & Christenson, 2000) contexts. In these studies, there is often a focus on trust between physician and patient and trust between teacher/school and student/parents.

Trust has been applied to a multitude of business and organizational contexts, such as trust within teams (e.g., Dirks, 2000a; Costa, Roe & Taillieu, 2001), trust in managers (e.g., Gomez & Rosen, 2001; Velez, 2001), the role of trust in sales (e.g., Flaherty & Pappas, 2000; Nicholson, Compeau & Sethi, 2001), brand trust (e.g., Chaudhuri & Holbrook, 2001; Delgado-Ballester & Munuera-Aleman, 2001), trust in strategic alliances (e.g., Das & Teng, 2001a; 2001b), and the role of trust in doing business on the Internet (e.g., Jarvenpaa & Tractinsky, 2000; Knights, Noble, Vurdubakis & Willmott, 2001). A strong interest in trust as a variable in negotiation studies could also be observed (e.g., Butler, 1999; Christen, 2001).

Thus, it is clear that the psychological construct of trust has been applied to many diverse areas. In the following sections, reviews of research on trust in the disciplines of political science, sociology, philosophy, economics, organizational behavior, and risk research, are presented. It could also be mentioned that trust is a subject of study in yet more disciplines, such as anthropology and history (Lewicki & Bunker, 1996; Worchel, 1979).

Trust in Different Disciplines

Trust in Political Science

In political science, one important area of research is to investigate people's trust (or confidence) in institutions, mainly political institutions. During the early 1970s, when the downfall in trust in institutions among Americans was increasingly recognized, there was a discussion between two scholars, Miller (1974) and Citrin (1974). Miller argued, based on an analysis of political trust data from 1964 to 1970, that a situation of widespread, basic discontent and political alienation existed in the USA at that time. However, it has been found that trust in the political system seems to remain at quite a high level in the USA and that the decreasing trust in institutions should be interpreted as a decreasing trust in political leaders and criticism of their behavior (Lipset & Schneider, 1983a). Moreover, Citrin argued that "the burgeoning ranks of the politically cynical may include many who are verbalizing a casual and ritualistic negativism rather than an enduring sense of estrangement that influences their beliefs and actions" (p. 975). Hence, it is not clear how to interpret the seemingly simple notion of a decline in trust in institutions.

Furthermore, there is also a disagreement about whether trust in institutions has actually been decreasing to the extent that is often claimed. Kasperson, Golding, and Kasperson (1999) agreed with Lipset and Schneider (1983a) that there was a real decline in the overall confidence in institutions in the USA between the middle of the 1960s and the early 1970s. However, in contrast with Lipset and Schneider, they argued that the levels of confidence have been quite stable since the early 1970s. The trust measure used by Kasperson et al. (1999) was "percentage of people who express a great deal of confidence in the leadership of ten American institutions". One reason for the levels of confidence to differ somewhat between different researchers and poll institutes may be due to the time when data was collected. It has been shown that public confidence in the USA appears to be quite sensitive to important events, such as the Vietnam War, the Watergate scandal, the stock market crash, and the Gulf War. Thus, these events are clearly reflected in the confidence in institutions, at least in the short run, and they can produce significant differences in confidence from one month to another. The effects of wording as well as the use of different measures of trust could also explain the varying results and conclusions from different researchers.

Lipset and Schneider (1983a) perceived a more long-term decline in the confidence in institutions, until around 1980, even if they agreed that the most dramatic decline occurred between the mid-1960s and the early 1970s. They also agreed with Kasperson et al. (1999) when it came to the sensitivity of the American public with regard to reactions to important events. However, Lipset

and Schneider argued that the large amount of "bad news" caused a more long-term decline in confidence.

When it comes to Sweden, there is less abundance of confidence data, but researchers at the so-called SOM-institute[5] have collected data on confidence since 1986. On the basis of these data, Holmberg and Weibull (1998) stated that there had been a decline in Swedish people's trust in different institutions in society during the 1990s. The measure of trust that was used was a so-called balance measure: the proportion of people with very high or rather high confidence minus the proportion of people with very low or rather low confidence. By performing factor analyses, four dimensions of institutions could be observed: (1) a political dimension (including, for example, the Government and the Parliament), (2) a "society preserving" dimension (e.g., the Royal House and the Swedish Church), (3) a social dimension (e.g., primary school and health care), and (4) a media dimension (TV/Radio and daily papers). No consistent trend for the media and "society preserving" dimensions can be distinguished in the data. During the period of 1994 – 1997, there was a clear decline in confidence in social institutions, but this trend was not at all evident for the period of 1986 – 1997. The clearest case was confidence in political institutions; there was a clear decline between 1986 and 1997. When it comes to horizontal trust – trust between people in general – there was no trend between 1981 and 1996, although the measure of this type of trust was only presented for three of the years during that period (Rothstein, 1997).

Trust as a public good is something that has been put in focus in the study of political science. Ostrom is a well-known name in this line of research. She showed how people in local communities are able to handle common resources in a society in an efficient manner, despite the problems that could arise in such a situation (Ostrom, 1990). These potential problems could be characterized as "social traps" (Rothstein, 1997). The basic assumptions in the theory about social traps are:

1. If everybody chooses to cooperate, everybody wins.
2. If you do *not* trust everybody else to cooperate, there is no point in cooperating yourself, since the potential gains of cooperation require that at least almost everybody cooperate.
3. It can thus be rational not to cooperate if you do not trust everybody else to cooperate.

The conclusion is that efficient cooperation, to reach common objectives, can only take place if people trust everybody else to cooperate. Without this trust, people are caught in the social trap; everybody become worse off, despite the fact that they know that all would be better off if they would cooperate.

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[5] Samhälle Opinion Massmedier (Society Opinion Media)

Ostrom (1990) found that people in local communities, when they handle issues on distribution of common resources, are able to establish trust *when they discuss* how to handle the problems. Thus, from a short-term perspective, people are motivated by self-interest not to cooperate. However, in a situation in which they have to justify their opinions and actions, they are by social norms (such as norms about trust) "convinced" about the virtues of cooperation, thereby enabling efficient cooperation. Trust, seen as a social norm, becomes a public good.

Another approach in political science is to relate trust to political variables. Inglehart (1997) found in a large empirical study, with data from 43 countries, that "a culture of trust" (operationalized as high levels of interpersonal trust) seems to be conducive to democracy, since such a culture helps to stabilize democracy. He found a very high correlation[6] between "the number of years for which democratic institutions have functioned continuously in given country" and "the percentage saying that most people can be trusted".

Trust in Sociology

Trust is also studied by sociologists. In fact, one of the most cited references in research on trust (across various disciplines) is Barber (1983). He aimed to clarify the meaning of trust, since he argued that the concept of trust is inadequately defined – "as with other emotionally charged words, such as love and duty, we are in a verbal and conceptual morass" (p. 1). Basically, he assigned a general meaning to trust, as an expectation of the persistence of the moral social order. Against the background of this comprehensive definition of trust, Barber proposed two more specific meanings: (1) the expectation of technically competent role performance,[7] and (2) the expectation of fiduciary obligation and responsibility.[8] By focusing on expectations, Barber raised the possibility that the declining trust in different institutions may be relative, and not absolute, since it may be the case that the public's expectations of these institutions have increased. Barber discussed in depth the meanings and dilemmas of trust in the following areas: the family, foundations, government, business, and professions.

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[6] $r = 0.72$, $N = 43$, significant at the $p < 0.0005$ level.

[7] An example of such an expectation is the statement: "I trust my doctor to perform the operation well"

[8] We expect that some others in our social relationships have moral obligations and responsibility to demonstrate a special concern for other's interests above their own. That is, we expect our doctor to feel morally obliged to perform the operation with the purpose of reaching the best possible outcome for us, as patients, and not the best possible outcome for him or her.

Barber's (1983) main conclusion was that modern America is not a distrustful society, if this concept is taken to mean alienation or anomie, a loss of basic values or a turning away to other values. On the other hand, Barber argued that the public has shown distrust, in the sense that they criticize parents, professionals, institutions, and officeholders for not meeting expectations that Barber considered rational and justified. Thus, he claimed that one may speak about a "rational distrust". One might conclude by saying that, as long as these different institutions fail to meet the public's expectations, insofar as these are justified, there is nothing particularly desirable about increased levels of trust.

Miztal (1996) is another sociologist who has done important work on trust. She related trust to the different types of order (stable, cohesive, or collaborative) that are supposed to be present in societies and argued that trust takes different shapes and plays different roles depending on the type of order. Miztal reviewed the sociological literature on trust and found that it conceptualizes trust as either (1) the property of individuals, (2) the property of social relationships, or (3) the property of the social system. As we will see below, these distinctions seem to be applicable in other literature as well.

Miztal (1996) also discussed in depth how she interpreted the views, on the role of trust, put forth by well-known theorists such as Luhmann (1979; 1988), Coleman (1990), and Giddens (1990; 1991).

Trust in Philosophy

Some modern scholars in philosophy have discussed the trust concept, although, as pointed out by Blomqvist (1997, p. 272), "Surprisingly enough, moral philosophers have written very little about trust". When discussing it, it seems as if moral philosophers usually see trust as good (Blomqvist, 1997). Dunn (1988) discussed the role of trust in a context of political philosophy. He argued that any theory about politics must include assumptions about trust; it is necessary to discuss whether trust is absent or present and to discuss whether trust is basically good or bad.

Seligman (1997) made an interesting point about the link between interpersonal trust (which, according to Rothstein (1997), could be termed "horizontal trust") and trust in authorities ("vertical trust", see Rothstein, 1997). He argued that "the very 'legitimation' of modern societies is founded on the 'trust' of authority and of governments as generalizations of trust on the primary, interpersonal level" (Seligman, 1997, p.14). According to Seligman, public (or vertical) trust used to rest on a private (or horizontal) trust, but this is no longer the case. The reason for this is that the "freedom of contract" (between individuals and between individuals and society) has been restricted by the many regulations and restrictions which have been established with the purpose to uphold public order. Thus, as society has become more complicated,

it has been increasingly difficult to know what lies behind public trust, and how it should be recovered when it is decreasing.

Faced with a society where the function of interpersonal trust may be unclear, we search for alternatives. Luhmann (1979) has proposed the term "system trust" as a plausible option. System trust is when people put their trust in a system, rather than relying on individuals, because the system is designed to operate in a predictable way (bureaucratic sanctions and the legal system are expected to function).

Thus, one might think of system trust (or institutional trust) as a security for us; when our trust in people in general is not high enough,[9] we prefer to rely on people in their roles as representatives of institutions, whose actions are regulated by law. As Hardin (1991) noted: "Most of us are somewhat like bank tellers: we are secured in our normal honesty by institutional arrangements that make significant dishonesty risky, even difficult. Much of what looks like honesty is essentially self-interest at work." (Hardin, 1991, pp. 203-204). Blomqvist (1997) discussed this subject – the role of trust in a legalistic, or institutional, context in general and the relation between trust and contract law in particular – more thoroughly.

Trust in Economics

It can be argued that trust as studied in game theory constitutes a gray area between psychology and economics. The types of variables psychologists are interested in – for example, awareness of each other's motivation in a game, the nature of the communication involving a promise to cooperate, and the power relationships between the players – should be equally interesting to game theorists with a background in economics.[10]

Basically, the assumption among economists who engage in the study of trust is that repeated games like the Prisoner's Dilemma (Axelrod, 1984) have demonstrated the effects of learning, communication, and the "shadow-of-future" (the existence of potential future transactions); the participants will cooperate when it pays them to do so (that is, if it is rational). Trust is then seen as a response to expected future behavior (Blomqvist, 1997). Economists, however, have by tradition considered social ties, such as trust and friendliness, unimportant in market exchange. The reason for this is mainly that the theories

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[9] It is important to note that our trust in people may be very high, but we may still prefer to put our trust in systems rather than people. As Hardin (1991, p. 203) argued: "many of us might trust our fortunes to a bank more readily than to most individuals, perhaps including close friends and relatives with whom we expect our relationships to last our lifetimes."

[10] And most likely also to sociologists (e.g., Macy & Skvoretz, 1998) and political scientists (e.g., Rothstein, 1997) who may be interested in studying "social traps".

on which economists base their studies do not allow them to take such factors into account (Lorenz, 1988).

The way trust is studied by economists, who do take it into consideration, is relatively similar to that of experimental psychologists who study trust. Loomis (1959) investigated the influence of communication under an individualistic orientation. The notes sent by one player varied in terms of (1) expression of one's intention, (2) expression of one's expectation, (3) expression of one's planned reaction to violation of one's expectation, and (4) expression of a means of restoring cooperation after a violation of one's expectation has occurred. The most complete note included all of these four elements: "I will cooperate and I would like you to cooperate. That way we can both win. If you don't cooperate, then I will choose so that you can't win. If you decide to cooperate and make a cooperative choice after first not doing so, then I will cooperate." It turned out that 80% of the subjects who received this complete information trusted the other player (i.e., made cooperative choices), while this percentage dropped as information became more incomplete. In the control condition (no communication), only 11% of the subjects trusted the other player. Thus, the ability and intent to retaliate do influence the other person's intent to cooperate.

It was also found, though, that there was a difference in trustworthiness between the note sender and the note receiver. The receiver expected more trustworthiness from the sender and was also less trustworthy than the sender. Worchel (1979) proposed that this difference could be explained by level of commitment; the note sender had committed himself to cooperation, whereas the note receiver had not made such a commitment.

There is, however, a possibility, according to Worchel (1979), that some subjects would refuse to cooperate if the gain obtained by refusal was greater than the expected retaliation. To be more convinced of the other person's intent to cooperate, the potential punishment or loss should be greater than the anticipated gain. The hypothesis that the relative values of punishment and reward are influential in determining the probability of a trusting choice has been supported by empirical research, as reported by Worchel.

Stack (1978) noted that the measurement of trust as cooperation in experimental games has contributed little to an understanding of generalized trust; as in the real world, motives behind cooperative and noncooperative behaviors in laboratory situations are confusing and cooperation depends on a variety of factors (e.g., risk-taking behavior, perceptions of the partner, partner's strategy). However, when the Prisoner's Dilemma situation is modified to fit the study of trust, it is possible to discover significant relationships between trust in the shape of IT or PHN and trust in the game. Trust in the game is then, for example, measured as a cooperative response in conjunction with an expectation for cooperation from the partner. This measure rules out people as trusting who *play cooperatively but actually expect*

competition. Another measure of trust is a person's cooperation after he has received his partner's promise to cooperate (discussed above). Wrightsman (1966) used the first measure to assess trust in a one-trial game. Those scored as trusting not only expected their partners to cooperate and cooperated themselves; they also provided reasons for their choice (such as trust or fairness). A significant correlation between PHN trust and behavioral trust was found in two experiments.

Yamagishi has conducted more contemporary research on trust in experimental games. He found, in two experiments conducted in the USA and Japan, that high-trusters tend to form committed relations less frequently than low-trusters when facing social uncertainty (Yamagishi, 1998). This result was interpreted as support for his "Emancipation theory of trust", which stresses the role of general trust in emancipating people from the confines of safe, but closed relationships.

Yamagishi with colleagues have, through a series of experiments, also found that high-trusters (as measured with a general trust scale) are more socially intelligent than low-trusters, as shown by their ability to detect signals of untrustworthiness in a one-shot prisoner's dilemma (Yamagishi, Kikuchi & Kosugi, 1997). They noted that people who are skilled in understanding their own and other people's internal states and use that understanding in social relations (i.e., high levels of social intelligence), are able to maintain a high level of general trust, whereas those with low social intelligence are not. For those who do not develop social intelligence, a very trusting attitude is too risky. Social intelligence is an important ability when people form new relations, which is a prospect when the opportunity cost for staying in secure and stable committed relations is high; new relations bring possibilities but also risks, because of the possibility of encounters with untrustworthy people.

Thus, people who try to develop social intelligence are better in dealing with risky situations (i.e., by their ability to detect untrustworthiness) and can therefore afford to *maintain* high levels of trust. They also *develop* more trust, perhaps as a consequence of the mere process of training social intelligence[11] and the resulting higher ability to face risks. These findings provide further support for the "Emancipation theory of trust".

Dasgupta (1988) argued for economists to give more attention to trust, as it is central to all transactions. He presented his view on trust in order to make it legitimate as an important factor in the economics of transactions. Dasgupta defined trust as correct expectations about the actions of other people that have a bearing on one's own choice of action when that action must be chosen before one can monitor the actions of those others. Thus, when there is a lack of

[11] It seems reasonable to guess that one way to develop higher social intelligence is to simply interact more with other people, including strangers. A condition for trust to emerge from such training is naturally that most people in fact are trustworthy.

sufficient knowledge, trust is necessary. Another important class of cases where trust comes into play is when other people know something about themselves or the world which I do not, and when what I ought to do depends on the extent of my ignorance of these matters. An agreement between those people and me may give them incentive to disclose information – but can I trust them to send me the correct signals, those they would send if they were truly trustworthy? Yet another way to look at trust, according to some economists, is to consider it an "externality", a good or commodity with real economic value, which increases efficiency, but not a commodity which can be traded on the open market (Zucker, 1986).

Trust studied by economists can also be important in an organizational context. La Porta, Lopez De Silanes, Shleifer and Vishny (1997) studied trust in large organizations. Their theoretical starting-point was the existing theories on trust in economics.

One view is based on repeated games. Two parties meet each other repeatedly and trust is the expectancy that the other party is cooperative rather than fully rational.[12] The other view is based on "one-shot" encounters. Trust is in this context the expectancy of a fair, cooperative behavior from the other party, even if one does not expect to meet him or her again.

La Porta et al. (1997) considered trust to be most important in "one-shot" encounters (that is, in large organizations where people do not meet each other as often as in small organizations). In repeated games, we are dealing with people who know each other and by reputation and social ties expect each other to cooperate (even if the degree of trust in the other party may be low).

Trust in people seems to have a strong effect on the performance of large organizations (in this case: nations). When holding GNP/capita as a constant, an increase in trust by one standard deviation will increase legal efficiency by 0.7, bureaucratic quality by 0.3, and compliance in paying taxes by 0.3 of a standard deviation. GNP/capita was held as a constant, since the level of trust is higher in rich countries. By holding GNP constant, it is actually possible that effects of trust may be underestimated, since trust may be input in the production of wealth.

When looking at the relationship between trust in people (strangers) and large companies' performance (operationalized as the relative share of GNP that is contributed by sales from the nation's 20 largest companies), it was found that this type of trust benefits development of large companies (a correlation of 0.65). On the other hand, strong family ties (trust in family) had a negative

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[12] If he or she was fully rational, one would suspect that he would immediately recognize situations in which it would not pay off to cooperate. This theory assumes that people consider cooperation to be the best option in most situations, and since one cannot trust one's ability to think rationally, cooperation is the most common choice.

effect (-0.56). Hence, this study supported the view that trust (in strangers) promotes cooperation in large organizations.

Trust in Organizational Behavior

Trust is an important theme in the traditional study of organizational behavior. This importance has been explained by the assumption that a certain level of trust is a fundamental element of the social fabric and a factor in all market transactions (Etzioni, 1988). Individual and market freedoms, such as those presumed to exist in many market economies, are inconceivable without a social order rooted in community norms, including trust (Etzioni, 1988; Granovetter, 1985).

Even though the focus on the role of trust in organizations, provided by sociologists and also economists, has been applauded, it is argued that many of the alleged insights are based on theoretical speculations only. What many theorists have in common is that they pay little or no attention to empirically testing their arguments about the importance of trust (Tyler, 1996). This word of caution is important to bear in mind when studying compilations of alleged progress in the field of trust and organizational behavior.

Trust has, among organizational scholars, received attention as a construct with many important functions (Creed & Miles, 1996). It has been assigned the role as an alternative to price and authority as well as to the opportunism that pervades agency theory and transactions cost economics. It has also been mentioned as a key factor in managerial beliefs and philosophies and as a necessary element in the operation of network forms of organization. In at least some of these cases, the focus has been on the inadequacies of the assumptions that underlie organizational economics. Within the ranks of managers, trust has been recognized as a major issue in building supplier relations; the starting point for problem-solving sessions across work groups and between firms, their customers, and suppliers; a key outcome of building relationships prior to the start of large projects; and a means of facilitating high-tech industry growth and success.

Trust in Risk Research

In the final section of the review of research on trust, the role of trust in risk research is discussed. Risk research is to a large extent driven by the objective to apply the results on real-world problems. Not only scholars are involved in risk research, but also many practitioners. This circumstance is probably due to the fact that risk research originally evolved as a response to policy problems in the risk area (Sjöberg, 1992). As a consequence, many people who follow risk

research more closely are not very interested in purely theoretical discussions. As Fischhoff (1999) has pointed out, it is probably of little importance to risk managers to know about trends in trust and distrust, since they are usually more concerned about a particular domain of risk management or even just a specific project.

Thus, the role of trust in risk contexts has often been studied in case studies, e.g., to what extent trust is important in the management of technological hazards (e.g., Bella, Mosher, & Calvo, 1988; Flynn, Burns, Mertz, & Slovic, 1992; Kasperson, Golding, & Tuler, 1992; Renn & Levine, 1991). Trust has also been discussed in the context of medical risks (Bostrom, 1999). It is often argued that most of these studies indicate that lack of trust is a critical factor in explaining failures in the management of hazards (Slovic, 1999), such as unsuccessful siting processes in the case of storing nuclear waste, but this claim has been challenged. Sjöberg (1999a) argued that many papers on trust and risk perception treat the matter mostly as a theoretical problem and present no data. In the cases of siting processes, it has been found that trust could affect acceptance of a hazard indirectly. Hine, Summers, Prystupa and McKenzieRicher (1997) found that trust affected perceived costs of a nuclear waste repository, which in turn affected support for building such a repository.

Some risk researchers have paid special attention to the trust concept itself. Frewer, Howard, Hedderley and Shepherd (1996) investigated determinants of trust in information about food risks and found that trust is a multidimensional concept; people do not trust information solely on the basis of perceptions of expertise and knowledge of the information source. Peters, Covello and McCallum (1997) also conducted an empirical study with the objective to test determinants of trust, in the context of environmental risk communication. They found that perceptions of trust and credibility were dependent on three factors: perceptions of knowledge and expertise; perceptions of openness and honesty; and perceptions of concern and care. In 1998, there was a debate in *Risk Analysis* between Earle and Cvetkovich (1998) and Peters, Covello and McCallum (1998) as a consequence of the study (Peters et al., 1997) described above. Earle and Cvetkovich argued that the results were dubious, partly because Peters et al. (1997) had not demonstrated the causal link between the alleged determinants of trust and trust itself in a convincing way. The response by Peters et al. (1998) was that, although cross-sectional studies cannot conclusively demonstrate causality, their study provided strong correlational evidence. Kasperson et al. (1992) also performed research on determinants of trust. Four dimensions of trust were identified: (1) commitment to a goal (which in turn is based on perceptions of objectivity, fairness, and information accuracy), (2) competence, (3) caring, and (4) predictability. Metlay (1999), partly building on these results, further investigated the area of dimensions of trust in a risk context. Credibility and fairness, in addition to the factors mentioned above, were found to be important dimensions of trust. Slovic (1999)

studied events which were thought to increase trust and events which were thought to decrease trust, by asking college students to rate impact on their level of trust, caused by 45 hypothetical news events.[13] It was shown that trust-destroying events seemed to have a greater impact than trust-increasing events on level of trust. Sjöberg (2001) criticized these results, arguing that Slovic's data showed only what 'folk psychology' has to say about trust, not necessarily how trust really would be affected by the events.

Earle and Cvetkovich (1999) have during the 1990s been arguing that the traditional way of looking at trust should be replaced with a concept of value-based trust. According to their view, social trust is based on value similarity, with the value basis varying across people, contexts, and time. Metlay (1999) tested this idea on empirical data, but he found that the impact of "shared values" on trust was insignificant.

As to the possible relation between the constructs of trust and risk perception, it seems as if the discussion about an important relationship between them started with an article about dimensions of risk (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978).[14] During the 1980s and 1990s some papers approached the matter with empirical investigations, showing varying degrees of relationship (for a review, see Sjöberg, 1999a; 2001).

Sjöberg has been skeptical to the argument that there is a strong relationship between trust and risk perception for some time. During the last years, there has been a debate in *Risk Analysis* on this theme. A paper by Siegrist (2000) appeared to provide data supporting a hypothesized model, aiming to explain public acceptance of gene technology. It was in the model assumed that low trust in institutions dealing with gene technology issues would cause people to perceive risks associated with such a technology as high, which in turn would make people less prone to accept gene technology. However, Sjöberg (in press-b) showed that the operational definition of risk and trust is an important factor in determining the relationship between these two concepts. Attitude scale items (used by Siegrist) yielded a much stronger relationship between risk and trust than the more traditional rating scales (where trust and risk items are rated separately, by assigning numbers indicating perceived size of risk and level of trust).

Furthermore, Siegrist and Cvetkovich (2000) proposed that trust could be explained by value similarity. They argued that Sjöberg's (1998) claim that trust accounts for little of the variation in risk perception could be due to how trust is operationalized; a general social trust in government in all situations would be a less successful explanatory variable than a specific measure of trust.

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[13] The events pertained to the management of a large nuclear power plant in their community.

[14] This article was the pioneer work within the so-called psychometric paradigm in risk perception research.

It should be noted, though, that Sjöberg and Siegrist agreed on the importance of knowledge in trust research. There are data showing higher correlations between trust and risk perception in cases where people judge their knowledge of the risk as low (Siegrist, Cvetkovich & Roth, 2000; Sjöberg, in press-b). It may be the case that people feel they depend more on experts when their own level of knowledge is low. Sjöberg (2001) demonstrated empirically the power of a concept called "limits of knowledge"; that is, people may trust experts to be competent and honest, but still perceive risks as high, because they may think that there are limits to the experts' knowledge.

Traditionally, research on trust and risk perception has focused on *social trust*; that is, people's trust in different organizations in society. This type of trust could be related to how trustworthy organizations are with respect to certain attributes, such as competence and honesty. It could also be related to how able authorities are when it comes to protecting citizens against various risks or to whether the information about risks supplied by authorities and corporations is credible or not. Sjöberg's (2001) finding about the limits of knowledge puts the spotlight on another type of trust – *epistemological trust*. Sjöberg (in press-a) related this term to his claim that some people might distrust modern science. Even if representatives of science could be perceived as very trustworthy, they could also be perceived as representing something fundamentally uncertain with clear limitations in the ability to make predictions about the future. In fact, some people might put more trust in alternative worldviews. People who subscribe to New Age beliefs, for example, have their own ontology and epistemology. The world is construed as spiritual rather than material, and knowledge comes from sources other than science, such as insight, feeling or ancient wisdom or magic. Interestingly, Sjöberg (2002b; in press-c) found support for the hypothesis that New Age beliefs are important for perceived risks.

Depending on whether trust is actually important for people's risk perception, trust could be more or less important in risk communication. Renn and Levine (1991) found that credibility of a communication source is closely linked to the perceived past performance record and its openness for public demands.

One rarely reads about the bad aspects of trust. Some cautions for risk management are, however, presented by Cvetkovich and Löfstedt (1999). It is noted that sanctioned violence, such as warfare or genocide, could happen because people trust those who direct the destructive actions to be legitimate authorities. Other examples of the negative aspect of social trust are prejudice and xenophobia; these consequences of trust may be the result of "group think" (see, for example, Janis, 1972). That is, trust in a leader may put into play psychological and social processes that isolate the group.

Theoretical Framework

Introduction

One of the best known general theories of trust is that of Erikson (1963). He emphasized that within the first two years of life each individual must learn to trust at least one other person. Trust is assumed basic to all other aspects of personality development, especially the growing sense of personal identity. Even though this importance has been proven to be difficult to establish empirically (Worchel, 1979), it is concluded by Hogan, Johnson and Briggs (1997) that at least some level of generalized trust appears to be necessary for a normal and satisfying life. The reason for this is probably that trust is a concept that is not restricted to the business arena, for example, or to the political arena. On the contrary, social and behavior scientists find the problem of trust a major concern in family relationships and business transactions, in client/professional interactions as well as driver/pedestrian encounters. They meet the problem of trust in the home and in the marketplace, at the office and on the street (Worchel, 1979).

Research on trust covers many areas of study and there are many suggestions as to the meaning of trust. One example is the area of personality psychology, in which trust has received some attention. In the *Handbook of Personality Psychology* (Hogan et al., 1997), trust is assigned a chapter. It is noted that one way of looking at trust is to focus on the scope or target of trust, for which two levels are proposed. The most common level is referred to as *generalized trust*. This type of trust is described as a general expectancy that other people in general are reliable and honest.

The second level of trust, described by Hogan et al. (1997), is referred to as *relational trust*. This type is the trust one has for a specific person or groups of people. In a sense relational trust derives from one's participation in specific relationships and interpersonal exchanges, and yet it does not reduce to the trustworthiness of one's relational partners. Instead, relational trust refers to the motivation and ability to permit oneself to become vulnerable to others through the development of the relationship itself. Relational trust will not be a matter of study in the present thesis.

As to scholars working within the generalized trust paradigm, Erikson (1950) considered trust to be a reliance on another's integrity and he related this concept to the development of personality early in life. He emphasized that within the first two years of life each individual must learn to trust at least one other person. Trust is considered to be basic to all other aspects of personality development, especially the growing sense of personal identity. In this perspective, trust is basically conceptualized as a personality trait. Deutsch (1958) also believed in a generalized trust, but tended toward a more operational definition of trust, relying on the *behavior* of a person in situations

of risk. Deutsch (1960a) proposed the following features of a situation in which the individual must decide whether to trust or distrust the behavior of another person: (1) the presence of an ambiguous path that can lead either to a beneficial or to a harmful event; (2) the perception that the occurrence of the outcome is dependent upon the behavior of another person; (3) the perception that the strength of the harmful event is greater than that of the beneficial event. A person who selects the ambiguous path is said to make a trusting choice; a person who does not take the path is said to make a distrustful choice.

Rotter (1954; 1966; 1971) proposed a theory of general expectancy. He also devised a scale to measure the trust variable and stimulated research to validate his scale (Rotter, 1971). Expectancies are the products of earlier reinforced responses that generalize to novel situations. The Interpersonal Trust Scale (IT) is designed to measure the generalized expectancy that the promises of other persons can be relied on (Rotter, 1967).

We have thus discussed two ways of treating generalized trust in psychology. A third method is to look at generalized trust by means of game theory, which is common in behavioral psychology.

Criticism of much of the psychological research on trust is often based on the argument that the assumption that people make rational calculations – judging intentions, sizing up risks, weighing and evaluating expected outcomes – is unrealistic. This argument is similar to the argument often used against economists, who use mathematical models, based on simplified assumptions, in order to predict economic behavior. A common suggestion is that one has to consider the social context of different situations. This point was made by Kramer and Tyler (1996), whose starting point was that trust can be conceptualized as an orientation toward society and toward others that has social meaning beyond rational calculations. Trust is linked to social context, and trusting behavior changes as social context changes. Related to this suggestion is the attempt to take situational characteristics into more consideration and to acknowledge the subjective element of trust (Stack, 1978). In fact, situational trust could be perceived as a different type of trust than generalized trust, which has been discussed above. In explaining situational trust, generalized trust is according to Stack (1978) only one of several determinants. Other determinants are (1) the degree of risk or uncertainty present; (2) the data, provided by communication, on which to base the trust-mistrust decision; (3) whether or not partners have kept their promises in the past; (4) social evaluation, based on past and present behavior, appearance, similarity to significant others, and so forth.

In Figure 3 below, Stack's (1978) proposal as to the processes leading to trusting behavior in a specific situation is presented.

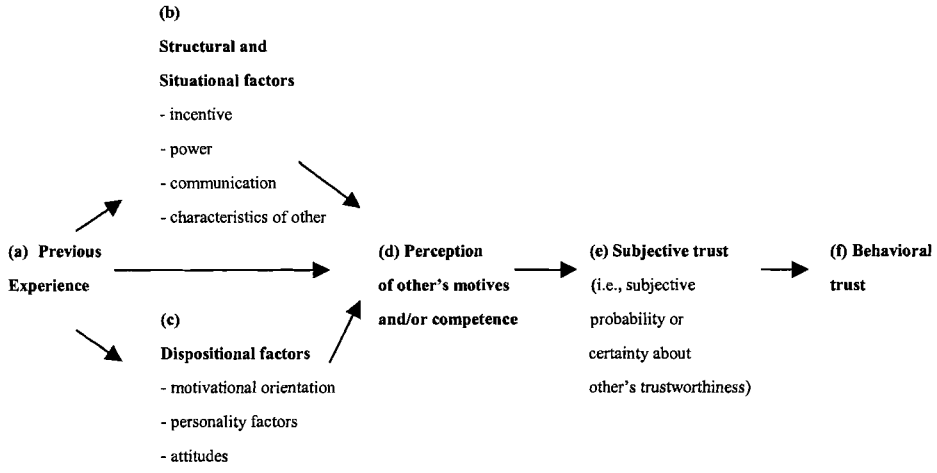

Figure 3. Proposed processes leading to situational trust

At this point, it is important to note that trusting behavior will not be investigated in the present thesis. There will be a focus on the concept of generalized trust; situational cues will not be taken into account. It is possible to study the effects of generalized trust, conceptualized as (for example) an attitude, on trusting behavior, without considering the situational context. Previous research has, however, shown that a general trusting attitude contributes rather moderately (although often significantly) to the understanding of trusting behavior, as it varies across very different situations. This is probably due to the simple fact that real-life situations are highly complex and, as suggested in the figure above, a lot of aspects come into play as determinants of a decision to trust another person or group of persons. By restricting the focus to a study of trust as a generalized attitude (or some other related, easily measured, construct, such as expectancy), the effects of situational factors are minimized.

It is important, however, to mention three factors, which are always important in a situation where a person has to make a decision about whether or not to trust someone else. These factors are:

- Uncertainty
- Risk
- Interaction

One distinguishing feature of a trust situation is the element of *uncertainty*. Any situation is by definition uncertain, since one can never have full access to information about the future consequences of any action. The element of uncertainty carries with it some degree of *risk*. This risk does not have to exist objectively, but the mere fact that we cannot be entirely certain of the future

means that we should include the element of risk in our judgment of the situation. The recognition of risk or uncertainty as an important determinant of trust brings us to one well-known scholar in trust research. Luhmann (1979) perceived trust as a reduction of uncertainty and complexity. His view was that trust is about risk, and risk is about the choice to expose oneself to a situation where the possible damage may be greater than the advantage that is sought (Luhmann, 1988). There is an interesting two-way relationship between trust and risk – if there is no risk, there is no need for trust, but when a person chooses to trust, it is in order to reduce risk. This idea could possibly be conceived of as the theoretical foundation of the inclusion of trust as an important predictor of perceived risk.

A clear feature of a trust situation is the involvement of at least two actors. There is an element of *interaction*, even though it could be argued that one could choose to trust oneself or not. In the present thesis, the focus is on the trust people put in others. In this situation, when there is an interaction between two or more actors, the outcome of the situation is most likely at least partially dependent on how the trusting part perceives the trustworthiness of the part who is to be trusted (or not). As shall be seen, perceived trustworthiness is in this study hypothesized to be a key determinant of people's trust in organizations.

The Dominant Conceptualizations of Trust

Since the context in the present thesis is psychological literature and theory, the conceptualizations of trust in the present thesis are, to quite a large extent, reflections of how trust has been viewed in psychology. Worchel (1979) provided an overview of the three major theoretical perspectives on trust in psychology. Although these perspectives have their origin in psychology, they have been applied to other disciplines as well (Lewicki & Bunker, 1996).

Personality theorists, concerned with individual differences, have emphasized the nature of the trust construct. Trust as a construct has been variously described as a belief, an expectancy, and a feeling. It is conceptualized as a personality trait or generalized response attributed to the reinforcement consequences of earlier social interactions. The view of Rotter (e.g., 1971) was described earlier. Another personality theorist, Wrightsman (1964), assumed that everybody develops a philosophy of human nature, or an expectancy of how people will behave. The first dimension of a personal philosophy is that of trustworthiness – that is, the extent to which one believes that people are basically honest as opposed to the belief that people are immoral and irresponsible.

The second perspective is one that is shared by many sociologists and economists, who have focused on trust as an institutional phenomenon. At this level, trust can be conceptualized as both a phenomenon within and between

institutions, and as the trust individuals put in those institutions (Lewicki & Bunker, 1996). Those who study trust in the context of an interpersonal or intergroup relationship derive the trust construct from the characteristics of the participants (Worchel, 1979).

Social psychologists who are concerned with behavioral psychology have tended to rely on operational definitions of trust, by means of experimental laboratory research (Worchel, 1979). The definitions of trust are derived from people's behavior in potentially harmful interpersonal transactions. The behavior could be interpreted in terms of the expectation of the other party in a transaction, assessment of risks associated with assuming and acting on such expectations, and the contextual factors ("cues") that serve to either enhance or inhibit the development and maintenance of that trust (Lewicki & Bunker, 1996). In these definitions, there is a strong focus on situational characteristics.[15]

The Multitude of Theoretical Perspectives on Trust within Different Disciplines

One of the problems of trust research is the disagreement as to the substance of trust, not only between different disciplines, but also within these disciplines. No surprise, then, that Blomqvist (1997) concludes that proposing a universal definition of trust is a "mission impossible". Nevertheless, it could be worth the effort to integrate different perspectives; both for theoretical reasons, in order to move trust research forward in a cumulative manner (McKnight & Chervany, 1996), and for practical reasons, such as proposing a working definition of trust for business contexts (Blomqvist, 1997).

McKnight and Chervany (1996) found a low degree of consensus regarding the true meaning of trust. One reason for this finding may be the fact that each literature has approached the problem with its own disciplinary lens and filters and little effort has been made to integrate the different perspectives (Lewicki & Bunker, 1996). McKnight and Chervany looked at the ways in which trust had been defined in sixty research articles or books on trust (where approximately 1/3 belonged to the areas of Management/Communication, Sociology/Economics/Political Science and Psychology/Social Psychology, respectively). Eight different categories of definitions of trust were observed, of which "belief" (24% of the articles used such a definition), "expectancy/expectation" (20%), "behavior" (18%), and "feeling"[16] (17%) were

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[15] See, for example, the view of Deutsch (1958), that was described earlier in this chapter.

[16] Definitions belonging to this category referred to an affective state, other than attitude, such as confidence or security.

the most commonly used definitions. The other definitions were "attitude",[17] "intention", "disposition",[18] and "impersonal/structural".[19]

Blomqvist (1997) tried to summarize how the concept of trust is approached and defined in various disciplines, in order to reach a generally acceptable definition that could be used in business research.

When it comes to trust in *social psychology*, Blomqvist (1997) noted that the existence of risk (which creates vulnerability) and some information (knowledge) about the potentially trusted person or situation are considered as necessary conditions for trust to exist. Under the assumption of perfect information, there is no trust but merely rational calculation, whereas under the assumption of total ignorance it is only possible to have faith (and/or gamble), but not to trust. As we have concluded, many psychologists also define trust as a personality trait, while other stress its social aspects. The tendency to perceive trust as an interpersonal phenomenon is appealing to Blomqvist, "as the concept makes very little sense to a man on a desert island" (p. 272).

As mentioned before, when it comes to trust in *philosophy*, moral philosophers tend to see trust as good. Beyond that, there does not appear to be a consensus on the meaning of trust, within the discipline, since it is concluded that trust can take many forms. For example, trust can be unconscious, unwanted, or forced, and it can be a question of encounters between strangers, or of long-term trusting relationships.

Trust in *economics* has traditionally been little attended to. One reason for this is that rational choice theory excludes differences among actors – that is, no differences in trustworthiness can exist according to this theory. Another reason for the lack of interest is said to be the assumption of ideal markets, with perfect information and pure competition between independent and faceless traders. There has been a shift in focus towards accepting a view of imperfect markets, however, which has produced some interest in the trust concept, mainly due to its role in long-term relationships between firms.[20] Economists usually study trust by means of game theory and relate the concept to cooperation; the most well-known scholar in this tradition is probably Axelrod (e.g., 1984). The main assumption is that participants in a repeated game, such as Prisoner's Dilemma,

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[17] It should be noted that the researchers attempted to break down the definitions to the lowest possible level – hence they only marked "attitude" when the author to the investigated article or book referred to attitude without breaking down the definition into beliefs, intentions, and affect.

[18] Based on personality attributes of the trusting party.

[19] This was founded upon social or institutional structures in the situation; that is, neither on personal attributes nor the property or state of a person or a group of persons. Rather, this category should be conceived of as an institutional property.

[20] Such relationships would be impossible under pure competition

will cooperate when it is to their advantage to do so. Trust is seen as a response to expected future behavior.

It is also interesting to note that in the case of *marketing*, trust has quite recently been recognized as an important construct. It is concluded that market research borrows heavily from other disciplines in discussing trust. "Trusting behaviour is seen as a long-term attitude among individuals or companies. It tolerates minor drawbacks in the relationship, but also expects and relies on the parties to respond to one another's needs. Thus a state of mind (attitude, confidence, belief), expectation of positive outcomes and behaviour (...'doesn't check'...'treats'...'expects', 'acts'...) all co-exist." (Blomqvist, 1997, p. 277)

Terminology in Trust Research

A dilemma in trust research is the fact that some terms are used as synonyms of trust, even if there are differences as to the meaning of these terms/concepts and trust. Blomqvist (1997) conducted a conceptual analysis of the concepts commonly used as synonyms of trust: competence, credibility, confidence, faith, hope, loyalty, and reliance. She provided definitions of these concepts and showed how they differ from trust. To discuss the meaning of all concepts would occupy a disproportionate amount of space in the present thesis, but it is interesting to present the most common synonyms of trust in some detail. Credibility is a concept that is described as "The actor's perceived ability to perform something he *claims* he can do on request" (Blomqvist, p. 277). Thus, credibility seems to involve an aspect of promise-keeping, which is in accordance with what others have observed with regard to this concept (e.g., Stack, 1978). It differs from trust, since degree of credibility does not say anything about the actor's intentions, nor his will to perform the requested task – only his ability.

Faith is described as an "Actor's blind belief in something". It is not the same as trust, because: "The actor does not have, or does not request information for considering alternatives as he in the case of trust does" (Blomqvist, p. 279).

Reliance is described as "The actor may on consideration decide to rely only on certain aspects or features of another actor or system" (Blomqvist, p. 279). It is seen as a narrower concept than trust in the sense that a trusting actor trusts another in all respects after judging the character and behavior of the other.

It is perhaps possible to describe the main difference between trust and somewhat related constructs by pointing to the distinguishing feature of trust – that it may rest on blended evidence of experience and on more subjective grounds, such as knowledge, affection, admiration, respect, or reverence. These

dual sources of trust (objective and subjective) seem to differentiate it from related concepts (Stack, 1978).

One might argue that the discussion above is nothing but a pointless exercise in semantics, having no actual importance. After all, consider a person who fills out a survey about his trust in different actors. How do we *know* that he or she has the degree of knowledge about the actors that distinguishes his judgment as an answer indicating trust rather than faith? The answer is that we can never know, which is one of the most disturbing problems, but perhaps also stimulating challenges, of performing research in social science. Trust is a construct, which makes it impossible to directly observe. This fact is, however, an argument in favor of semantic "carefulness". The validity of a construct is likely to be improved if the researcher is careful both in his or her verbal interpretation of the construct and in his or her statistical treatment of the construct.

The concept of "confidence" is most likely the term that is most often used as a synonym of trust. The distinction between these concepts is the most relevant in the present thesis, since surveys are used for collecting data on trust. There are different approaches when it comes to what term to use when describing how people in surveys rate their trust (or confidence!) in different institutions in society – in political science, the dominating method appears to be to speak about confidence in institutions (e.g., Lipset & Schneider, 1983a; 1983b; 1987), whereas in, for example, risk research, "trust" is the term researchers refer to. Carelessness with respect to the use of these terms may have serious consequences, especially if one would like to argue that there are clear empirical differences between the concepts of confidence in institutions and trust in institutions.

It is not clear, however, if there actually are clear empirical differences between trust and confidence. In the anthology *Citizens and the State* there are two chapters on these issues: "The dynamics of trust in politicians" and "Confidence in political institutions", which implies a difference between the concepts. The difference is said to lie in the fact that trust is not directed toward a specific person or party, but rather a fairly general attitude. It is further argued that a decline in trust is less serious than a decline in confidence in institutions. Trust in politicians (Listhaug, 1995) and confidence in institutions (Listhaug & Wiberg, 1995) are both studied on the basis of survey data from several Western European countries. The alleged difference between trust and confidence is dubious, however, since level of generality only concerns the actors (politicians and institutions). The authors do not present a conceptual difference between trust and confidence; thus it is equally possible to label the research problems "confidence in politicians" and "trust in political institutions".

There are scholars who do describe differences on a conceptual level. Blomqvist (1997) described confidence as "The actor expects something to happen with certainty, and does not consider the possibility of anything going

wrong" (p. 279). This is not the same as trust, since confidence apparently does not involve a conscious consideration of alternatives. Luhmann (1988) discussed the distinction extensively. He noted that the normal state is that of confidence. People are confident that they will not be disappointed with their expectations. Trust, on the other hand, requires a previous engagement. It presupposes a situation of risk. If alternatives are not considered, there is a situation of confidence. Trust is different in the sense that people have formed an attitude towards someone or something, an attitude that allows them to take risks (or to decide not to take risks, if their trust is not high enough).

Finally, it is important to note that trust according to Luhmann (1988) is only possible in a situation where the possible damage may be greater than the advantage that is sought. Otherwise, it would simply be a question of rational calculation and people would choose their action anyway, because the risks remain within acceptable limits. Trust is only required if a bad outcome would make them regret their action.

The distinction between trust and confidence appears to be similar in dictionaries. For example, in the Cambridge International Dictionary of English (1995) trust is based on a belief whereas confidence is based on certainty. The definition of trust is according to the dictionary: "to have belief or confidence in the honesty, goodness, skill or safety of (a person, organization or thing)" (p. 1565). The definition of confidence is: "the quality of being certain of your abilities or of trusting other people, plans or the future" (p. 286). The two terms are related to each other, but they do not mean the same thing. It seems as if confidence may require some level of trust, whereas trust does not require confidence.

The problem of trust versus confidence is somewhat mitigated by the fact that the surveys in the present thesis were sent out to Swedish people. There is not the same conceptual confusion in Sweden, where all researchers seem to use one word to measure trust in their surveys ("förtroende"). In order to compare the results of the present thesis with earlier research on trust, it is appropriate to use the term that has been used in most previous studies. When the results of the present thesis are reported, the main language is English. The term "trust" will be used, since the research is presented in the context of risk research, and it is a good idea to use the terms used by other risk researchers. Moreover, the understanding of trust is, in the present thesis, to a large extent based on psychological research on trust, which has emphasized the importance of uncertainty, risk, and limits of knowledge. These factors are less prominent in discussions about confidence.

Hedquist (2002) conducted an interesting conceptual analysis. By using a rhetorical approach, he analyzed the concept of credibility. It was argued that credibility is a function of many different factors, such as extraversion (including openness and ability to communicate), self-control, consistency and knowledge. In the literature on trust research, these types of attributes are

usually related to trustworthiness. Interestingly, credibility is often argued to be one of the attributes that determine perceptions of trustworthiness.

Hedquist (2002) suggested a "trust ladder", where trust is a function of credibility, which, in turn, is a function of trustworthiness. There are two major difficulties with Hedquist's type of research, which he identified. First, due to a considerable amount of overlaps, there are no clear boundaries among the concepts discussed above. For example, what was here interpreted as Hedquist's version of trustworthiness could also be interpreted as reliability. Hedquist's operationalization of the trustworthiness or reliability construct (in Swedish: "tillförlitlighet") was that "it is likely that what is said is true". Based on the assumption that an oral or written statement is true, a source could be perceived as credible. Whether this is the case is then dependent on whether the source is perceived as, for example, extraverted, consistent, and knowledgeable. If the source is perceived as credible, it could also be trusted.

The notion of trust is related to the second difficulty, which concerns language. Hedquist (2002) noted that it is difficult to translate trust to Swedish, since it could be translated in two different ways: "förtroende" or "tillit". Hedquist argued that trust could be distinguished on two levels. One can trust an institution ("ha förtroende"), but one can also trust "others" ("känna tillit"). The second level of trust includes delegation of responsibility (e.g., one can delegate the responsibility for one's transportation to a bus driver), but it is also important in personal relationships. This, possibly stronger, level of trust makes individuals vulnerable and Hedquist argues that it is impossible to develop such a relationship to an authority or another type of organization. This treatment of trust is similar to the treatment of trust in the present thesis. Instead of distinguishing between confidence in institutions and trust in others, it could be argued that there are two main expressions of trust: a weaker form of trust in institutions and a stronger form of trust in "others", where the second form most likely is more dependent on risk and vulnerability than the first. It is probable that the two forms are related empirically. When respondents are asked about their trust in an organization, it is likely that they have a mental idea of the trust concept. It is possible that these ideas include notions of risk and vulnerability. These notions are probably less salient in people's judgment of trust in organizations than in their judgments of trust in other people.

Another topic in trust research is the difference between trust and distrust. One would perhaps guess that distrust is just the opposite of trust. This is not the case, according to Luhmann (1988), who argued that distrust is also a functional equivalent for trust. His explanation of the difference between trust and distrust is derived from the function of trust. Trust reduces social complexity by enabling risk taking. However, if you are unwilling to trust (i.e., take a risk) or if your trust is rejected, the function of trust would remain unfulfilled. This could create a surplus of complexity, which places too many demands on you as an individual. You become incapable to act and are forced to functionally

equivalent (but different) strategies in order to reduce complexity. You are forced to form negative expectations instead of positive ones; that is, you distrust instead of trust. These *negative* strategies give distrust an emotionally tense and often frantic character, which distinguishes it from trust.

In the present thesis, there is a distinction between different degrees of trust. One can be a low-truster or a high-truster. The term "distrust" is not used. In a cross-sectional study based on survey data, it is difficult to set limits – what is low trust and what is distrust?

A dimension often referred to in trust research is trustworthiness. Sanner (1997) considered trustworthiness to be an attribute of individual parties, while trust is an attribute of a relationship between parties. To be trustworthy is to have certain qualities that merit confidence or trust.

Trust Concepts used in the Thesis

Here, trust concepts used in the present thesis are discussed. Most of them have been used in earlier trust research, but a new conceptualization of trust will also be presented, based on the Expectancy-Value Model.

The trust measures are all assumed to generalize. Although trusting behavior is not investigated in the present thesis, it is important to note that generalized trust need not be restricted to an attitude or belief (Rotter, 1967), but it may also be an actual behavior (Deutsch, 1958). The common feature is that one still focuses on the target, or scope, of trust, and assumes that trust can be generalized (simply the notion that if you trust people in general, you are more likely to trust institutions, corporations, family etc, than if you put low trust in people in general). The main difference between these notions is that trusting behavior usually deals with the situational context whereas trust in the form of, for example, an attitude does not.

Even though all measures of trust are assumed to generalize, they are more or less specific in character. In the second article, it is investigated whether two measures of trust could explain levels of perceived risk. One of the measures is specific, since it relates respondents' trust in authorities' ability to protect against risks to ratings of specific risks. The other measure is general (Sjöberg, 1999a) and includes approximately 40 items measuring people's trust in different social agents (e.g., the fellow man, politicians, and corporations).

In the third article, the ratings of trust in five organizations are the dependent variables. Here, the above mentioned measure of general trust is included, as well as two other measures of general trust (one measure is based on the scale developed by Rotter, 1967, whereas the other was developed by the author of the present thesis). These general trust measures are used as possible explanatory variables, but also for validation purposes. The main explanatory variables are expected to be interpersonal trust (based on the dichotomous

question: "In general, would you say that most people can be trusted or that one cannot be too careful when dealing with strangers?") and assessments of organizations' trustworthiness, with respect to a number of attributes.

Ratings of trustworthiness as predictors of trust in organizations are empirically studied. The intention is also to make a theoretical contribution to research on trust. In order to accomplish this, the so-called Expectancy-Value Model, well-known from research on attitudes, is used. By conceiving of trust as an attitude, it is possible to include beliefs about attributes of trustworthiness (rather common in research on determinants of trust) as an explanatory variable, but also to include values assigned to these attributes. It is important to note that it is not established that the attributes assumed to signal trustworthiness actually do reflect this psychological construct. The use of the term trustworthiness is based on previous research where trustworthiness is described as an attribute of individual parties. A trustworthy social agent is one that possesses certain qualities that merit trust.

Fishbein and Ajzen (1975) developed the Expectancy-Value Model. The equation is formulated as:

$$A = \Sigma bV.$$

In this equation, A is the attitude towards an object (here, trust in an organization), whereas b is the belief that the object has a certain property and V is the value of that property. Summation is across all salient properties of the object. The objects (organizations) and properties (attributes of trustworthiness) are thoroughly discussed in the third article.

Conceptual Framework

The main purpose of the thesis is to investigate the role of trust in risk policy, with a particular focus on energy policy and people's perceptions of nuclear risks. It is suggested that trust could have importance for risk policy, by means of its effect on people's risk perceptions. This relationship can take the shape of policy-makers taking levels of perceived risk into account (which is not investigated) and it can also be the case that people's risk perceptions affect their policy-related attitudes (which is investigated). Thus, if low levels of trust are strongly related to high levels of perceived risk, and if high levels of perceived risk, in turn, are strongly related to policy-related attitudes, it can be concluded that trust is an important factor to consider in the forming of risk policy. This is based on the assumption that people's attitudes are important factors to consider for policy-makers. The main research question of the thesis in the shape of a model was presented in Figure 1 above.

In the first article, the case of energy policy is studied. There is a focus on individuals' attitudes related to energy policy in general, and to risks associated with nuclear power in particular. The reason for the focus on nuclear power is the planned phase-out of nuclear power as a main energy source in Sweden, which creates a need for a reformation of the energy system in Sweden. The official policy of the Swedish government is to compensate for the expected loss in energy production by means of higher levels of electricity saving among Swedish households and in industry. Therefore, attitudes related to electricity saving and self-reported electricity saving behavior are also investigated. Two main relations should be noted here:

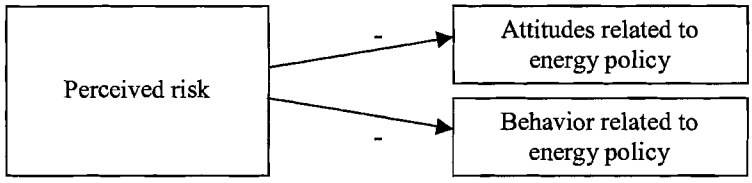

Figure 4. Conceptual model in the first article.

In the second article, the purpose is to explore the possible relationship between trust and risk perception, within and across four Western European countries. Two main trust measures are used in this extensive empirical study: specific trust (trust in authorities' ability to protect society against specific risks) and general trust (a scale developed by Sjöberg, 1999a, including approximately 40 items measuring respondents' trust in various social agents). Since there is a particular focus on nuclear risks, the study also includes questions closely related to nuclear power. One important variable is people's trust in the competence and information of various authorities, in case of a nuclear accident. This type of trust is tested as a possible predictor of perceptions of nuclear security. The main relations investigated in the second article are:

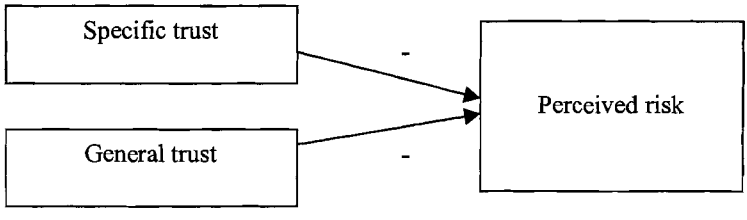

Figure 5. Conceptual model in the second article.

In the third article, the objective is to test determinants of trust in different organizations. Trust in an organization is conceptualized as an attitude,

dependent on respondents' beliefs about and values assigned to different attributes of trustworthiness of the organization. Using the Expectancy-Value Model for analyzing trust enabled this conceptualization. It is also hypothesized that the degree of interpersonal trust will correlate on substantial levels with trust in organizations. That is, the relations in focus in the third article are:

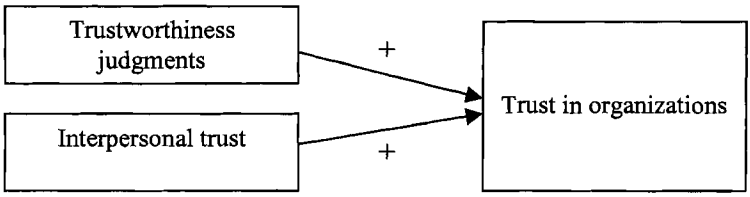

Figure 6. Conceptual model in the third article.

DISCUSSION

Summaries of Articles

Summary of article 1: Energy Policy Options – from the Perspective of Public Attitudes and Risk Perceptions

The energy situation in Sweden is currently very dynamic. Two important changes in Sweden are the phasing out of nuclear power (to be replaced by other energy sources) and the deregulation of the electricity market. There is hope that a market deregulation will make people more efficient in their electricity consumption; that is, that they will simply consume less electricity without having to decrease their standard of living. If the Swedish electricity market would actually be more efficient, in terms of more cost-efficient electricity consumption, the nation would be more capable of managing a possible shortage of electricity (which might be the consequence of a phase-out, if no alternative sources of energy have been found at that time). However, a possible complication could be that deregulation will not necessarily lead to decreased consumption of electricity, since deregulation *also* leads to increased competition and lower prices, which is probably strongly related to an *increase* in electricity consumption.

Another possible complication of phasing out nuclear power is related to effects on the environment. The main threat to the environment is that of carbon dioxide emissions, which have been estimated to increase in case of a phase-out of nuclear power (Energikommissionen, 1995). Another factor is cost-efficiency, since nuclear power is a relatively inexpensive energy source.

In order to examine the influence of *psychological* variables (e.g., perceived risks) on attitudes and behaviors related to energy policy, a mail survey was used as means of collecting data. The response rate was 66.3%, with 797 completed and returned questionnaires. One objective of the study was to work with a sample representative of the Swedish population, in order to be able to generalize the results. According to the sample results regarding background variables, this objective seems to have been reached.

The specific questions in the article were:

1. How do Swedes perceive different kinds of risks, including nuclear risks, and what risks are perceived as biggest?
2. What attitudes do Swedes hold in different energy policy related issues?
3. Does people's risk perception influence their attitudes related to energy policy and electricity saving?
4. What is the relation between attitudes towards electricity saving and self-reported electricity saving behavior?

5. To what extent can psychological variables explain people's attitude towards electricity saving?
6. To what extent can psychological variables explain people's self-reported electricity saving behavior?

Findings in the present study are presented in Figure 7 below.

Findings in article 1
Electricity saving behavior
A regression model explaining approximately 20% of the variance in behavior was presented.
Several physical limits to electricity saving were identified; most of them were related to type and size of dwelling.
The impact of lifestyle factors on electricity saving behavior was tested but the effects were weak.
Attitude and behavior
The relationship between attitude towards electricity saving and self-reported electricity saving behavior was significant, but weak ($R^2_{adj} = 0.052$).
The variables explaining attitude towards electricity saving were to a large extent different from those explaining self-reported electricity saving behavior. Attitude was more determined by perceived risks, whereas behavior was more determined by variables related to circumstances of living (e.g., type of housing). An altruistic factor, however, accounted for approximately 10% of the variance in attitude as well as behavior.
Attitude towards electricity saving
People were positive towards electricity saving. They felt ready to save more electricity if needed and realized that the need for electricity saving will most likely increase as a consequence of a nuclear power phase-out. Almost all respondents reported that they act at least to some extent in order to maintain and protect the environment.
Risks were important in explaining attitudes towards electricity saving, under the condition that the degree of proximity (= semantic overlap) between the independent variable (i.e., risks associated with saving or not saving electricity) and the dependent variable (i.e., attitude towards electricity saving) was high.
Attitudes towards energy production systems
People were more negative towards nuclear power than they were towards most other energy production systems.
People were positive towards solar power and wind power as energy sources and wanted these sources to provide a larger share of the Swedish energy production in the future.
Attitudes towards energy production systems were largely determined by perceived risks associated with the systems.

Figure 7. Findings in article 1

Summary of article 2: Trust and Risk Perception in Western Europe: A Cross-National Study

An issue currently very much debated in risk perception research is the relationship between trust and perceived risk. In the present study, recent findings on the relationship between trust and risk perception were discussed and extensive data bearing on the issue from four European countries were presented. Data were collected within the European Union project RISKPERCOM and included survey responses from citizens of Sweden, France, Spain, and the United Kingdom.

The number of respondents included in the present study ranged from approximately 250 (UK), through 500 (Spain), to 750 (Sweden). In the French questionnaire, the general trust scale was not included. Some questions were analyzed with data from all three waves. Here, data from the UK and Spain were based on answers from approximately 1000 respondents, respectively, while the number of respondents was higher in France (approximately 1350) and Sweden (approximately 2050). Generally, the sample was fairly well representative of the population in each country.

The main research question in the present study concerned whether trust was an important determinant of risk perception within the four countries and whether trust was a major variable when it came to explaining the different levels of perceived risk among these countries. Related to this main research question were also a number of additional questions:

1. Which measure of trust (general or specific) is the more important determinant of perceived risk within countries?
2. Are there differences among countries concerning levels of trust and perceived risk as well as strength of the relationship between trust and risk perception?
3. Is the relationship between trust and risk perception stronger for nuclear risks than for other risks?
4. Which measure of trust (general or specific) accounts for more of the variation in perceived risk across countries?
5. Are the respondents' perceptions of own knowledge of different risks an important determinant of the strength of the relationship between trust and risk perception?

Findings in the present study are presented in Figure 8 below.

Findings in article 2
Trust as source of variation in perceived risk across countries
Levels of perceived risk varied considerably among the countries. Respondents from Sweden perceived risks as lower than respondents from the UK, Spain, and France.
General trust was a significant source of variation in perceived risk among countries, but the effects were moderate.
A mean of all trust and risk items was calculated for each individual, in all countries, and the new factors constituted aggregated trust and risk. The correlation between aggregated general trust and aggregated risk was -0.37 and the correlation between aggregated specific trust and aggregated risk was -0.18.
General trust and risk perception
Levels of general trust varied across countries. Respondents from Sweden were the most trusting ones, followed by respondents from the UK and Spain.
The relationship between general trust and perceived risk was strongest in the UK (Pearson's r = -0.45), followed by Sweden (-0.33) and Spain (-0.23).
Specific trust and risk perception
Levels of specific trust did not vary to the same extent as levels of general trust. The main variation was that levels of specific trust were significantly higher in Sweden than in the other countries.
The relationship between specific trust and perceived risk was strongest in the UK (Pearson's r = -0.32), followed by Sweden (-0.23) and France (-0.17). No significant relationship was found in Spain.
Trust and policy attitudes
A significant relationship between (specific) trust and demand for risk mitigation was found only in the UK.
Nuclear risks
The relationship between specific trust and perceived risk was generally stronger for nuclear risks than for other types of risks.
Trust in the domestic atomic energy authority and the national government was more related to perceptions of nuclear security than trust in other authorities was.
Trust in authorities' information was not as related to perceptions of nuclear security as trust in their competence.
Factors affecting strength of the relationship between trust and perceived risk
The level of self-reported knowledge had some effect on the strength of the relationship between trust and risk perception (especially for nuclear risks). The higher the level of knowledge, the weaker the relationship. This tendency was not as strong as in earlier reported research and it also varied among countries.
Proximity was important for the strength of the relationship. Strong relationships existed between trust in authorities' competence in case of a nuclear accident and perceptions of nuclear security, especially in the UK (amount of variance accounted for was 41%), but also in Sweden (28%) and Spain (14%).

Figure 8. Findings in article 2

Summary of article 3: An Expectancy-Value Approach to Determinants of Trust

An Expectancy-Value model (based on the view of trust as an attitude) was used to test various attributes as determinants of people's trust in an organization. The basic design of the present study was to use people's ratings of trust in five different organizations as dependent variables, representing the observed trust attitude towards each organization, respectively. The independent variables were people's beliefs about whether the organizations have certain attributes and also people's evaluations of these attributes (i.e., if it is good or bad that the organization has a certain attribute). By applying the Expectancy-Value model, through a summation of all products between belief and value for each attribute, a predicted (or expected) trust attitude towards each organization was calculated. The higher the correlation between predicted and observed trust attitude, the better the model.

It is also important to make sure that observed trust attitude is indeed a measure of trust. Thus, it was also hypothesized that general interpersonal trust (measured by the dichotomous question "Do you think that most people can be trusted or that one cannot be too careful when dealing with strangers") is a determinant of observed trust.

The respondents were asked to evaluate eleven attributes, which, based on previous research, were assumed to represent trustworthiness (e.g., competence, openness, and honesty). Five organizations were assessed: The Swedish Government, Swedish advertising firms, Swedish e-commerce firms, the Swedish Nuclear Power Inspectorate (SKI), and the Swedish Trade Union Confederation (LO). The Swedish Trade Union Confederation will henceforth be referred to as the Workers' Union, as it organizes workers in Sweden.

A mail survey was used as the means of collecting data. Preliminary analyses suggest that the sample was representative of the Swedish population. The questionnaires were sent out in March 2001 and after three reminders 347 respondents had completed and returned the questionnaire, yielding a response rate of 55.5%.

Two main questions were asked in the study:

1. Is the suggested model supported by data? That is, is there a high correlation between predicted and observed trust attitude, and is there a substantial correlation between interpersonal trust and observed trust?
2. What attributes are the most important determinants of trust? That is, what attributes are most correlated with observed trust, and are there any differences between beliefs and values when it comes to the strength of the relationship with observed trust?

Findings in the present study are presented in Figure 9 below.

Findings in article 3
Main results of the application of the Expectancy-Value Model
The correlations between the sum of products of beliefs about and values assigned to an organization's attributes of trustworthiness and observed trust in that organization were high, especially for non-commercial organizations.
Separate ratings of beliefs were more related to observed trust in organizations than separate ratings of values were.
Although the sum of products of beliefs and values was highly correlated with trust, especially with trust in non-commercial organizations, it was found that the sum of values alone was even more powerful in explaining trust in the Government and advertising firms.
The importance of type of organization
It was hypothesized that aspects of political ideology could trigger the phenomenon of double denial, which would make the value component of the Expectancy-Value Model redundant. Strong double denial was indeed discovered and it was suggested that when an organization is perceived as non-neutral, aspects of ideology come into play, causing double denial. When the organization is perceived as less ideologically loaded, ideology becomes less important for the trust judgment, and the value component provides extra explanatory power, beyond that provided by beliefs alone.
General trust (operationalized, for example, in the same way as interpersonal trust) was more important in explaining trust in non-commercial organizations than in commercial organizations.
Trust was found to generalize. Respondents who put high trust in one organization were more likely to put high trust in other organizations as well, especially if these were of the same type.
Attributes of trustworthiness
Two dimensions of beliefs about trustworthiness were strong predictors of trust in the organizations: competence (including evaluations of competence, efficiency, and the organization's commitment to a goal) and morality (including evaluations of honesty, credibility, and to a slightly smaller extent also fairness and care).
Factor analyses suggested two or three factors of attributes of trustworthiness: (1) competence/professionalism, (2) morality, and in some cases also (3) corruption (including items concerning perceived self-interest and whether the organization is part of a power elite). The morality dimension appeared to be more related to everyday work than the corruption dimension, which seemed to be more related to basic structures in society.
Trust in organizations and the effect of demographic variables
The highest ratings of observed trust were assigned to the Swedish Nuclear Power Inspectorate (mean 4.27, on a scale from 1 to 7), followed by the Government (3.69), the Workers' Union (3.64), e-commerce firms (3.01), and advertising firms (2.77).
The main effects of demographics on trust in organizations were similar to the effects on interpersonal trust (e.g., the higher the income and level of education, the more trust), although there were different effects related to type of organization.

There were clear effects of income on trust in the Government and also of age on trust in e-commerce firms (here, experience was an important explanatory variable).
Political ideology was important for trust in organizations. Left-wing respondents put more trust in public organizations representing a Social Democratic ideology, while right-wing respondents put more trust in commercial organizations. However, an important finding was also that trust was clearly distinguished from political ideology, even in judgments of political organizations; it was found that some respondents put high trust in organizations representing a political ideology very different from their own.
The effect of demographic variables on levels of interpersonal trust
There were great differences in interpersonal trust related to some of the demographic variables, especially those related to social class. Income, education, and union membership were important. The higher the income and level of education, the higher the trust.
Political preferences also mattered. Left-wing respondents were somewhat more trusting and respondents who preferred a political party not represented in the Parliament were clearly less trusting than respondents who chose any of the established parties.

Figure 9. Findings in article 3

Discussion of Empirical Findings

The Use and Limitations of Psychological Variables and Explanatory Models

A number of psychological constructs were examined in the present thesis. Such variables can be very useful in order to understand mechanisms underlying human behavior. In article 1, there was a focus on finding factors determining people's attitudes towards different issues related to energy policy. The objective was also to explain the variation in people's self-reported electricity saving behavior. It seems reasonable to suggest that this behavior is only partially determined by psychological constructs. In previous research, it has been shown that electricity prices influence the demand of electricity among Swedish households (Andersson, 1994). One test of the power of psychological variables would be to compare the effects of psychological and economic variables on self-reported electricity saving behavior. There is a scarcity of economic variables in the available data, since the primary objective was to test the effects of psychological variables on electricity saving behavior. Thus, there are, for example, no data on electricity prices. A possible model, based on available data, could be to compare self-reported expenses for electricity consumption with important psychological factors. The dependent variable would be self-reported electricity saving behavior. One difficulty with such a model is the two-way relationship between expenses and degree of electricity

saving. If people in a household are highly involved in electricity saving activities, this should automatically decrease their expenses for electricity consumption. Thus, it is hard to determine if the possible relationship is only due to this automatic effect or if it is also a consequence of people starting to engage in electricity saving because of a desire to decrease their expenses.

In spite of the difficulties, a test was conducted. It should be mentioned that psychological variables (e.g., perceived risk) were considerably more important in determining attitudes towards electricity saving than electricity saving behavior. However, one psychological variable that was important for behavior was based on respondents' stated willingness to, by their actions, maintain and protect the natural environment. This variable could be conceived of as a general behavioral intention. When looking at the economic variable (self-reported expenses for electricity consumption), it is noteworthy that as many as 43.9% of the respondents reported no knowledge of their expenses. Thus, these respondents were excluded from the analysis. This circumstance created uncertainty in the results, in addition to the inherent uncertainty of self-reported data. Correlations were higher between the psychological variable and electricity saving behavior (-0.32) than between the economic variable and electricity saving behavior (0.22). When the independent variables were divided into subcategories, to distinguish differences in self-reported electricity saving behavior, it was shown that there was a greater variation among the categories of the psychological variable. Respondents who reported that they absolutely act in order to maintain and protect the environment were more engaged in electricity saving activities (mean: 3.38, on a scale from 1 to 5) than respondents who reported doing so to some extent (mean: 2.78) or to a very small extent (mean: 2.15). Respondents who reported paying low amounts of money for electricity consumption were less engaged in electricity saving activities (mean: 2.78) than respondents who reported medium (mean: 3.27) or high amounts (mean: 3.45). Thus, the more respondents reported to pay for electricity consumption, the higher their self-reported degree of electricity saving activities was. This is probably due to the fact that people living in a house pay more for electricity than people living in apartments, which creates a stronger incentive for electricity saving. It is also possible that the high cost for electricity in itself creates an incentive for electricity saving. It should be repeated that it is difficult, on the basis of available data, to make fair comparisons between economic and psychological variables. However, it seems as if some psychological variables (i.e., general intention to act in order to maintain and protect natural environment) appear to be at least as predictive of electricity saving behavior as the economic variables used here.

Psychological variables are important for reasons other than as predictors of behavior. People's attitudes are traditionally of importance for Swedish energy policy-making. In the present thesis, it was found that people were more negative towards nuclear power than towards most other energy production

systems. This is an important fact, especially in the light of polls showing trends of less negative attitudes towards nuclear power among Swedes. As long as nuclear power management is an essential issue in Swedish energy policy-making, it is crucial to be aware of the relatively negative attitudes, and to examine their causes. It was also found that people were positive towards solar power and wind power as energy sources and that they wanted these sources to provide a larger share of Swedish energy production in the future. This is another indicator of the fundamental attitudes towards energy production systems among Swedes. It is likely that solar power and wind power are considered to be environmentally friendly energy sources and less risky than nuclear power.

Psychological variables are not only useful in the form of attitudes. It is also important to examine the variables determining various attitudes. For example, it was found that attitudes towards energy production systems were largely determined by perceived risks associated with the systems. This is important information for policy-makers. Popular attitudes seem to be driven by considerations regarding risks, rather than benefits. This is especially true for nuclear power, an energy source that has been considered particularly "risk-loaded", according to earlier research (Sjöberg, in press-b). The finding in the present thesis could possibly be explained by the potentially catastrophic consequences in the event of an accident at a nuclear power plant or a nuclear waste management plant.

Although perceived benefits did not have as strong a predictive power of attitude as perceived risks, it is worth mentioning that people perceived relatively large general benefits with nuclear power and hydro power. This is probably a consequence of the fact that approximately 90% of the Swedish energy production is based on these energy sources. Thus, nuclear power and hydro power provide concrete benefits in the form of electricity to households.

An important theme in the first article was electricity saving. People were positive towards electricity saving. They felt ready to save more electricity if needed and realized that the need for electricity saving will most likely increase as a consequence of a nuclear power phase-out. Almost all respondents reported that they act at least to some extent in order to maintain and protect the environment. Basically, it was found that Swedes have positive attitudes towards efforts with the purpose of maintaining and protecting the natural environment.

Risks were important in explaining attitudes towards electricity saving, under the condition that the degree of proximity between the independent variable (i.e., risks associated with saving or not saving electricity) and dependent variable (i.e., attitude towards electricity saving) was high. Thus, people's risk perception could be an important factor in policy-making, due to its effect on policy-related attitudes. However, risks in general (e.g., perceived risk of road traffic accidents) have little or no effect on specific and not

obviously related attitudes (e.g., attitudes towards electricity saving). When the explanatory variable is proximal to the dependent variable, risk is an important factor to consider.

Because of the strong relationship between risk perception and policy attitudes, energy policy could be conceived of as a case of risk policy. Determinants of perceived risk are then in focus. It was discussed whether trust in risk management could be a strong predictor of perceived risk. Earlier research (e.g., Slovic, 1999) suggests that it is important to establish public trust in nuclear power management. An extensive empirical study on the relationship between trust and perceived risk was presented in my second article. The starting point was that levels of perceived risk varied considerably among four European countries. Respondents from Sweden perceived risks as lowest, followed by respondents from the UK, Spain, and France. The cross-national variations naturally raise questions about causes related to specific characteristics of a nation or perhaps a culture. It was suggested that one such characteristic, often noted as an important predictor of perceived risk, could be a nation's level of trust. Thus, it was hypothesized that risk estimates would co-vary relatively strongly with ratings of trust across countries (i.e., the topic of the second article in the present thesis).

Another notion regards the relationship between attitudes and behavior. Even if attitudes are important *per se*, they are not necessarily powerful predictors of behavior. For example, much research (Eagly & Chaiken, 1998) has shown that relatively general attitudes are not very predictive of actual behaviors. In the present thesis, data showed that the relationship between attitude towards electricity saving and self-reported electricity saving behavior was significant, but weak ($R^2_{adj} = 0.052$).

It is likely that the relationship between attitude and behavior would be stronger if the attitudes were more specific, i.e., related to the specific behaviors included in the questionnaire. Nevertheless, the relatively weak relationship between attitude and behavior leads to the important conclusion that human behavior is very complex and it is rare to account for a large proportion of variance in behavior by only using attitudes or similar constructs (e.g., beliefs or values).

Furthermore, the variables explaining attitude towards electricity saving were to a large extent different from those explaining self-reported electricity saving behavior. Attitude was better explained by perceived risks, whereas behavior was more determined by variables related to circumstances of living (e.g., type of housing). It should be noted, though, that an altruistic factor accounted for approximately 10% of the variance in attitude as well as behavior.

As noted above, human behavior is complex and affected by many different factors. A real-world case was discussed in the article. The energy crisis in California during 2001 caused a need to conserve large amounts of energy during a short period of time. This objective was reached and the

information/education campaign for energy conservation was a success. However, the success was most likely caused by many different factors, such as economic incentives, fear of "rolling" blackouts, an increased will to be morally responsible citizens after 9/11,[21] and general environmental concerns. The challenge for psychological research in this area is to identify such key factors and contribute with knowledge in order to make campaigns as efficient as possible. An efficient campaign is one where people become convinced of how energy conservation can lead to positive outcomes, such as more money saved, lower risk of electricity shortage and an improved protection of the natural environment.

Although much of the variance in electricity saving behavior was unaccounted for, a regression model explaining approximately 20% of the variance in behavior was presented. Even though this could appear to be a modest explanation value, it is important to note that this is actually a rather high figure for psychological research. One of the difficulties with the use of psychological variables is the fact that there are often practical limits to the possibilities of explaining behavior. In the present thesis, several physical limits to electricity saving were identified; most of them were related to the type and size of dwelling. It makes much more sense to very frequently engage in different electricity saving activities if one lives in a big private house than if one lives in a small apartment.

Another important notion regards the use of proximal versus distal explanatory variables. As noted above, risks in general have little or no effect on specific and not obviously related attitudes. When the explanatory variable is proximal to the dependent variable, risk is an important factor to consider.

Furthermore, it was found that the impact of lifestyle factors on electricity saving behavior was weak, which serves as another reminder of the difficulty to explain behavior with distal variables (such as lifestyle factors). One factor, albeit with a low internal consistency, was important in accounting for behavior, though. This factor was entitled "Nature People" and people scoring high on this dimension appeared to be very nature-oriented, in their attitudes as well as their actual habits. An interesting comparison concerns the dimensions of "Nature people" and "Environmental activists"; people scoring high on the latter dimension appeared to have very pro-environmental attitudes, but their self-reported electricity saving behavior was neither high nor low.

Finally, the importance of proximity between independent and dependent variables was also demonstrated in the case of the relationship between trust and perceived risk. The strongest relationships of this type were found between trust in authorities' competence in case of a nuclear accident and perceptions of

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[21] The urgent energy crisis occurred in the first half of 2001, but the trend towards lower energy consumption levels was fairly persistent during the whole year, which could be related to the 9/11 events.

nuclear security, especially in the UK (amount of variance accounted for was 41%), but also in Sweden (28%) and Spain (14%).

The Measurement of Trust

In the present thesis, trust is measured in several ways. In the second article, trust was conceptualized as a fairly general concept (including four factors: trust in corporations, trust in politicians, belief in social harmony, and belief in general honesty), and also as a specific trust in authorities' ability to protect citizens against different types of risks.

It was found that levels of general trust varied across countries. Respondents from Sweden were most trusting, followed by respondents from the UK and Spain (scales of general trust were not included in the French questionnaires). Thus, ratings of general trust seemed to co-vary with perceived risk in the hypothesized manner (i.e., negatively). This was the case for all four dimensions of general trust.

Levels of specific trust did not vary to the same extent as levels of general trust. These findings provide material suitable for future research. A possible reason for specific trust to vary less than general trust could be that specific trust was directly related to risk management, while general trust covered trust in other social agents as well, such as "other people in general". The greater variation in the question itself could very well cause the variation in aggregated data.

It is of course also interesting to speculate about the causes of the cross-national variations in trust observed here, even though the present study (article 2) focused on causes of cross-national variations in perceived risk rather than trust. An interesting question is whether variations in trust are due to respondents/citizens (more or less trusting) or the institutions (more or less trustworthy) they are asked to rate. It seems plausible that there could be an interaction between trust and trustworthiness. The more trustworthy an institution appears to be (e.g., by providing information in an open and honest manner, and ensuring competence by recruiting staff based on merits), the more likely it is that it will eventually gain the public's trust. Since trust is often assumed to generalize, an increase in trust is also likely to benefit other organizations in society.

There was also an effect on the strength of the relationship between trust and perceived risk, depending on how trust was measured. The relationship between general trust and perceived risk was strongest in the UK (Pearson's r = -0.45), followed by Sweden (-0.33) and Spain (-0.23). Various kinds of

statistical analyses on the relationships among sub-factors of trust[22] and risk[23] were conducted. They did not reveal any particularly interesting information about the relationship between trust and risk perception. The above mentioned correlations were thus sufficient and adequate measures of the strength of the relationship. When it comes to the relationship between specific trust and perceived risk, it was strongest in the UK (Pearson's r = -0.32), followed by Sweden (-0.23) and France (-0.17). No significant relationship was found in the Spanish data. A discussion about possible reasons for the differences in size of correlation among countries is given below. It should be noted that the aggregated factor of perceived risk was constructed by calculating a mean for each individual (in each country, respectively). It included all items measuring perceived personal and general risk (demand for risk mitigation was not included). Correspondingly, the aggregated factors of general and specific trust were constructed by calculating a mean for each individual, including all items measuring general trust and specific trust, respectively.

One important finding was that general trust, in contrast to what is generally suggested (e.g., Siegrist et al., 2000; Sjöberg, 2001), was more strongly related to perceived risk than specific trust. This is also shown in the finding that the correlation between aggregated general trust and aggregated risk was -0.37 and the correlation between aggregated specific trust and aggregated risk was -0.18. These correlations were based on the total data set; that is, from all countries mentioned above. It was found that the correlation between specific trust and perceived risk seemed to be a consequence of the fact that specific trust and general trust had some common variance.

These are surprising results and it is difficult to speculate about their causes. Further research is most certainly needed. One hypothesis could be based on specific trust functioning as a so-called suppressor variable. That is, it is possible that specific trust is only slightly correlated with perceived risk, but still increases the amount of variance accounted for in perceived risk, when included in a multiple regression analysis together with general trust as the second predictor of perceived risk. This could be caused by specific trust directly predicting some of the variance in perceived risk and also "cleansing" general trust (i.e., by measuring some of the variance in perceived risk that does not exist in general trust). However, specific trust was not found to operate in this manner, and even if it was, it would not have been a satisfying *psychological explanation* of the finding.

Another possibility is that the scope of specific trust was too limited. Here, specific trust only measured respondents' trust in authorities, thus excluding possibly important actors, such as corporations. Moreover, specific trust was

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[22] Trust in corporations, trust in politicians, beliefs in general honesty, and beliefs in social harmony.

[23] Nuclear risks, non-nuclear radiation risks, and other risks, to oneself as well as to others.

limited to authorities' *ability* to protect against risks. Specific trust accounted for some of the variance in perceived risk, which could be due to the semantic overlap between the variables. The more potent predictive ability of general trust could thus be explained by the fact that this factor covered trust in several possibly important actors, such as corporations. Finally, general trust was not restricted to trust in the competence of these actors; dimensions indicating morality (or lack thereof) were also included.

Measures of general trust were also used in the third article. It was found that these measures were more powerful in explaining trust in non-commercial organizations than in commercial organizations.

Another aspect, related to the measurement of trust, that has been found to be an important determinant of the strength of the relationship between trust and perceived risk is the type of scaling used. When trust and perceived risk are measured on Likert scales, instead of traditional rating scales, the common variance of these dimensions increases substantially (Sjöberg, in press-b). Traditional ratings include separate ratings of trust and risk items, by assigning numbers indicating perceived size of risk and level of trust. In the second article, only traditional scales were used, which at least partly could explain the fairly weak relationships that were found.

The main theoretical contribution in the third article consisted of a conceptualization of trust as an attitude. The Expectancy-Value Model was tested. Observed trust in Swedish organizations was assumed to be dependent on respondents' beliefs about and evaluations of the organization with respect to attributes of trustworthiness. It was found that there were substantial correlations between predicted trust (the sum of products of beliefs and values) and observed trust. The relationship was stronger in the cases of non-commercial organizations. It was also found that the sum of values was better in explaining trust in the Government and advertising firms than the sum of products of beliefs and values.

It was suggested that the Expectancy-Value Model should be modified to be more suitable for the study of trust in organizations. First, it is important to make sure that the respondents understand the distinction between belief and value. Second, it is also important to specify the scope of the evaluation. If this is not done, the evaluation could be interpreted as pertaining to the respondent himself, to the organization that is evaluated, or to society at large. It is also worth mentioning that there were signs of wishful thinking among the respondents. Further discussions about possible causes for the limited usefulness of the Expectancy-Value Model are given below.

The Dimensionality of Trust

It was found that trust is not a unidimensional concept. The fundamental rationale of the conceptualization of trust as an attitude was that respondents' beliefs about and evaluations of organizations' attributes of trustworthiness to a large extent could determine a trusting attitude. Indeed, it was shown that attributes of trustworthiness were important in explaining levels of trust in most organizations.

There were two dimensions of beliefs about trustworthiness that were strong predictors of trust in the organizations: competence (including evaluations of competence, efficiency, and the organization's commitment to a goal) and morality (including evaluations of honesty, credibility, and to a slightly smaller extent also fairness and care). Thus, earlier research (e.g., Barber, 1983), pointing towards two general dimensions as being especially strong factors of trustworthiness, was supported. In the second article, it was also shown that trust in competence is a very relevant aspect. Here, it was shown that trust in authorities' information was not as strongly related to perceptions of nuclear security as trust in their competence was. Perceptions of competence are thus important in risk management, perhaps because nuclear safety is regarded as a particularly complex issue.

Furthermore, factor analyses suggested two or three factors of attributes of trustworthiness: (1) competence/professionalism, (2) morality, and in some cases also (3) corruption (including items concerning perceived self-interest and whether the organization is part of a power elite). The morality dimension included variables that appeared to be related to how people in the organization carry out everyday work (e.g., openness, honesty, concern, and fairness). The corruption dimension, on the other hand, included variables that seemed more related to basic structures of society. The inclusion of items regarding self-interest and power concentration was inspired by American literature on trust (i.e., Lipset & Schneider, 1983a) and it is possible that these tendencies are stronger in the USA than in Sweden. One might speculate whether there are two different forms of morality that are important for people's trust in an organization: a morality of the system (which the organization can be a part of) and a work morality of the people of the organization.

To sum up, trustworthiness was an important dimension of trust, and trustworthiness, in turn, consisted of more than one dimension.

The findings regarding the appropriateness of the Expectancy-Value Model, in explaining ratings of trust, gave rise to further discussions about the multidimensionality of trust. It was found that trust in advertising firms was not accounted for to as large an extent as trust in the other organizations was. This was particularly interesting due to the fact that respondents rated advertising firms high in terms of competence attributes, yet assigned the lowest trust ratings to this type of organization. It was speculated that this finding could be

due to perceptions of advertising firms as working against the public interest. It is possible that people perceive the primary objective of advertising firms to be to "poison people's minds" through different types of campaigns. Thus, to be considered trustworthy (in terms of competence) may not be enough, since a competing dimension of trust (i.e., whether the organization is considered to work actively against public interest, almost as a "public enemy") might be a better determinant of people's trust in the organization. One might speculate that the same phenomenon could be applied to explain low trust in other commercial organizations, even though the effects are not likely to be as pronounced as in the case of advertising firms. Data, however, showed that this explanation did not seem to be appropriate. E-commerce firms were rated as relatively low in competence and also low in observed trust. Advertising firms were rated considerably lower in observed trust, even though they were perceived to have a higher level of competence and efficiency than most other organizations.

Based on the discussion above, one might speculate that there is a multidimensionality of trust. Trust based on perceptions of high degrees of trustworthiness is the kind of trust one puts in friends – they can be trusted to act with good intentions towards you. The causality is not entirely clear. For example, it is possible that you rate your friends highly in terms of competence, honesty, fairness, and care, because they are your friends. It is also possible that you select your friends because of their trustworthiness. But you can also trust your enemies, in one sense, since they can be trusted to act with malevolent intentions towards you. This trust appears to be based on predictability – if your enemies have the necessary degree of competence and ill will, you can rely on them to try to cause you harm, if given the chance. You will probably lend a friend money because he or she is an honest person who will pay you back. You would, however, be very hesitant to lend money to an enemy, because you trust him or her not to pay back the money, if he or she could get away with it. This is where control mechanisms such as legal contracts enter. A new business partner could be a friend, but it could also be an enemy. In order to protect yourself from the risk of future harm as a consequence of dealing with an enemy, you sign a contract. This mechanism was most likely prevalent in the Cold War – the USA and the Soviet Union were aware of each other's competence to cause great harm to each other by means of nuclear weapons. Since the nations were enemies, they predicted (trusted) that the counterpart would try to cause great harm, if given the chance. This created an arms race, where the nations made sure that they were on similar levels in terms of military capability, so that the counterpart would be deterred from attacking them. Österman (1999) distinguished between this positive and negative aspect of trust. If a terrorist stated that he would bomb a certain building and then actually did it, there was a reason to trust him in a negative sense. In most cases trust is a

positive concept, but there are instances when it is associated with negative aspects.

To conclude, it appears as if people's trust in organizations is usually related to the type of trust that exists among friends. But when the organization is perceived as an enemy (possibly advertising firms), its level of trustworthiness (in terms of, for example, competence) becomes almost irrelevant. No matter how competent the organization, it will never gain high levels of public trust, because it is considered an enemy.

Ideology is an aspect that is related to the discussion of friends versus enemies. Political ideology was important for trust in organizations. Left-wing respondents put more trust in public organizations representing a Social Democratic ideology, while right-wing respondents put more trust in commercial organizations. However, an important finding was also that trust was clearly distinguished from political ideology, even in judgments of political organizations; it was found that some respondents put high trust in organizations representing a political ideology very different from their own. Thus, even if it is more difficult to build trust in a specific organization among people who subscribe to a different ideology than the organization, it is possible to accomplish. If the people who are targeted are high-trusters in general, the task will be further facilitated.

Ideology was an important aspect in discussions about the strong presence of double denial in the data. Double denial occurs when people, while expressing their attitude toward an object, deny both the probability of attributes that would speak against the attitude and the value of these attributes. It was suggested that political ideology as well as anti-business ideology could trigger the phenomenon of double denial, which would make the value component of the Expectancy-Value Model redundant. It is likely that the ideological component must be relatively strong. The sum of values alone was a better predictor of trust than the sum of products of beliefs and values for only one of the types of commercial organizations (advertising firms) and only one of the non-commercial organizations (the Government). Double denial could partly explain why the model worked (relatively) better for organizations with a less salient ideological component (i.e., the Nuclear Power Inspectorate, the Workers' Union, and e-commerce firms). When ideology is less important for the trust judgment, the combination of beliefs and values provides extra explanatory power that goes beyond that provided by beliefs alone.

It was speculated that double denial is based on respondents' initial emotional reaction when they are asked to evaluate an organization. A strong right-wing respondent's gut feeling when asked to rate his or her trust in the Government might be a strong sense of dislike, causing him or her to almost automatically assign a low trust rating to this organization.

It could be argued that the hypotheses about "trust between friends versus trust between enemies" and "trust based on ideology" actually concern the same

thing. Basically, whether people "like" an organization or not is important for the level of trust they put in the organization. There are, however, two important differences.

The first difference concerns specificity. The first hypothesis is more specific, since it concerns specific types of organizations (e.g., advertising firms), whereas the second hypothesis concerns more general categories (e.g., commercial organizations). The second difference concerns the difference between not liking someone and considering him or her to be an enemy. It is useful to compare this with the cases of distrust versus low trust. While distrust sometimes is argued to be a highly negative and affective state, low trust implies at least some level of basic trust. Even if some people for ideological reasons neither like nor trust the Government, the Workers' Union, and e-commerce firms, it is not likely that many people consider these organizations to be public enemies. This could indeed be some people's view of advertising firms. The reason for the low trust in advertising firms could thus be due to a combination of them being commercial organizations and being perceived as public enemies. It is useful to compare advertising firms with the other commercial organization in the study. E-commerce firms received higher ratings of observed trust than advertising firms, in spite of also being commercial organizations and being perceived as less competent. It should be noted, though, that e-commerce firms were not very trusted – the relatively low trust people put in e-commerce firms could be due to a combination of them being commercial organizations that people have little experience of as well as other factors that were not examined in the present thesis.

Determinants of Trust

One highly interesting challenge is, of course, to find factors that determine levels of trust. As mentioned before, it was found that levels of specific and general trust varied across countries. It was considered probable that these variations could be the result of variations with regard to trustworthiness among institutions in the different countries and/or the result of variations with regard to some basic trust among people in the different countries.

In the third article, data were collected to further explore the issue of determinants of trust. If the causes for varying levels of trust are found on an individual level, rather than an organizational level, it could be the case that demographic variables are important.

It was found that there were great differences in interpersonal trust, related to some of the demographic variables, especially those concerning social class. Income, education, and union membership were important variables. The higher the income and level of education, the higher the trust. These findings indicate that people in higher social classes are more trusting, which might be a

consequence of them feeling more rewarded, e.g., financially, by society. According to this hypothesis, the differences in interpersonal trust between social classes should become greater as people grow older. For example, it takes some time before higher education pays off financially. Thus, the proportion of high-trusters should increase with age, whereas the proportion of low-trusters could be assumed to be on a fairly constant level. When the difference in trust between social classes was examined, for different age categories, a clear, linear relationship was not discovered. There was, however, a clear tendency that respondents in the age category of 31-40 who belonged to the lowest social class (in terms of education, income, and union membership) were much less trusting than other respondents in the same age category. The difference in trust was in general considerably smaller for younger (18-30) as well as older respondents (41-76). One might speculate that in this particular period of life (31-40), the social differences become clearer. Before 30, people from higher classes are still in college or in very early stages of their careers, while people from lower classes have often reached their "peak" (e.g., in terms of salary) at that time. It could further be speculated that, after the period between 31 and 40, people find it easier to accept social differences based on social class. Social differences, perhaps still perceived as unfair, might be attributed to other factors than untrustworthy fellow citizens.

Political preferences also mattered. Left-wing respondents were somewhat more trusting than right-wing respondents and respondents who preferred a political party not represented in the Parliament were clearly less trusting than respondents who chose any of the established parties. These are interesting results. It is perhaps surprising that there were differences in interpersonal trust, related to political preferences (right vs. left). It is probably less surprising that respondents who sympathized with a political party not represented in the Parliament were low-trusters. These respondents are possibly less trusting of society in general and this attitude seems to be related to trust in the fellow man.

The effects of demographics on trust in organizations were similar to the effects on interpersonal trust. It was also found that interpersonal trust correlated significantly with trust in organizations. The correlations were rather low for advertising and e-commerce firms and the Workers' Union (approximately -0.10 to -0.15) and higher for the Government and the Swedish Nuclear Power Inspectorate (-0.33 and -0.32, respectively). Thus, trust generalizes – if one trusts one's fellow man, it is more likely that one also trusts organizations in society.

There were clear effects of income on trust in Government and also of age on trust in e-commerce firms. The higher the levels of income, the more trust in the Government, and the younger the respondents, the more trust in e-commerce firms. These are examples of variables that are fairly distal from the dependent variable (trust in a specific organization) and they show that there are factors

other than general trust and perceived trustworthiness of an organization to consider.

As noted before, political ideology was important for trust in organizations. Left-wing respondents put more trust in public organizations representing a Social Democratic ideology, while right-wing respondents put more trust in commercial organizations.

If the reason for varying levels of trust is to be found at an organizational level, it is likely that perceptions of organizations' trustworthiness (which might be a more or less accurate reflection of actual trustworthiness) are important factors. This was tested by means of the Expectancy-Value Model.

The model appeared to work reasonably well. The correlations between the sum of products of beliefs about and values assigned to an organization's attributes of trustworthiness and observed trust in that organization were high. This was especially true for non-commercial organizations. Although the Expectancy-Model needs to be modified, it is an important theoretical contribution that the correlations in the model were high.

Another important finding with respect to the model was that two dimensions of beliefs about trustworthiness appeared to be especially strong predictors of trust in the organizations: competence (including evaluations of competence, efficiency, and the organization's commitment to a goal) and morality (including evaluations of honesty, credibility, and to a slightly smaller extent also fairness and care).

It was also found that separate ratings of beliefs were more related to observed trust in organizations than separate ratings of values were. It should be noted, however, that separate ratings of values were in general also significantly correlated with observed trust.[24]

Thus, it appears that the reasons for varying levels of trust are related to individual differences as well as to differences in (perceptions of) trustworthiness of various organizations in society.

One important finding in the present thesis was that trust appears to generalize. Respondents who put high trust in one organization were more likely to put high trust in other organizations as well, especially if these were of the same type (e.g., commercial or non-commercial). This is in line with previous research on the subject (e.g., Lipset & Schneider, 1983a).

Below, a summary of different determinants of trust in the five organizations studied in the third article is presented. It is intended to give an

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[24] Separate ratings of beliefs and values were compared with respect to different attributes and it was shown that belief about an attribute was generally more strongly correlated with observed trust in an organization than the value assigned to that attribute. The *sum* of values was, however, in general more predictive of observed trust than the *sum* of beliefs was. This is due to the fact that the sum of beliefs was corrected for the direction of corresponding values and the sum of values was corrected for the direction of corresponding beliefs.

overview of the major determinants of trust in each organization, respectively, as well as to give rough estimates of how big an impact various determinants had on trust (the more plus signs, the stronger the impact). A question mark following a determinant means that the determinant has not been tested with empirical data in the present thesis. These types of determinants are still important to include in a summary, as they can be useful information for future researchers, interested in trying to further explain trust in different organizations.

1. The Government
   - Attributes of trustworthiness +++
   - Generalized trust (trust in other non-commercial organization) ++
   - Political ideology ++
   - General trusting stance (including trust in other people) +

2. Advertising firms
   - Generalized trust (trust in the other commercial organization) +++
   - Attributes of trustworthiness ++
   - Antagonistic relationship/working against public good ?
   - Pro- or anti-business ideology ?

3. E-commerce firms
   - Generalized trust (trust in the other commercial organization) +++
   - Respondents' experience ++
   - Attributes of trustworthiness ++
   - Pro- or anti-business ideology ?

4. The Nuclear Power Inspectorate
   - Attributes of trustworthiness +++
   - Generalized trust (trust in other organizations) ++
   - Knowledge +
   - General trusting stance +
   - Attitudes to technology (nuclear power) ?

5. The Workers' Union
   - Attributes of trustworthiness +++
   - Generalized trust (trust in other non-commercial organizations) ++
   - Political ideology +
   - General trusting stance +

It should be mentioned that demographic variables were not included in the summary above; these types of determinants had the clearest and most consistent effect on levels of interpersonal trust.

Trust, Risk, and Knowledge

According to theory, trust, risk, and knowledge are concepts related to each other. With imperfect knowledge and existence of risk, the need to trust arises. In risk research, a common hypothesis is that lower levels of trust in risk management are related to higher levels of perceived risk. Data pertaining to this issue were presented in the second article.

It was shown that the relationship between trust (general and specific) and perceived risk was relatively modest within countries.[25] The correlations among various measures of trust and perceived risk were in general highest in the UK, followed by Sweden, France and Spain.

Only in the UK was there a significant relationship between trust and demand for risk mitigation. This is an interesting finding. People's demand for risk mitigation is a policy attitude and it is in the present thesis suggested that trust is a determinant of perceived risk, which, in turn, is a determinant of policy attitudes. Since the relationship between perceived risk and demand for risk mitigation in general was relatively weak, it is not surprising that the relationship between trust and demand for risk mitigation was even weaker. It is, however, possible to suggest a relationship between trust and policy attitudes that is unrelated to perceived risk. One hypothesis could be that respondents with a high degree of trust in risk management are more positive than low-trusters towards various management actions, regardless of whether their degree of perceived risk is low or high. In some cases there was a significant relationship between trust and demand for risk mitigation, when controlling for perceived risk. One example can be taken from the case of risks associated with nuclear waste in the UK. The correlation between trust in authorities' ability to protect against risks associated with nuclear waste and demand for mitigation of these risks was -0.20; that is, the higher the trust, the less is the need for risk mitigation perceived to be. This is not surprising, since both variables co-vary with perceived risk. It is thus reasonable that the relationship between trust and demand for risk mitigation is negative, just as the relationship between trust and perceived risk usually is. When controlling for perceived risks (personal) associated with nuclear waste, the correlation was -0.13. Hence, some of the relationship was due to risk perception, but some was due to other factors. When perceived risks are controlled for, one could also expect a positive relationship between trust and demand for risk mitigation. It is, however, difficult to speculate about the causes of the sign of the relationship when the correlations are so low. It would be interesting to see more analyses of this type

[25] See Appendix A for a list of the items of perceived risk that were studied in article 2 (with a few exceptions, these were the risk items that were also studied in article 1). See also Appendix B for a list of the items of general trust that were studied in articles 2 and 3 (Sjöberg 1999a).

in future research. Perhaps the inclusion of other policy attitudes would reveal different results.

It was found that general trust was a significant source of variation in perceived risk among countries. The effects were, however, moderate. There are several possible reasons for the finding that trust has limited importance in explaining perceived risk.

As noted before, it appears as if the amount of variance accounted for in perceived risk increases substantially when trust and perceived risk are measured on Likert scales. Here, trust and perceived risk were measured on traditional rating scales, which could partially explain the limited explanatory value.

Another important aspect is in regard to the alleged psychological differences between (low) trust and distrust. Luhmann (1988) argued that distrust is based on negative expectations instead of positive ones; that is, you distrust instead of trust. These negative strategies give distrust an emotionally tense and often frantic character, which distinguishes it from trust. When you have low levels of trust in someone or something, you still have positive expectations, although the expectations are very weak. Hence, while distrust could be a very strong indicator of popular rejection of hazardous waste facilities, low trust could be a relatively moderate predictor of the same variable. This is a rather theoretical explanation and it is possible to propose other, somewhat related, explanations. Sjöberg (in press-a) suggested that the finding that the dynamics of trust is different for advertising firms, compared to other organizations studied here, could be explained by an antagonistic relationship between some people and advertising firms. This is the same type of explanation as the one previously discussed, regarding trust between enemies. It is possible to extend this explanation to the subject of trust and perceived risk. Perhaps the alleged difference between trust and distrust is a theoretical construction that says little about real-world conditions. Instead, an important factor in explaining failures of, for example, siting processes could be that there is an antagonistic relationship between the locals and the people responsible for siting the facility. Whether people responsible for risk management are trustworthy or not is then less important for the outcome of the siting process than the fundamental conflict between the two main actors.

Moreover, it is important to consider the different aspects of trust. For example, high levels of trust in an organization could be a reflection of trust in its representatives, and not in the organization's technology. The latter type of trust could be more predictive of perceived risk than the first type.

As noted above, it was found that the strength of the relationship varied depending on country. The relationship was fairly strong in the UK, moderate in Sweden, and fairly weak in France and Spain. When it comes to the causes for these variations, cultural differences is one possible hypothesis, although it has been found in risk perception research that explanations based on concepts of

culture do not seem to be appropriate when tested with empirical data (e.g., Sjöberg, 1999b[26]). It is also possible that respondents in different countries interpret and therefore respond to a questionnaire differently.

Another hypothesis that could explain why the effects of trust were rather modest is based on the concept of limited knowledge. According to this hypothesis, people can very well trust risk management organizations and professionals to be competent and honest, but still perceive risks as very high. This is because people have been found to have some doubts about science. The future is uncertain and there is a widespread belief that there are limits to experts' knowledge and their ability to correctly estimate risks for the future. What experts consider being low risk today could be high risk for the experts of tomorrow.

Finally, there were also possible causes for the finding in the second article that could be tested with available data. For example, it was shown that the relationship between specific trust and perceived risk was generally stronger for nuclear risks than for other types of risks. This finding could give some support to earlier research that suggests that trust is an important variable in cases regarding the management of nuclear power, in particular management of nuclear waste. It is interesting to speculate about the reasons for the finding. In previous studies, it has been discovered that models of risk are often more powerful when dealing with nuclear risks than with most other risks (Sjöberg, in press-b). The importance of nuclear risks is thus not restricted to models of trust and perceived risk. One might speculate that people's risk judgments when it comes to other risks are more indicative of general attitudes, influenced by many different idiosyncratic factors. This could, in turn, make it harder to use empirical data on these risk judgments to test models based on theoretical assumptions about the nature of risk. Another possible reason for why attitudes to a technology such as nuclear power are particularly easy to explain with the construct of perceived risk could be that the technology is so often discussed in the media that most people perceive it along similar dimensions. This does not, of course, mean that they perceive the size of risks as similar; in fact, the variations are often great. Yet another possibility could be related to levels of knowledge and the fact that nuclear power technology is complex. It is possible that people, due to a lack of knowledge, feel a greater need to rely on risk estimates provided by experts when they assess nuclear risks than when they judge less complicated risks.

Here, it should also be mentioned that the greater the proximity is between independent (trust) and dependent (risk) variables, the stronger the relationship is. This is actually a very common finding in psychological research (Sjöberg, 1980) and it is important to be aware of this tendency. The line between an

[26] It should be noted, though, that Cultural Theory, evaluated by Sjöberg, is only a small part of the concept of culture.

interesting research finding and a somewhat trivial finding is not always clear. An interesting example from research about trust and risk perception is the above discussed finding that trust and perceived risk correlate strongly when the same type of Likert scales are used (Sjöberg, in press-b). It is not surprising that variables co-vary when 1) questions are relatively similar in wording, and 2) questions are presented on identical Likert scales.

One important factor for the relationship between trust and perceived risk regards the role of people's knowledge of different risks. It was found that the level of self-reported knowledge had some effect on the strength of the relationship between trust and risk perception (especially for nuclear risks): the higher the level of knowledge, the weaker the relationship. This tendency was not as strong as in earlier reported research (c.f., Siegrist & Cvetkovich, 2000; Sjöberg, in press-b) and it also varied among countries (see Appendix C). One interesting finding was that respondents in the UK rated their knowledge of nuclear risks much lower than respondents from the other countries did. The relationship between trust and perceived nuclear risks was rather strong in the UK.

Thus, low levels of self-reported knowledge could explain part of the relationship between trust and risk perception within most countries. It was also tested whether knowledge could explain part of the effect country had on the relationship between trust and risk perception. It is possible that the relationship was weaker in France and Spain because respondents in these countries reported higher levels of knowledge than in Sweden and the UK, thus less need to trust authorities. The differences in levels of self-reported knowledge among countries did not, in general, support this hypothesis. One interesting difference was found to exist between respondents from Spain and the UK, since Spanish respondents reported significantly better knowledge of risks than respondents from the UK did. However, it was also found that the relationship between levels of knowledge, on one hand, and correlations between trust and perceived risk, on the other hand, was weakest in these two countries.

Self-reported knowledge is an interesting factor and it can be concluded that there are indications that people actually behave in the hypothesized manner; that is, if their level of knowledge is low, they tend to rely more on risk management in their risk estimates. It is possible to see other ways in which knowledge can be important in explaining the relationship between trust and risk perception. One might speculate about respondents who perceive that they have little knowledge about a risk and "blame" this on authorities in society. The perceived failure of informing citizens about risks could very well be related to low levels of trust and high levels of perceived risk.

Organization Perception

An important part of the present thesis was to the search for determinants of people's trust in different organizations. In the case of risk policy, it was found that trust in the domestic atomic energy authority and the national government was more related to perceptions of nuclear security than trust in other authorities. Since the domestic atomic energy authority is usually responsible for nuclear safety in a country, it is not surprising that this authority played an important role. It is, furthermore, logical that national governments are important as well, since they are responsible for policy-making in the area of nuclear safety.

As noted before, it should be mentioned that a person could put high trust in an organization without necessarily trusting all aspects of this organization. For example, it is possible to imagine that people could trust one aspect of an organization, for example, its representatives, but at the same time be skeptical about the technology used by the organization. The opposite case is also plausible. In the third article, an important objective was to discover the variables important in explaining the kind of unidimensional rating of trust that people are often exposed to in questionnaires. Whether people trust one aspect of an organization, but distrust another aspect, is an interesting question for future research.

When looking at the available data, it was possible to see that people's trust in different organizations is related to many factors. The highest trust ratings were assigned to the Swedish Nuclear Power Inspectorate, followed by the Government, the Workers' Union, e-commerce and advertising firms, respectively. It was speculated that ratings of trust in these organizations to a large extent are reflections of the type of organization that is evaluated. For example, it is possible that organizations that are perceived as fairly neutral (e.g., not politically controlled or primarily interested in profit) gain more public trust. This could explain the high trust ratings for the Nuclear Power Inspectorate. Organizations that represent a certain ideology will face difficulties in gaining trust among those subscribing to a different ideology.

Thus, ideologically loaded organizations face difficulties because of their ideology. This could be the case for commercial as well as politically controlled organizations. An additional difficulty in the case of commercial organizations was due to the fact that it was more problematic to explain ratings of trust in them by means of concepts often used in traditional trust research, such as attributes of trustworthiness and scales measuring general trust. Some variables that were important in explaining trust in e-commerce firms were fairly distant from the dependent variable. As noted before, there were clear effects of income of age and experience on trust in e-commerce firms. Thus, there are factors other than general trust and perceived trustworthiness of an organization to consider.

There are two major challenges here for researchers interested in trust in organizations. First, it is crucial to identify important explanatory variables that are unique for commercial organizations. It is possible that these variables could be related to the fact that the organizations are commercial and/or they could be more related to specific (types of) organizations. Second, it is important to acquire deeper insights into the mechanisms underlying perceptions of organizations.

When it comes to earlier research on the themes above, it should be mentioned that Lipset and Schneider (1983a) discussed the bases of trust in business thoroughly. A main finding was that American public criticisms of business could be grouped into two categories: power and morality. Generally, corporations who are distrusted act in industries where the concentration of power is high (i.e., monopolies) and these corporations are believed to be low in ethical and moral practices. Some interesting exceptions should, however, be noted. Banks were judged very favorable, as they were assumed to provide good service and be high in ethical and moral practices. Banks were also rated relatively high in terms of concentration of power. Thus, the banking industry was considered powerful but benign. Another interesting industry is "cigarette and tobacco". Although this industry was not considered monopolistic, producers of cigarettes and tobacco were judged least favorably of all of the types of corporations. This was probably due to the association with health hazards. These exceptions imply that it is crucial to be specific when trying to examine trust in specific types of organizations.

It is, of course, possible to be very specific and ask people to rate their trust in given companies. Aspects regarding image and brand trust will probably enter into these cases. Brand trust is currently of much interest, for researchers as well as for practitioners. In studies by Chaudhuri and Holbrook (2001) and Delgado-Ballester and Munuera-Aleman (2001), brand trust was related to consumer loyalty.

In the present study, trust in specific *types* of commercial organizations has been examined. Currently, there is a growing interest in consumer trust in e-commerce (or e-retailing). This interest is probably a consequence of the specific characteristics associated with e-commerce (abstract shopping on the Internet, associated with risks such as computer viruses and credit card frauds), together with the fact that e-commerce firms are new types of organizations.

In an interesting study by Walczuch, Seelen and Lundgren (2001), the psychological determinants of consumer trust in e-retailing were examined. Since most research so far has focused on situational factors of trust in e-retailing, i.e., design of website, use of brand names or of trust seals, it was considered necessary to thoroughly investigate psychological aspects. Some of the findings were similar to the findings of the present thesis. For example, whether individuals were "trusting personalities" (i.e., high or low in generalized trust) or not was not important for their trust in e-retailing. It was

also found that knowledge and experience, to a limited degree, were determinants of consumer trust. The most important factors for consumer trust were so-called perception-based factors, including reputation of the company, perceived similarity, perceived control, and perceived familiarity with e-retailing.

This type of study constitutes important knowledge for researchers interested in trust in e-commerce firms. However, more research on the area is needed. There is little research on the public's trust in other specific types of commercial organizations, such as advertising firms. It should be noted that there is an abundance of research regarding trust *within* specific types of organizations (e.g., Tyler, 1996). There is also a plentitude of research regarding public trust in non-commercial organizations (e.g., authorities and citizen groups) in studies on environmental risk management. To increase the understanding of the dynamics of trust, it is, however, necessary to examine more types of organizations. It has been shown in the present thesis that there are important similarities and differences with regard to the determinants of trust in different types of organizations.

Conclusions and Implications of the Articles

Conclusions and Implications of Article 1

The main relationships that were tested in the first article are presented below in figure 10. It was suggested that individuals' risk perceptions could influence their attitudes as well as their behavior. In this case, it would mean that if people perceived risks as low, they would be more positive towards electricity saving and also more engaged in electricity saving activities.

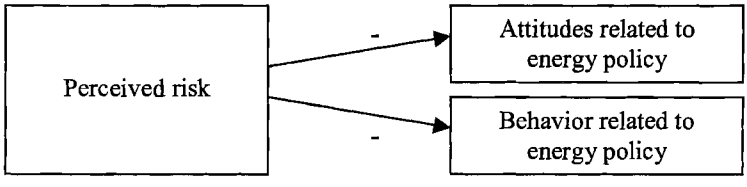

Figure 10. Conceptual model in the first article.

Perceived risk was a potent predictor of some attitudes, under the condition of proximity between risk and attitude. Perceived risks associated with saving/not saving electricity correlated on relatively high levels with attitude towards electricity saving. Perceived risks associated with different energy

production systems also correlated relatively strongly with attitudes towards these systems.

Perceived risk was not a good predictor of behavior (i.e., self-reported electricity saving behavior). Behavior was more difficult than attitudes to account for, by means of an approach focused on individual processes, and it was to a larger extent than attitudes a consequence of practical circumstances (e.g., type of living) and most likely also economic incentives. Earlier research (e.g., Andersson, 1994) suggests that the price of electricity is an important factor in determining the demand of electricity of households.

One important piece of information for policy-makers should be the finding that perceived risks are more predictive of attitudes to energy production systems than perceived benefits are. Attitude towards nuclear power is especially well explained by a model including perceived risks and benefits of nuclear power as independent variables. Nuclear power management is an important issue in Swedish energy policy, probably due to its large share of the Swedish energy production and the potentially very serious consequences in the event of a nuclear power accident. Therefore, it is very important to find explanations of people's attitudes towards various aspects of nuclear power. Since risk appears to be an important factor to consider, it is, in turn, of importance to examine the determinants of people's risk perception, in particular perceptions of nuclear risks. One possible explanation of people's levels of perceived risk could be found in the concept of trust. The idea is that the more trust people put in risk management, the lower they perceive risks. This idea was tested in article 2.

Conclusions and Implications of Article 2

The model that was tested in the second article is presented below in figure 11. It was suggested that trust – specific as well as general – would correlate negatively with perceived risk. That is, the higher the trust, the lower the perceived risk.

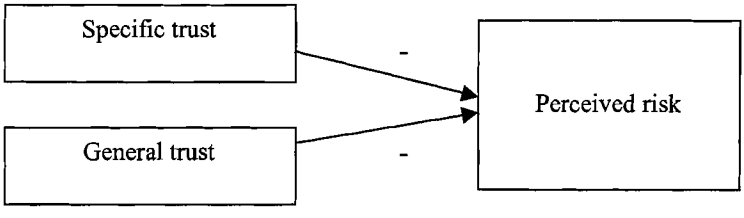

Figure 11. Conceptual model in the second article.

It was found that both specific and general trust correlated, on significant levels, with perceived risk. General trust was, somewhat surprisingly, a stronger predictor of perceived risk. However, trust was not a very strong predictor of perceived risk, neither within nor across countries.

Several reasons for this main result have been suggested, related to the measurement of trust, the role of self-reported knowledge, perceptions of expert knowledge, differences based on country characteristics, and differences based on type of risks studied.

The implications of the study are that there is hardly a universally strong and important relationship between trust and perceived risk. In some cases, trust can be important. For example, policy-makers dealing with nuclear power management should certainly consider the concept of trust, due to its effect on perceptions of nuclear risks. However, in most cases trust is only one of many significant predictors of perceived risk. Summing up, the relationship between trust and perceived risk is often significant and trust could be an interesting element in models of risk perception – but those expecting to find the key solution to risk policy problems in the concept of trust will be disappointed.

Conclusions and Implications of Article 3

In the present article, it was suggested that there would be high correlations, on a significant level, between the measure of predicted trust (based on beliefs about and evaluations of attributes signaling trustworthiness) and observed trust, for each organization. It was also suggested that there would be substantial correlations, on a significant level, between interpersonal trust and observed trust, for each organization. The model is presented in figure 12 below.

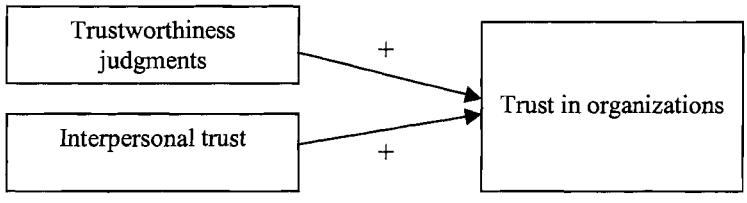

Figure 12. Conceptual model in the third article.

It was found that the model appeared to be appropriate, since the above mentioned correlations were relatively high for all organizations. However, the correlations were decidedly higher for non-commercial organizations. It was speculated that people could perceive commercial organizations as competent and efficient, yet not trust them, due to a perception that these organizations work against their best interest. Such an explanation was considered much more

likely in the case of advertising firms, as compared to e-commerce firms, since one could imagine that some people might perceive advertising firms as organizing campaigns intended to "poison people's minds".

It was also shown that a measure of predicted trust based solely on the sum of values with respect to attributes of trustworthiness in two cases was considerably better in explaining observed trust than when the measure was based on the sum of products of beliefs and values. This finding gave rise to a discussion about people's perceptions of different types of organizations. It is possible that the Expectancy-Model works better for relatively neutral organizations, and worse for strongly ideologically loaded organizations (i.e., the Government and advertising firms). That is, people's trust is determined to some extent by the ideology they subscribe to. When people evaluate an organization that clearly represents a certain ideology, attributes of trustworthiness become less important for the evaluation. The explanation based on ideology could possibly also explain the strong degree of double denial in the evaluations of the organizations that was found in the data. Double denial occurs when people, while expressing their attitude toward an object, deny both the probability of attributes that would speak against the attitude and the value of these attributes. It was speculated that double denial is more likely to occur when people, for ideological reasons, process information in an argumentative rather than an analytical manner.

One implication of the study is that the Expectancy-Value approach, under certain conditions, can be considered an important theoretical contribution to the body of trust research. For some organizations, it is an appropriate model for evaluating the components of people's trust in those organizations. For other organizations, the model is less appropriate. It is important to consider the differences between commercial and non-commercial organizations. It is likely that important explanatory factors are related to the specific qualities that distinguish commercial business organizations. Furthermore, there are other specific qualities that distinguish these organizations, besides the quality of being commercial. The case of e-commerce firms is interesting. A distinguishing feature of these firms is that they are relatively new. Consequently, whether people have had any personal experience at all with these firms becomes an important predictor of people's trust in the firms.

For policy-makers it is important to realize that, even if it is considered important to build more public trust, there are probably limits to the extent to which one can build that trust. Even though there might exist possibilities to improve the public image, by taking measures in order to appear trustworthier in different respects, it is probably very hard for a commercial or politically controlled organization to appear entirely neutral and uninfluenced by the fundamental economic or political interests of the organization.

Trust in Risk Policy

Main Risk Policy Implications and Further Questions

The main relationships that were investigated in the present thesis are presented in figure 13 below.

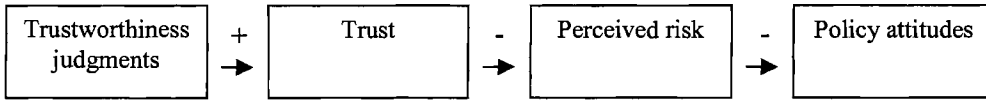

Figure 13. Thesis model

Perceived trustworthiness is an important determinant of trust in an organization, but there is a difference in degree of importance, depending on the type of organization studied. Factors such as whether the organization is commercial or non-commercial (or privately or publicly owned) and politically controlled or not enter. It was discussed whether people, when deciding on their level of trust in an organization, do not necessarily process the available information in a purely analytical manner. Instead, they often tend to evaluate the organization as if they were trying to convince an opponent. That is, if they are negative they appear to use their overall, global, negative attitude towards the organization as a starting point, and process information input with the purpose of legitimizing that negative attitude.

The policy implications for risk management are that there may be limits to the possibilities to increase the level of perceived trustworthiness and build public trust. An organization could make strong efforts to build an image of being a competent, open, fair, and credible organization, but still not gain the necessary degree of public trust, because public perceptions can be based on certain organizational characteristics (non-commercial or commercial; politically controlled or not) that are very fundamental and not easily changed. It should be noted, however, that public trust is far from determined only by these basic characteristics. Some results in the thesis imply that there are possibilities to build trust even among people who subscribe to ideologies that are different from the ideology the organization subscribes to or at least is perceived to represent.

But, so what? Even if an organization succeeds in building a high degree of public trust, it has been found in the present thesis that trust often is a fairly weak predictor of (low) perceived risk. It is possible to trust an organization to be very competent and honest, yet perceive risks as high. This could possibly be explained by the concept of limited knowledge; a belief that science does not have all the answers and that there are limits to experts' ability to predict the future, for example with regard to technological risks. Overall, knowledge or lack of knowledge appears to be an interesting factor in discussions about trust

and risk. The latter is in line with what many scholars have argued. However, the findings of the present thesis suggest that there are many aspects to the concept of knowledge. Is it true that imperfect knowledge and the presence of risk cause the need to trust? In strict theoretical terms, this makes sense. When individuals face a high degree of complexity and uncertainty, they could rely on expert systems rather than trying to handle the complexities themselves. However, the findings here suggest that the most knowledgeable individuals may also be the most trusting individuals. As suggested above, the role of knowledge could very well be more important when it is the expert and risk management knowledge that is in focus. Perhaps increasing complexity in society causes individuals to reflect on knowledge, but is it expert and scientific knowledge rather than their own knowledge? The doubts that science has all the answers may grow stronger as complexity in society grows stronger, causing people to doubt experts' risk estimates despite a fundamentally high trust in science.

The conclusion that trust is not a very strong predictor of perceived risk does not mean that trust is necessarily unimportant in risk policy. Instead of trying to integrate trust and risk, it could be useful to approach these factors as separate units. One interesting question could evolve around the societal consequences of different degrees of trust and perceived risk among the public. It is most likely important to try to at least maintain today's level of public trust in the Western world, not necessarily with regard to the possible effects of trust on perceived risk, but for other reasons as well.

When trust and risk are viewed as separate units, interesting situations can occur. In figure 14 below, there are four states, depending on whether levels of trust and risk, respectively, are low or high.

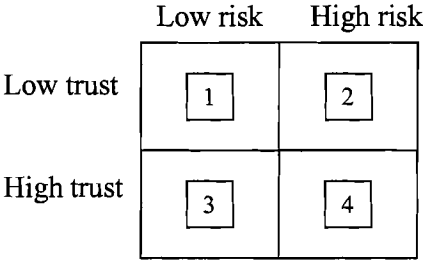

Figure 14. Different states of (low/high) trust and (low/high) risk

In the first state, people in society are low-trusters and at the same time they perceive risks as low. This could perhaps be a characteristic of a rather undeveloped society with a low degree of complexity, in terms of technology as well as society. People do not trust those in power, but they worry little about risks associated with advanced technology. The second state appears to be the

worst kind. People are worried about risks, but put little trust in the leaders of society. This type of society is probably highly unstable and sensitive to threats and crises. The third state, on the other hand, appears to be an ideal society. People trust their leaders and there are many opportunities for technological progress, based on the low levels of perceived risk. One possible danger in such a society is based on the idea that blind trust rarely is good. When people are uncritical, there is always a risk for irresponsible leaders to exploit that faith. In the fourth state, people are trusting and perceive risks as high. Perhaps such a society is characterized by modernity; a high degree of technological complexity and well-educated and cultivated citizens. Different types of risks, which the knowledgeable citizens identify, often accompany technological development. An interesting example is perhaps information technology.

One could speculate about the effects of different types of events in society on levels of trust and risk. During the 1970s, there was a clear decline in levels of trust in the USA, probably a consequence of events such as the Watergate scandal and the Vietnam War. After the Chernobyl accident in 1986, people in general perceived nuclear risks as much higher and the attitude towards nuclear power became much more negative than it had been before the accident. What would happen if one or more events of both types would occur at about the same time (i.e., a move to the highly negative second state in the figure above)? The 9/11 events made many Americans, as well as people from all over the world, worry about the terrorist threats. The fear of attacks, whether in the form of attacks on civil and military buildings or in the form of anthrax letters, appeared to be very strong. What would be the effects of a very weak and/or immoral American leadership during this time and thereby a fall in people's trust in their leaders? In the case discussed above, American support for government leaders showed a major rally effect after the terrorist attacks, and the surge in approval for President Bush reflected the largest short-term increase in Gallup Poll history (Moore, 2001). Can a society handle the opposite reaction – a dramatic decline in public trust – at the same time as people are worried about the effects of a disastrous event (e.g., 9/11 and Chernobyl)?

Although trust is usually rather moderately related to perceived risk, it is possible that there are other ways in which trust could be important for risk policy. Trust may be more important for risk communication than for risk perception; credibility of the communication source is often highly important for the degree of success of the communicator (e.g., Stack, 1978). However, in the present thesis, the focus has been to understand the role of trust and perceived risk in risk policy, with regard to effects on individual attitudes related to policy. In this context, it is logical to consider the factor of perceived risk, on theoretical as well as empirical grounds. Even though perceived risk is not always important in predicting policy attitudes – proximity is almost always a pre-condition – it was found that there are several strong and important relationships.

There are ambitious attempts to develop risk policy recommendations that include aspects of social trust. TRUSTNET is a European network of some 80 participants, including regulators, experts, and stakeholders with experience of industrial, natural, and medical risks. Dubreuil et al. (2002) authored a report of the outcome of the TRUSTNET program. An interdisciplinary model describing the available approaches to governance of hazardous activities was proposed in the form of two main paradigms: Top-Down Governance and Mutual Trust Governance. It is suggested that these two paradigms should interact in order to improve risk governance. Top-Down Governance is characterized by little public knowledge of aspects of the decision-making process. Experts are asked to provide the public authorities with optimal solutions. Each stakeholder defends their own specific interest while the public authorities are entrusted with the task of representing the general interest. Thus, the roles of different actors are clearly defined. Mutual Trust Governance, on the other hand, gives room for more open political processes where the key aspects are more public involvement and social trust. The need for social trust is assumed to be higher than under the Top-Down Governance and this is likely to increase the demands on authorities and stakeholders in nurturing social trust and social cohesion.

It was suggested that the two paradigms are useful under different circumstances. The Top-Down approach is efficient in contexts where decision-making is not characterized by complexity, when for instance the scientific expertise is providing a clear picture of the risks and when the considered options are clearly beneficial for society as a whole. When decision-making is characterized by complexity, a Mutual Trust approach will make it possible to maintain public confidence or to create the conditions for society to build social trust and social cohesion, which are considered key aspects in successful decision-making under high complexity. Thus, it is suggested that Mutual Trust approaches emerge in contexts where the Top-Down governance systems encounter difficulties. However, a Top-Down approach is also likely to replace a Mutual Trust approach as soon as a sufficient basis of social trust has been established.

It is clear that this perspective puts high demands on different actors. If they fail in maintaining high levels of trust (for example, as a consequence of incompetent and/or immoral behavior that affects their trustworthiness in the eyes of the public), it could have serious consequences. It will be very difficult and take a very long time to regain the levels of public trust that are considered necessary in future projects where the mutual trust approach is adopted.

The discussion about different approaches to risk governance thus illustrates that the need for trust can be varying, depending on the nature of the issue at stake. If the decision-making process is highly complex, trust could be an important factor. An obvious challenge for policy-makers is to improve their ability to distinguish between situations when trust is an important aspect and situations when the need for public acceptance and involvement is less

important. More knowledge of individuals' preferences, beliefs, values, and attitudes is necessary. Suggestions for areas where more research is desirable are presented next.

Science Implications and Suggestions for Future Research

The present thesis has raised a number of questions and themes for future research. From an economic-psychological perspective, the first article raised questions about the use of economic and psychological explanatory variables. It would be highly interesting to see research using actual economic data and psychological variables in order to examine effects on, for example, individuals' levels of electricity saving. Another challenge for future research is based on the view of energy policy as a case of risk policy. Here, it is important to further investigate determinants of perceived risk, especially risks associated with nuclear power, but also other risks related to important aspects of energy policy. For example, why do individuals perceive risks associated with saving or not saving electricity and why do they perceive risks associated with different energy production systems? A persistent dilemma in research concerning energy conservation behavior is whether it is possible to achieve long-term effects on individuals' energy consumption without offering any long-term economic incentives. Here, it is important to further study real-world cases. It is necessary to conduct more systematic studies on the effect caused by various factors in the successful campaign for reducing levels of energy consumption in California. A possible task for students of information and communication could be to study how campaigns based on knowledge of important psychological factors (e.g., pro-environmental attitudes and feelings of moral obligation) could be designed.

There are several aspects of the relationship between trust and perceived risk that need further attention. For example, it is important to conduct more in-depth studies on the nature of the relationship for specific types of risks. One obvious example is that of risks associated with nuclear power. In the present thesis, it was found that the relationship between trust and perceived risk was stronger for nuclear risks than for other types of risks. In fact, it has been found that models of risk perception often work better when nuclear risks are included than when other types of risks are included (Sjöberg, in press-b). In the case of trust and perceived risk, it could possibly be explained with the role of individuals' level of knowledge. That is, people have less knowledge of nuclear risks than they have of other risks and need to rely on risk management for assessments of nuclear risks to a larger extent. Another, overall, explanation could be that non-nuclear risks have properties in common with "regular" attitudes to a larger extent than nuclear risks (which, according to this hypothesis, are more genuine assessments of risk).

The concept of limited knowledge should be further explored. More empirical data is needed in order to increase the knowledge of people's view of science and expert knowledge, their trust in experts and other actors related to risk management, and their risk perceptions.

As indicated above, the aspect of knowledge is also important when it comes to people's levels of knowledge. It seems as if the level of self-reported knowledge often has an effect on the strength of the relationship between trust and perceived risk. Why is that? An explanation based on theories about the relationship between trust and risk (e.g., Luhmann, 1979; 1988) is that the lower the degree of knowledge, the higher the need to rely on risk management in making risk judgments. A complicating factor, however, is that the least knowledgeable individuals also appear to be the least trusting (in terms of interpersonal trust as well as trust in organizations). Instead of the explanation suggested above, one might speculate about respondents who perceive that they have little knowledge about a risk and "blame" this on authorities in society. The perceived failure of informing citizens about risks could very well be related to low levels of trust and high levels of perceived risk. Clearly, there is a need for more research on the effects of knowledge on levels of trust and perceived risk.

Another aspect that is important for the relationship between trust and perceived risk is the measurement of trust. It has been found, in previous research, that Likert scales generate a much higher amount of variance in perceived risk accounted for than more traditional scales for rating trust and risk (Sjöberg, in press-b). More data is needed to replicate this finding. Furthermore, it was found that general trust was more strongly related to perceived risk than specific trust. This rather contra-intuitive finding raises questions. It is necessary to conduct further studies in order to replicate the finding and find valid explanations. Another, related, finding was that levels of general trust varied more among countries than levels of specific trust did. This could be an important theme in future studies regarding cross-national variations in levels of trust.

It has often been argued that trust is a critical factor for the popular acceptance or rejection of hazardous waste facilities (e.g., Slovic, 1999). Here, it is important to be aware of possibility that there are conceptual differences between distrust and low trust. While distrust has been considered a highly negative and affective state, low trust implies at least some level of basic trust. This could be an explanation of the findings in the present thesis, where trust and perceived risk were much more weakly related than what could be expected on the basis of previous case studies. This is an aspect that needs to be attended to in future case studies.

Trust in different organizations is also an aspect that needs attention in future research. It was shown that trust in either the domestic atomic energy authority or the national government was more predictive of perceptions of

nuclear security than trust in other institutions was. This was the case for all countries participating in the cross-national study. However, when studying trust in organizations, it is important to be aware of the possibility that this type of trust may not always be very predictive of perceived risk. It could very well be the case that people trust an organization (or representatives of the organization), but that they do not trust the technology used by the organization.

Trust and risk could be important concepts on a societal level. It is important to further explore causes for variations in levels of perceived risk and trust among countries, as well as causes for variations in the strength of the relationship between trust and perceived risk. One aspect is the effect of levels of trust in a society. Previous research suggests that high levels of trust are related to higher levels of well-being and democratic stability (Inglehart, 1997), as well as to legal efficiency, bureaucratic quality, and compliance in paying taxes (La Porta et al., 1997). Data in the present thesis suggested that controlling for trust would increase perceived risk in a high-trust society and decrease perceived risk in a low-trust society, even though the effects were relatively weak. In the real world it is, of course, impossible to control for a psychological construct such as trust. One way to illustrate the finding is to consider the European Union, where countries become more and more similar to each other, for example in terms of currency and foreign policy. If individuals in different countries would be more similar also in terms of attitudes such as trust, this would have some effect (admittedly weak) on how they perceive risks. As to variations in levels of trust among countries, it would be interesting to see future studies where the effects of relatively objective measures of trustworthiness of institutions (e.g., levels of corruption) are compared with effects of measures of trust among citizens (there are abundant and longitudinal data, from the World Values Surveys, on levels of interpersonal trust).

In the present thesis, it has been investigated whether trust could be important for individuals' policy attitudes, due to its effect on their risk perception. It is also of interest to examine whether trust has any effect (and if so, what type of effect) on attitudes related to risk policy, when controlling for risk perception. Preliminary analyses suggest that the effect is very weak, but data on policy attitudes were limited and more extensive research on the topic is desirable. Finally, trust can be important in risk policy by means of its effect on other risk variables (e.g., risk communication) than risk perception. More research on the topic is welcomed.

In article 3, it was found that an Expectancy-Value Model seems to work best when there is no ideological context of the kind that appeared to be activated when respondents rated their trust in the Government and advertising firms. Since the model seemed to work comparatively best when the other organizations were assessed, it could be the case that these organizations were judged as more neutral, thus not activating an ideological context (at least not to the same extent as for the Government and advertising firms). The natural

questions, then, regard why and how this type of ideological context is activated.

It seems plausible that qualitative research could contribute with a deeper understanding of the reasons for the activation of an ideological context and the earlier described phenomenon of double denial. Qualitative research may generate hypotheses about perception of organizations.

Double denial could be activated by an affective reaction to certain organizations. A negative, affective reaction could be based on stereotypical thinking regarding various organizations; this could be investigated by experimental research methods.

In order to get an insight into how ideological considerations can guide organizational perceptions, based on a more cognitive perspective, one could use survey methodology. Important aspects most likely include individuals' views on how much societal influence a given organization should have, the political control of the organization, and aspects of ownership (e.g., whether the organization is commercial or not). It was found that the Expectancy-Value Model (based on attributes that in previous trust research have signaled trustworthiness) and scales measuring general trust accounted for more of the variance in trust in non-commercial organizations than in commercial organizations. A challenge for future researchers is to find explanatory models that explain more of the variation in trust in commercial organizations.

The Expectancy-Value Model was clearly not as good in identifying important determinants of trust in advertising firms, in comparison with other organizations. This finding generated further suggestions about determinants of people's trust in organizations. Advertising firms were perceived as competent and efficient, yet they were not trusted to the same extent as other (in many cases perceived as less competent and efficient) organizations. It was discussed whether this could be due to perceptions of advertising firms as not only working in their own interest, but actually working against the public good. It is possible that people perceive advertising firms as predictable (as a consequence of being competent and efficient), but untrustworthy because of the perception of them as working against public good. Thus, trust in an organization is often based on perceptions of its trustworthiness. However, for organizations such as advertising firms, other dimensions of trust might enter and be more predictive of trust in the organization. Perhaps such dimensions will be identified in future research.

There is also a multidimensionality of trustworthiness. By means of factor analyses, at least two general dimensions of trustworthiness were discovered: perceptions of competence (e.g., competence, efficiency, and commitment to a goal) and perceptions of morality (e.g., honesty, fairness, and care). It was also found, however, that a third factor could be distinguished in some cases. This factor included perceptions of whether an organization is working in its own interest and whether it is part of the power elite in Sweden. It was suggested that

the morality dimension could be divided into two sub-categories: an everyday work morality of people of the organization (including attributes of honesty, fairness, and care) and a morality associated with the system in which the organization operates. It would be interesting to see further research on this theme; particularly in countries where the levels of "system immorality" (operationalized, for example, in terms of levels of corruption and number of lobbyists) could be suspected to be perceived as higher than in Sweden.

Some modifications of a more practical nature could also be useful in future research based on data similar to the data used in the present study. For example, it should be studied whether people understand the distinction between belief and evaluation in the Expectancy-Value Model. Furthermore, it is considered important to specify the scope of the evaluation (i.e., if the attribute is good/bad for the respondent, the organization, or the nation as a whole), in order to improve the explanatory value of the model.

It was found that there were some overlaps between trust and political ideology; for example, in assessments of politically controlled organizations such as the Government. If there is a distinction between "the current government" and "Swedish governments in general", it will most likely be easier to see when the ideology component dominates (probably in the first example) and when the trust component dominates (probably in the second example). In the available data, it appears as if some respondents' ratings of trust in the Government were more influenced by ideology than trust and that other respondents' ratings were more influenced by trust (to investigate the reason for this difference is, in itself, an interesting research challenge!).

A possible task for future research is also to investigate causes for the great difference in trust among people from different social classes. A hypothesis that people in higher social classes might be more rewarded by society, and therefore more trusting of the fellow man as well as different organizations, was discussed. Logically, the difference between social classes should increase with age, since people from higher social classes will continue to be more rewarded (e.g., higher income and more interesting jobs) through life. A different pattern, however, could be observed in the data. The difference between the social classes was small in the group of respondents under 30 and in the group of respondents over 40. In contrast, the difference was much larger for people between 30 and 40. Research on the possible causes for these findings would be interesting in a psychological, social, and political perspective.

It was found that some new items of trust, constructed for the study and similar to behavioral intentions, correlated with interpersonal trust. It is most likely important to also examine trusting behaviors, in order to create a better understanding of the trust concept – and to get more insight into the differences between different types of trust (such as interpersonal trust and trust in organizations).

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APPENDIX A. *Items of Perceived Risk (in Article 2).*

Nuclear risks
Domestic/Western European/Eastern European nuclear power plants*
Nuclear waste*
Nuclear arms*
Radioactive waste from the Chernobyl accident*

Non-nuclear radiation risks
Radiation from in-house radon*
Food that has been irradiated to be preserved*
Depletion of the ozone layer*
Natural background radiation*
Food that has been polluted by radioactive substances*
X-rays*
Sun radiation.

Other risks
Smoking (own or that of others)
Alcohol consumption*
EMF
AIDS
Air pollution*
Presence of high voltage lines*
Global warming effect
Inadequate dietary habits
Road traffic accident*
Hit by the lightning
Genetic engineering
Polluted drinking water
Terrorist attacks
Spoiled food
War
Chemical waste*
Dangerous goods transportation
Floods*
Inadequate medical care when ill
Violence and aggression
Mad cow disease (BSE) *

*This item of perceived risk was included also in question 13 (that is, those risks that were included in the measure of specific trust).

APPENDIX B. *Items of General Trust (in Articles 2 and 3).*

All items were rated on 1 – 5 category scales, 1 denoting agreement and 5 disagreement. Scale scores were computed as mean ratings of non-missing items, after appropriate reversal of some items (reversed items starred below).

Trust in corporations

The leaders of great corporations in Sweden seem to be mostly interested in their own profits.

Corporations are driven by merciless greed.

The large corporations in the country have almost a monopoly position; free competition is very rare.

Insider business is very common on the stock market, i.e. certain persons exploit their contacts to get information before the public gets it.

Most who make a career in this country are opportunists.

Because leading persons in society exploit others to their own advantage common people get an increasingly worse situation.

It used to be better; people were not so materialistic and egotistic.

When somebody says a risk is small or non-existent I believe he or she is a "bought" person.

Belief in social harmony

There are great conflicts between various groups in Swedish society.

Bribes can be common in other countries, but not in Sweden. (*)

Sabotage and terrorism can be common in other countries, but in this country we need not worry. (*)

There is no reason to worry about harmony in society; after all the antagonisms are small.

APPENDIX B (continued). *Items of General Trust (in Articles 2 and 3).*

In many respects we have common values here in Sweden. (*)

After all, there are no big conflicts between different groups in the country. (*)

Belief in general honesty

If you are not on your guard you can easily be fooled.

You cannot trust many people to tell the truth.

Bribes are getting to be more and more common in this country.

If a Swede gives you his or her word of honor that is enough, written contracts are really only seldom necessary. (*)

Basically, most people are honest and decent and can be trusted.

Most people are law abiding. (*)

You cannot trust anyone except yourself.

The Police is not always eager to find the truth about a crime.

In most professions in this country the practitioners are competent and honest.

The civil servants in this country do not take bribes. (*)

Swedish corporations act in accordance with laws and regulations.

There is a lot of illegal actions with rental leases.

Insurance fraud is very common.

It is common to hire illegal workers for whom taxes and social costs are not paid.

If you leave your car to a service workshop you can never be sure they do what they charge you for.

Fraudulent income tax declarations are very common.

APPENDIX B (continued). *Items of General Trust (in Articles 2 and 3).*

Trust in politicians

Politicians in this country are mostly honest. (*)

Politicians usually know little about things they make decisions about.

It is useless to work hard and save money, politicians will always find a way to get most of it back in taxes.

You can trust what leading government spokespersons say. (*)

Funds of the municipalities are wisely used for the common good.

There is a lot going on behind the back of the people.

Only a few politicians care about anything except being re-elected.

If the public was unknowingly exposed to a risk, politicians would keep quiet about it.

Political decisions are usually taken after a careful investigation and on factual grounds.

We can trust that politicians see to our well-being.

In Sweden we have good chances to get compensation if authorities or corporations have treated us wrong. (*)

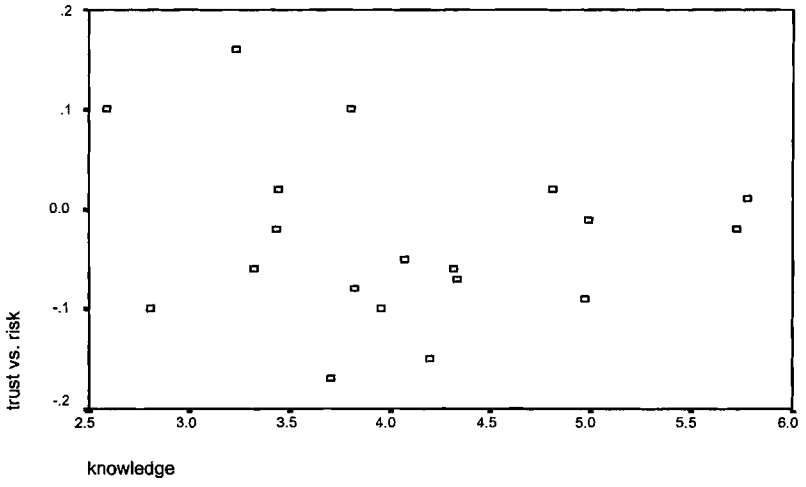
In the Parliament everybody tries to get as big a piece of the cake as possible.

The members of the cabinet seem to be wise and honest persons. (*)

It is common that leading politicians say one thing in public and then act in a completely different manner in their private lives.

APPENDIX C. *Figures (C1 – C4) of the Relationship between the variable "Strength of the Relationship (Pearson's r) between Specific Trust and Specific Risk" and the variable "Self-Reported Knowledge about the Corresponding Risk", in France, Spain, Sweden, and the UK, respectively.*

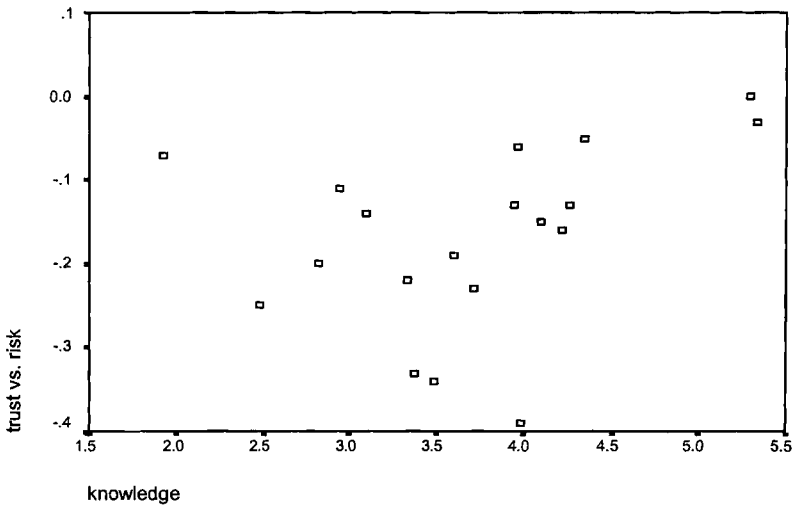
Figure C1. Spain



Risk	K	T/R	Risk	K	T/R
Alcohol	5.72	-.02	Natural radiation	3.23	.16
Air pollution	4.97	-.09	Nuclear waste	3.95	-.10
EMF	3.70	-.17	Contaminated food	3.32	-.06
In-house radon	2.59	.10	X-rays	4.07	-.05
Irradiated food	2.81	-.10	Chemical waste	3.82	-.08
Traffic accident	5.77	.01	Nuclear arms	4.33	-.07
Ozon layer	4.81	.02	Floods	4.99	-.01
Domestic n.p	4.20	-.15	Chernobyl	3.80	.10
West Europe n.p	3.43	-.02	BSE	4.31	-.06
East Europe. n.p	3.44	.02			

APPENDIX C (continued). *Figures (C1 – C4) of the Relationship between the variable "Strength of the Relationship (Pearson's r) between Specific Trust and Specific Risk" and the variable "Self-Reported Knowledge about the Corresponding Risk", in France, Spain, Sweden, and the UK, respectively.*

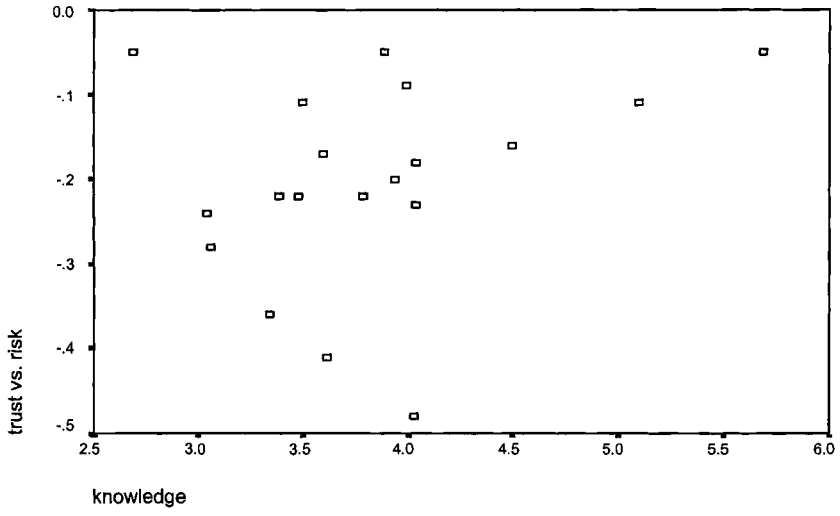
Figure C2. France



Risk	K	T/R	Risk	K	T/R
Alcohol	5.33	-.03	Natural radiation	2.94	-.11
Air pollution	4.26	-.13	Nuclear waste	3.49	-.34
EMF	3.10	-.14	Contaminated food	2.82	-.20
In-house radon	1.92	-.07	X-rays	4.10	-.15
Irradiated food	2.48	-.25	Chemical waste	3.33	-.22
Traffic accident	5.29	-.00	Nuclear arms	3.72	-.23
Ozon layer	3.96	-.06	Floods	4.35	-.05
Domestic n.p	3.98	-.39	Chernobyl	3.94	-.13
West Europe n.p	3.38	-.33	BSE	4.22	-.16
East Europe. n.p	3.60	-.19			

APPENDIX C (continued). *Figures (C1 – C4) of the Relationship between the variable "Strength of the Relationship (Pearson's r) between Specific Trust and Specific Risk" and the variable "Self-Reported Knowledge about the Corresponding Risk", in France, Spain, Sweden, and the UK, respectively.*

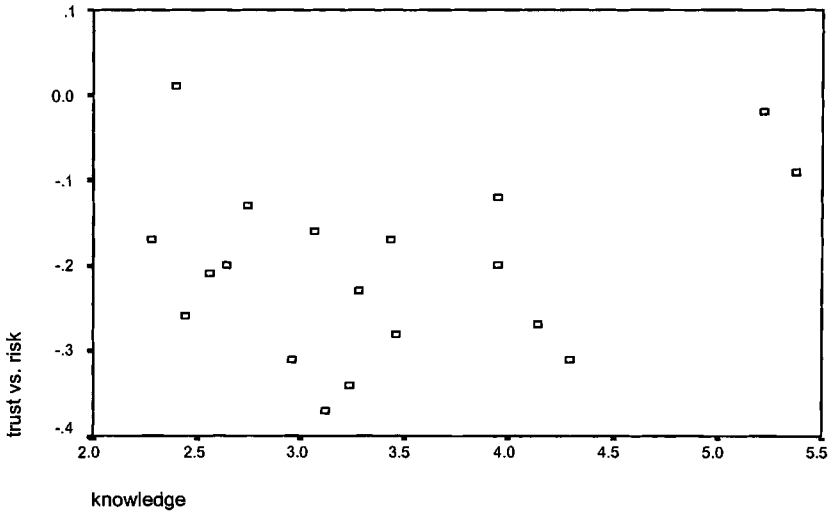
Figure C3. Sweden



Risk	K	T/R	Risk	K	T/R
Alcohol	5.68	-.05	Natural radiation	2.69	-.05
Air pollution	4.49	-.16	Nuclear waste	3.61	-.41
EMF	3.59	-.17	Contaminated food	3.06	-.28
In-house radon	3.49	-.11	X-rays	3.93	-.20
Irradiated food	3.04	-.24	Chemical waste	3.38	-.22
Traffic accident	5.10	-.11	Nuclear arms	4.03	-.23
Ozon layer	3.99	-.09	Floods	3.88	-.05
Domestic n.p	4.02	-.48	Chernobyl	4.03	-.18
West Europe n.p	3.34	-.36	BSE	3.78	-.22
East Europe. n.p	3.47	-.22			

APPENDIX C (continued). *Figures (C1 – C4) of the Relationship between the variable "Strength of the Relationship (Pearson's r) between Specific Trust and Specific Risk" and the variable "Self-Reported Knowledge about the Corresponding Risk", in France, Spain, Sweden, and the UK, respectively.*

Figure C4. UK



Risk	K	T/R	Risk	K	T/R
Alcohol	5.37	-.09	Natural radiation	2.40	.01
Air pollution	4.29	-.31	Nuclear waste	3.12	-.37
EMF	3.43	-.17	Contaminated food	2.56	-.21
In-house radon	2.74	-.13	X-rays	3.46	-.28
Irradiated food	2.64	-.20	Chemical waste	2.96	-.31
Traffic accident	5.22	-.02	Nuclear arms	3.28	-.23
Ozon layer	3.95	-.20	Floods	3.95	-.12
Domestic n.p	3.24	-.34	Chernobyl	3.06	-.16
West Europe n.p	2.44	-.26	BSE	4.14	-.27
East Europe. n.p	2.28	-.17			

ARTICLE 1:

ENERGY POLICY OPTIONS – FROM THE PERSPECTIVE OF PUBLIC ATTITUDES AND RISK PERCEPTIONS

ENERGY POLICY OPTIONS – FROM THE PERSPECTIVE OF PUBLIC ATTITUDES AND RISK PERCEPTIONS

Mattias Viklund
Center for Risk Research
Stockholm School of Economics

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A revised version of the article has been submitted to *Energy Policy*.

ABSTRACT

In the present study a representative sample (N = 797) of the Swedish population was surveyed, with regard to attitudes related to energy policy issues (e.g., environmental attitudes, risk perceptions, and attitudes towards different energy production systems) and self-reported electricity saving behavior. These factors were considered relevant in a Swedish energy policy context, because of the planned phase-out of nuclear power. Citizens' attitudes have traditionally been important factors in energy policy-making, especially nuclear policy, and one of the conditions for a successful phase-out is increased levels of electricity savings among households and in industry, in order to compensate for the loss in energy production. Respondents reported positive attitudes to the environment in general and to electricity saving, while the attitudes to nuclear power as an energy production system in Sweden were relatively negative. Perceived risk was an important predictor of these attitudes and it was concluded that it is important to investigate mechanisms behind this variable. The relationship between attitudes towards electricity saving and electricity saving behavior was weak. It is discussed whether the contribution of psychological knowledge in energy conservation campaigns could be to elaborate on people's willingness to be moral and public-spirited citizens in combination with their pro-environmental attitudes. This work was supported by grants from NUTEK and FRN. Viklund (1999) presented more data from the survey referred to here.

Keywords: energy policy, electricity saving, risk perception, attitudes, behavior

CONTENTS

INTRODUCTION

Policy-making in modern society is a complex art. In a representative democracy, there is a wide range of factors, which must be taken into consideration in the decision-making process. Policy-makers must always be aware of the economic consequences of their decisions. Furthermore, in modern society there is very often a need for risk analysis before making important decisions. Such an analysis includes assessment of the probabilities of the occurrence of different events, together with an evaluation of the consequences if these events should occur, in terms of effects on public health and the environment. Policy-makers must also reflect on demands by various interest groups and stakeholders in society (e.g., organizations representing industry, environmental organizations, and consumer movements). There are also a variety of political factors to take into account, such as the distribution of mandates among political parties, which is the key to practical possibilities of making political decisions. Naturally, the policy-maker is guided, and should be guided, by his or her convictions, as well as the ideology and opinions of the party he or she represents.

But, as the power of the policy-maker is dependent on the will of the voters, he or she must also have some knowledge of their political attitudes and behaviors. Granted, the citizens delegate much responsibility to politicians in elections, but the act of voting is not the only way in which voters can influence policy. One obvious way is to form civic associations, some of them with the explicit aim to influence policy. However, even citizens who are relatively inactive politically can influence policy by participating in polls and other kinds of surveys. Thus, there is a fairly important participatory element in modern democracy, which is also included in most models of ideal democracy, where people have much influence over policy. A popular influence is not only preferable from a normative viewpoint, though, since knowledge of citizens' opinions also could be viewed as a very constructive decision support tool.

Knowledge of citizens' attitudes and behaviors may be especially important in energy policy, since it is traditionally an area where Swedish citizens have had a comparatively large influence. Of course, people can have their say in national elections, but the nation's energy policy has also been considered important enough to arrange a referendum concerning the nation's future use of nuclear power as energy source. There have only been four other referenda in Sweden. These referenda concerned prohibition (1922), right-hand traffic (1955), a new pension system (1957), and membership in the European Union (1994). The referendum concerning nuclear power was held in 1980 and it was decided that the nuclear power would be successively replaced by other energy sources and that it should be completely phased out by 2010. Risk was a prominent issue in the discussions of nuclear power. Still today, it seems as energy policy to quite a large extent is influenced by the citizens' attitudes

towards energy sources and perceptions of (especially nuclear) risks. Viklund (1999) noted that there are voices that doubt that the government is very interested in implementing the phase-out decision, because of the current (relatively) positive opinion towards nuclear power in Sweden.

Finally, yet another possibility for citizens to influence energy policy is, of course, by their consumption of electricity. In fact, because of the problems associated with phasing out nuclear power, it has been proposed that it is necessary for households to change their energy consumption (i.e., electricity saving must increase).

Thus, it is clear that Sweden's energy policy historically has been influenced, to some extent, by people's attitudes (mainly towards nuclear power) and behaviors (mainly their electricity consumption). The need for public guidance over energy policy today is greater than ever before, because of the many challenges policy-makers are facing.

The long-term policy decision taken by the Swedish government in 1997 is a good starting point for describing today's complex energy situation. The overall goal in that decision was to accomplish a redistribution of the use of different energy sources in the production and consumption of electricity in Sweden (Energimyndigheten, 1998). In the end of the 1990s, 46% of the electricity consumed in Sweden was based on nuclear power (and approximately the same amount was based on hydro power). Nuclear power as an energy source will be phased out and replaced by other energy sources, according to the Government.

The purpose of this transformation of the energy system is to make it more economically efficient and friendlier to the environment, but one important objective is most likely also to decrease the risks to the public. Risks associated with nuclear power are usually considered risks of the type "small probability – large consequences" and people tend to worry more about these risks, compared with other types of risks (Drottz-Sjöberg et al., 1994; Drottz-Sjöberg & Sjöberg, 1990). It was the fear of a nuclear accident that was the major driving force in the arguments against nuclear power at the time of the referendum and it was probably this fear that contributed most to the phase-out decision. Another objective is most likely that the Government, by following the referendum decision, hopes to avoid a debate regarding them deceiving the Swedish public, and the possible loss of public trust that could be the result of abandoning the phase-out plans. To achieve these goals, the Government thus has stated its determination to replace nuclear power (Energimyndigheten, 1998). However, at the present time, it seems unlikely that all nuclear power plants will be closed down in 2010. In the policy decision from 1997, it was stated that the phase-out process would start with closing the two reactors of the nuclear power plant in Barsebäck. The first closure took place in 1999, but the second reactor has not yet been closed, since it was not guaranteed that new electricity production and

decreased electricity consumption could compensate the loss of electricity production.

Another major change on the electricity market is the deregulation of the market. The decision to deregulate the market is related to the phase-out of nuclear power. There is a hope that a market deregulation will make people more efficient in their electricity consumption; that is, they will simply consume less electricity without having to decrease their standard of living (Bernström, Eklund & Sjöberg, 1997). If the Swedish electricity market will actually be more efficient, in terms of more cost-efficient electricity consumption, the nation will be more capable to manage a possible shortage on electricity (which might be the consequence of a phase-out, if no alternative sources of energy have been found at that time).

Thus far, everything is fairly simple – the deregulation has already taken place and should, according to the logic described above, contribute to solving an important problem (possible shortage of electricity) associated with phasing out nuclear power. However, things are rarely that simple in the real world. It is quite unusual that one policy decision (deregulation) leads to the predicted result with complete certainty, since there is more than one dimension at play in the real world – and in some cases one event can even cause two contrary effects. In the present case, this means that deregulation not necessarily leads to decreased consumption of electricity, since deregulation *also* leads to increased competition and lower prices, which is strongly related to an *increase* in electricity consumption (Viklund, 1999). Yet another factor is the long-term trend towards higher levels of consumption, which is largely due to usage of new household appliances and electronics (Energikommissionen, 1995).

There are other complications with phasing out nuclear power. One important factor is that of effects on the environment and another factor is cost-efficiency. The main threat to the environment is that of carbon dioxide emissions, which have been estimated to increase in case of a phase-out of nuclear power (Energikommissionen, 1995). In short, nuclear power is a clean, "green", and inexpensive energy source and it is a major technological challenge to find an energy source with similar advantages.

The government has two options. The first option is to (continue to) postpone the nuclear phase-out or even decide to continue using nuclear power as an energy source in Sweden, due to the many problems associated with a phase-out. It would perhaps be possible to choose this option, considering that people in Sweden currently are relatively positive towards nuclear power and that fewer than ever before (but still a majority) are proponents of a phase-out. There is an evident risk, however, that people's trust in the government would be seriously damaged if the government would change course completely and decide to ignore the result of a referendum, regardless of how distant in time it is. Moreover, the main reason for skepticism towards nuclear power to begin

with – the risk; mainly the consequences of an accident, but also risks relating to the management of nuclear waste – would not disappear.

The second option is to continue the process of phasing out nuclear power, despite potential problems with environmental effects and the cost-efficiency of alternative energy sources, and the risk of shortage of electricity, causing problems in well-being and higher electricity prices. The reader may object, arguing that higher prices would be good, since they would increase levels of electricity saving. The problem is, however, that long-term savings are desirable *before* nuclear power is phased out. The trend of the late 1990s was that prices were decreasing, because of the increased competition caused by the deregulation of the electricity market (Viklund, 1999), but this trend is less clear at the time of writing (January, 2002).

The government will most likely continue to phase out nuclear power, although a complete phase-out by 2010 is probably a too ambitious goal, by successively replacing it with energy based on new, inexpensive and "green" technology. And if the electricity prices will continue to be on quite low levels, there is a hope that other incentives than purely economic ones will lead to increased levels of savings.

Thus, there appears to be a need for psychological research in the area. It is perhaps possible to find non-economic factors, which explain some of the variation in people's electricity consumption. It is important to note that when the term "electricity saving" is used, it does not necessarily refer to actual savings of money (even if electricity saving often leads to such savings). The broader term "energy conservation" is, however, not used instead of electricity savings, simply because it is too broad; the present study is based on empirical data on electricity saving. A review of research (see below) on the area suggests that there is room for important psychological explanatory factors.

EARLIER RESEARCH AND OBJECTIVES OF THE STUDY

In the present article, a representative sample of the Swedish population is investigated, with respect to perceptions of risks in general, and nuclear risks in particular, attitudes towards different aspects of the energy policy issue and towards electricity saving, as well as self-reported electricity saving behavior. The emphasis when it comes to electricity saving is to find psychological explanations of attitudes and behavior.

The specific questions in the article are:

1. How do Swedes perceive different kinds of risks, including nuclear risks, and what risks are perceived as biggest?
2. What attitudes do Swedes hold in different energy policy related issues?

3. Does people's risk perception influence their attitudes related to energy policy and electricity saving?
4. What is the relation between attitudes towards electricity saving and self-reported electricity saving behavior?
5. To what extent can psychological variables explain people's attitude towards electricity saving?
6. To what extent can psychological variables explain people's self-reported electricity saving behavior?

Earlier research in the area suggests that psychological factors may be of importance when trying to explain pro-environmental behavior. Cameron, Brown and Chapman (1998) tried to estimate the influence of social value orientations on actual pro-environmental behavior. It was found that pro-social participants (i.e., a person who made more cooperative/altruistic choices in a series of decomposed games) in the study were more likely to send letters supporting a transportation pollution reduction program, compared with pro-self participants (i.e., a person who made more competitive/individualistic choices), who were more likely to send letters opposing the program.

Sadalla and Krull (1995) investigated possible psychological barriers to energy conservation. Their hypothesis was that conservation measures could negatively affect (as perceived by the individuals themselves) a person, by stigmatizing the individual and reducing his or her status. This hypothesis received some support in data and it was concluded that, since consumption seems to be equated with status, it might be easier to promote the consumption of products that conserve energy than to discourage energy consuming behavior.

De Young (1996) focused on how people can be intrinsically satisfied, by adapting pro-environmental consumption behavior. The recommendation based on the results from the study was that, in order to frame consumption behavior, these intangible, intrinsic, but positive payoffs should be highlighted.

Axelrod and Lehman (1993) investigated possible predictors of environmentally concerned behavior and noted that although many people according to research results are concerned about the environment, this concern does not correlate with action. Three theoretical concepts were in focus as possible explanations – attitudes towards behavior, personal efficacy in relation with behavior, and motivational forces behind behavior. Six factors were included in the final multivariate model, which accounted for 49% of the variance in environmentally concerned behavior. These were principled outcome desires (the extent to which respondents act in accordance with deeply held values for the environment), issue importance (absolute importance of the environment to the individual as well as its relative importance with other social concerns such as AIDS and poverty), self-efficacy (respondents' beliefs that they, personally, have the capability to engage in actions that can help solve

environmental problems), social outcome desires (the extent to which family, friends, and the community served as guides to one's behavior with respect to the environment), channel efficacy (perceived difficulty the individual expected to encounter, when attempting to act in environmentally-protective ways), and threat perception (perceived likelihood, severity, and immediacy of environmental problems).

In a similar study, structural equation modeling was used to investigate the multivariate relationship between environmental attitudes and pro-environmental behavior (Grob, 1995). A model with the following five components was tested, confirmed and found to account for 39% of the variance in behavior: (a) factual knowledge about the environment and recognition of environmental problems (the only variable that did not correlate significantly with behavior); (b) the emotional value which the individual places on aspects of the environment and the disturbance resulting from his/her perception of the discrepancy between ideal and actual environmental conditions; (c) openness: post-materialistic beliefs and readiness to adopt new attitudes (the factor that correlated the most strongly with behavior: 0.45); (d) perceived control: beliefs about the efficacy of science and technology and beliefs about self-efficacy; and (e) direct actions that impact the environment.

When it comes to electricity saving, Cialdini (1993) referred to a study in which a chance for people conserving energy to have their names in newspaper articles, where they were described as public-spirited and fuel-conserving citizens, motivated them to substantial conservation efforts within a short period of time (a month). A sense of commitment thus seems to have an impact on people's energy-saving behavior. One issue of interest is whether the effects obtained would persist. It is possible that the effects could have been the result of "energy-conscious" behavior for a relatively few days that then faded as the utility month progressed. However, when this possibility was further investigated, it was shown that public commitment resulted in lower energy consumption throughout a 12-month period (Pallak, Cook & Sullivan, 1980).

Bernström et al. (1997) investigated the issue of electricity saving, using many of the variables included in the present study, although their results were not based on a strictly random sample of the Swedish population. They presented a regression model that explained 27.0% of the variance in the households' electricity saving behavior. Four variables were included in this model: (a) electricity payments; (b) perceived personal risks due to saving electricity; (c) general hazards as reasons to save electricity; and (d) development of the electricity consumption (during the last 5 years). It could also be noted that although the households were positive towards electricity saving, this attitude did not directly affect their saving behavior.

According to the study performed by Bernström et al. (1997), risk perception could be important in understanding electricity saving. Risk perception research has dealt with how people tend to perceive the risks in their

environment, which means that some of the work has also focused on risks stemming from different energy sources. It has in many studies been shown that the attitude towards different energy production systems to quite a large extent is due to the risks associated with these systems (see for example Bernström et al., 1997; Sjöberg, 1999). Perceived risks are more important in explaining the attitude than the perceived benefits with the systems. A rather impressive result is that perceived risks and benefits associated with nuclear power in general accounted for approximately 60% of the variance in attitude towards nuclear power (Bernström et al.; Sjöberg & Drottz-Sjöberg, 1993).

Nuclear power is a particularly interesting area in risk perception research. The public tends to worry more about nuclear risks in comparison with other risks (Drottz-Sjöberg & Sjöberg, 1990; Drottz-Sjöberg et al., 1994). It is worth mentioning that there exists a notable difference between the public and experts when it comes to perceived risks associated with nuclear power. The public perceives nuclear risks as much greater than the experts do (Sjöberg & Drottz-Sjöberg, 1994). This distinction between experts and the public is obviously an important aspect in decisions about energy policy, which ideally include opinions from both parties.

Summing up, the purpose of the present study is to map environmental attitudes, attitudes towards different energy systems, and risk perceptions of a large representative sample of the Swedish population. By doing so, the aim is to clarify psychological mechanisms of importance for some of the energy policy options Swedish decision-makers currently are facing and to describe the degree of popular support these options may receive. Psychological mechanisms underlying attitudes to electricity saving and self-reported behavior are especially in focus. One of the cornerstones of the long-term energy policy decision (that includes the decision to phase out nuclear power) in Sweden is to enable a transformation to a more economically efficient energy system, which is also friendlier to the environment, by means of increased levels of electricity saving in households as well as in industry.

METHOD

A mail survey was used as means of collecting data. The questionnaire was intended to cover a wide range of issues and the respondents were therefore asked to answer 313 questions on a total of 37 pages. The questionnaire was sent out in May 1998. The net sample consisted of 1202 and since 797 questionnaires were completed and returned, the response rate was 66.3%.

One objective of the study was to work with a sample representative of the Swedish population, in order to be able to generalize the results. According to the sample results regarding background variables, this objective seems to have been reached. The respondents were representative of the Swedish population in

terms of gender distribution and average age. With regard to income and education, there was a difference between the respondents and the Swedish population (on average, respondents had higher income and were better educated than the population at large). Income is not, however, an important explanatory variable and level of education tends to be only weakly related to risk perception data. Level of education turned out, furthermore, to be only moderately related to attitude towards electricity saving (Pearson's $r = 0.19$) and not at all related to reported electricity saving behavior. The structure of employment status among the respondents was quite similar to that of the population, but there were differences since there were fewer students and more retired people in the sample. This is a well-known phenomenon, which is probably due to the fact that retired people have more time to fill out extensive questionnaires. Moreover, there was a notable difference between the share of unemployed people in the sample and the share in the population, which is probably at least partly a consequence of the fact that unemployment rates had decreased somewhat in Sweden from 1997 (population data on unemployment are dated to this year) to 1998. The respondents were also representative of the population in terms of employer and occupational status. To conclude, the main conclusion is that the sample on the whole is representative of the population, especially with a response rate as high as 66.3%.

Electricity saving behavior was measured as an index; a mean was computed on the basis of reported frequency of different electricity saving activities. The general attitude towards electricity saving was based on one question. Risk perception was measured by ratings of general and personal risk of 37 hazards, on 8 step category scales. A "don't know" response category was also used and these responses were throughout treated as missing. Attitudes towards eight energy production systems, as well as perceived risks and benefits associated with these systems, were measured by 5 step Likert scales. Perceived risks were also measured by asking questions about the magnitude of risks associated with saving and not saving electricity, respectively.

There was a particular focus on nuclear power, based on its importance for the Swedish energy production system today and the interesting questions arising from the planned phase-out. Examples of such questions, which were included in the questionnaire, relate to if it is at all possible to phase out nuclear power and what the likely environmental, economic, and social consequences of a phase-out are.

Finally, some questions of a more practical nature were also included. These were mostly related to the respondents' living arrangements (e.g., place of living, type of living, size of apartment or house, and possible ownership of different kinds of electrical appliances).

RESULTS

As noted before, the current trend in people's attitude towards nuclear power in Sweden seems to be that they are becoming more positive and more open to a continued use of nuclear power as a source of energy in Sweden, even after 2010. However, when comparing the attitude towards nuclear power with the attitude towards other energy production systems, it is evident that Swedes were still *relatively* negative towards nuclear power. According to Table 1, it appears that perceived risk was more important in explaining attitude, compared with perceived benefits. Nuclear power, to which people were relatively negative, was considered quite risky, but also as yielding many benefits.

Table 1
Means of Attitude, Perceived Risk and Benefit of Energy Production Systems

Energy source	Attitude	Personal risk	General risk	Personal benefit	General benefit
Solar	1.49 (0.76)	4.69 (0.68)	4.68 (0.67)	2.85 (1.48)	2.81 (1.43)
Wind	1.62 (0.89)	4.73 (0.65)	4.69 (0.66)	2.93 (1.50)	2.79 (1.43)
Hydro	1.84 (0.90)	4.53 (0.75)	4.38 (0.81)	2.17 (1.17)	1.81 (0.96)
Biomass	2.28 (1.01)	3.61 (1.00)	3.53 (0.99)	2.86 (1.25)	2.76 (1.16)
Natural gas	2.44 (0.99)	3.54 (0.95)	3.46 (0.93)	2.49 (1.29)	2.95 (1.07)
Nuclear power	3.04 (1.41)	2.79 (1.37)	2.65 (1.34)	3.27 (1.14)	1.98 (1.16)
Oil	3.61 (0.97)	2.54 (1.00)	2.42 (0.97)	3.09 (1.19)	2.64 (1.13)
Coal	4.17 (0.93)	2.13 (1.05)	1.97 (0.93)	4.06 (1.08)	3.73 (1.10)

Note. With regard to the attitudes, the respondents were asked to mark their opinion by selecting a number on a scale from 1 to 5. The steps on that scale were (1) strongly positive, (2) quite positive, (3) doubtful, (4) quite negative and (5) strongly negative. The risk and benefit scales also ranged from 1 to 5, where 1 = very large risks/benefits and 5 = very small risks/benefits. Standard deviations are presented within parentheses.

The pattern that perceived risk is more important than benefits in explaining attitudes is established in Table 2, where ratings of attitude to the eight energy production systems are regressed on judgments of risk and benefit of these systems. Moreover, it is interesting to note that the highest amount of attitude accounted for was in the case of nuclear power.

Table 2
Multiple Regression Analysis between Risks and Benefits associated with different Methods of Producing Electricity and the Attitude towards each method

Energy source	β, personal risk	β, general risk	β, personal benefit	β, general benefit	R^2_{adj} adjusted
Coal	-0.09*	-0.42***	0.18***	0.15***	0.43
Hydro power	-0.20***	-0.14**	0.29***	0.19***	0.38
Oil	-0.27***	-0.30***	0.18***	0.10*	0.41
Nuclear power	-0.42***	-0.18**	0.24***	0.07*	0.59
Natural gas	-0.13*	-0.36***	0.14***	0.18***	0.38
Bio-mass	-0.32***	-0.20***	0.17***	0.17***	0.44
Solar	-0.07	-0.25***	0.17***	0.13*	0.17
Wind	-0.11*	-0.23***	0.21***	0.17***	0.22

* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

One explanation of the fact that people perceive more general benefits with nuclear power compared with most other energy sources is most likely that other energy sources, such as solar power and wind power, currently are used to a small extent. When asked about their preferences for the method of producing energy in the future, however, respondents wanted to see more of solar power and wind power. On a scale from 1 (definitely negative towards using that source in the future) to 5 (definitely positive towards using that source in the future), the means for solar and wind power were 4.41 and 4.38, respectively. This could be compared to the current major energy sources in Sweden, hydro power and nuclear power, where the means were 3.97 and 2.83, respectively. The lowest scores were assigned to oil ($M = 2.30$) and coal ($M = 1.61$).

The main conclusion as to the future use of nuclear power as an energy source in Sweden is that, despite the trend towards more acceptance of nuclear power, there is a fairly strong will among the Swedes; that will is to use environmentally friendly energy sources such as solar power and wind power. It is important to note that nuclear power is quite a clean energy source, when it comes to emissions, but the popular skepticism is more due to perceived (mostly personal) risks associated with using nuclear power to produce energy.

On the attitudinal level, there also seems to be a widespread support for the governmental policy of trying to phase out nuclear power, and at the same time increase electricity savings. One question to the respondents were: "If a phase-out would mean a need to increase the electricity savings, are you ready to save electricity?". The scale ranged from 1 to 5 and the mean was 4.01. See Table 3 for frequencies.

Table 3
Whether the Respondents would Save Electricity if it was needed as a Consequence of a Phase-Out of Nuclear Power

Statement	Frequency in percent
No, definitely not	3.3
No, probably not	8.6
Maybe, maybe not	14.3
Yes, maybe	31.6
Yes, definitely	42.1

The respondents were, however, not as sure about the possibility to replace nuclear power. When this question was based on the same type of scale as in Table 3 above, the mean was 3.46. One important point for policy-makers who want to pursue the policy of phasing out nuclear power, and to increase electricity savings, is to make sure that the citizens are aware of the connection between these two factors. The respondents were asked about their beliefs about possible consequences of a phase-out of nuclear power and it turned out that the most likely consequence was a factor termed "Increased needs for savings" (which included the following variables: "Increased electricity prices", "Increased need to save electricity in the households", "Increased need to save electricity in the industry", and "Increased effluent of carbon dioxide"). On a scale from 1 (very unlikely) to 7 (very likely), the mean for this factor was 5.64, which could be compared with the three other factors: "Reduction of environmental hazards" ($M = 4.80$), "Reduced standard of living" ($M = 4.54$), and "An alternative source of electricity" ($M = 5.23$).

Respondents' risk perception was investigated by asking them to rate how big they perceived different risks to be, in terms of risky to themselves as well as risky to Swedish people in general. The scale ranged from 0 (non-existent risk) to 7 (very large risk) and the mean personal risk for almost all risks was less than 4 (except for East European nuclear power, with an average personal risk of 4.73). There was a strong tendency to rate general risks as higher than personal risks; this was particularly the case with so-called lifestyle risks, such as alcohol consumption and AIDS. The type of risks where personal risks were considered as big as general risks were risks associated with nuclear power (this category also included items such as "nuclear arms" and "nuclear waste"). People perceived these risks higher to themselves, when compared to non-nuclear radiation risks (e.g., irradiated food and natural background radiation) and other risks (e.g., floods and air pollution).

Does risk perception affect attitudes towards electricity saving and electricity saving behavior? This question was tested by using three types of risk perception items: (1) risks associated with different energy production systems, (2) factors of nuclear risks, non-nuclear radiation risks, and other risks, as

constructed on the basis of the extensive list of separate risk items, and (3) perceived risks with saving and not saving electricity. In Table 4, correlations between perceived risks and attitude towards electricity saving as well as electricity saving behavior are presented.

Table 4
Risk Perception versus Attitudes towards Electricity Saving and Electricity Saving Behavior (Pearson's r)

Risks	Attitude	Behavior
Personal risks with nuclear power	0.12**	-0.11**
General risks with nuclear power	0.13***	-0.11**
Personal risks with solar power	-0.19***	0.14***
General risks with solar power	-0.20***	0.08*
Personal risks with wind power	-0.16***	0.07
General risks with wind power	-0.20***	0.07
Personal nuclear risks	-0.11**	0.16***
General nuclear risks	-0.12**	0.17***
Personal non-nuclear radiation risks	-0.06	0.12**
General non-nuclear radiation risks	-0.07*	0.13**
Personal other risks	-0.04	0.13**
General other risks	-0.05	0.15***
Personal risks with saving electricity	0.40***	-0.16***
Risks to society with saving electricity	0.34***	-0.14***
Personal risks with not saving electricity	-0.19***	0.08*
General risks with not saving electricity	-0.31***	0.10*

* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

There was no common pattern as to any possible difference between effects of personal and general risks. The main conclusion based on the results reported in Table 4 is that perceived risks generally have weak effects on attitude towards electricity saving and electricity saving behavior. However, when looking at specific perceived risks, directly related to the issue of electricity saving, these had an important bearing on attitude towards electricity saving. Since perceived risk was important also in explaining attitude towards different energy production systems, it seems that risk is an important aspect of attitudes related to energy policy issues. One might suggest that a risk associated with saving electricity is a fear of decreased standard of living and/or level of comfort (due to changed habits), and that a risk with not saving electricity could be that there would eventually be a shortage of electricity.

As noticed above, it seems to be possible to pursue a policy of replacing nuclear power and at the same time increase electricity savings, based on the attitudes reported by the respondents. Overall, the respondents could be considered as very pro-environmental and pro-electricity saving. For example, it

was found that 94.7% of the respondents reported that they, at least to some degree, "act to maintain and protect the environment". When asked about their general attitude towards electricity saving, almost 60% considered it an extremely good or very good thing. When also including those who answered "rather good", the figure increased to approximately 90% of the respondents.

However, the step from having an attitude to actually take some pro-environmental action can be difficult to take. When using general attitude as single predictor of electricity saving behavior, it turned out to explain only 5.2% of the variance. Although a statistically significant relationship, it clearly shows that general attitude is very far from being a powerful predictor of behavior. This was also shown in the multiple regression models for explaining attitude and behavior. Four variables (personal risks with saving electricity; general risks with not saving electricity; perception of whether Sweden can save electricity; interest in environmental issues) that explained 32% of the variance in general attitude towards electricity saving only accounted for 8.8% of the variance in self-reported behavior.

The variables affecting behavior were mostly of a different sort than those affecting general attitude. One interesting exception was a factor called "altruistic reasons for saving electricity", which correlated on an approximate level of 0.30 with both attitude and behavior. This factor included the following reasons for saving electricity: (a) out of concern for the environment; (b) out of concern for future generations; (c) out of concern for health factors; and (d) out of concern for Swedish society. Otherwise, the predictors of self-reported electricity saving behavior clearly reflected that electricity saving to a large extent is dependent on practical circumstances (see Table 5). The amount of variance accounted for (approximately 20%) is most likely a reflection of the fact that economic factors (saving money) are at least as important as psychological ones. It should be noted, though, that 20% explained variance is still a rather strong result in a social science context.

Table 5
Multiple Regression Analysis of Variables Affecting Electricity Saving Behavior in Sweden

Parameters	Electricity saving behavior (β)
Whether received information about electricity saving	-0.13***
Whether try to act in order to maintain and protect the environment	-0.22***
Perceived amount of electricity consumed in comparison with other households	-0.15***
Pleasant temperature at home	-0.15***
"Nature people"	-0.16***
R^2 adjusted	0.198

*** $p < 0.0005$.

"Nature people" is one so-called lifestyle factor that could be identified on the basis of a factor analysis. In the questionnaire, a large number of lifestyle items were included, in order to enable a test of whether "lifestyle" was important in explaining attitudes towards electricity saving and electricity saving behavior. On the whole, these factors (e.g., "yuppie/consumption oriented" and "family oriented") were not very important since they together accounted for approximately 10% of the variance in attitude and behavior, respectively. However, one of the extracted lifestyle factors was important enough to be included in the regression model above. It should be noted, though, that the "nature people" factor is not very reliable (Cronbach's alpha: 0.52) and only included three items ("It is important to me to be out, in the natural environment", "Nature gives me peace of mind" and "I fish, hunt and/or pick berries to get more money to our household").

Finally, it is important to mention some limits to electricity saving. That is, although people may be positive towards electricity saving, there are practical limits to their possibilities to change their levels of electricity consumption. The most obvious limitations are physical: type and size of dwelling. If the area of the home of the respondent was large, the respondent was more likely to be active in electricity saving ($R^2_{adj} = 0.031$, $F = 26.62$, $\beta = 0.180$, $p < 0.0005$). There is also a limit on electricity saving when it comes to equipment; if the respondent had a thermostat at home, he or she was more likely to be active in electricity saving ($R^2_{adj} = 0.032$, $F = 26.93$, $\beta = -0.181$, $p < 0.0005$). Moreover, if the respondent preferred a low temperature at home, he or she was more likely to be more active in electricity saving ($R^2_{adj} = 0.042$, $F = 36.22$, $\beta = -0.209$, $p < 0.0005$). Where the respondent lived was also important for his or her stated electricity saving behavior – the respondent living in a small community was more likely to be active in electricity saving ($R^2_{adj} = 0.014$, $F = 12.64$, $\beta = -0.125$, $p < 0.0005$). Another type of physical limitation is whether the relation

between the respondent and his or her home is characterized by owner or tenant status. Whether a respondent lives in a private house or in a rental apartment should be reflected in his or her electricity saving behavior. A person living in a small apartment does not have the same possibility to save electricity, because of the limited space as well as the fact that he or she usually does not pay for heating on a basis of level of consumption, but a flat rate independent of how much is consumed. This was the case when we tested the assumption on the data. A person living in a private house was more likely to be active in saving electricity ($R^2_{adj} = 0.041$, $F = 35.04$, $\beta = -0.205$, $p < 0.0005$), while a person living in a rented apartment was less likely to be active ($R^2_{adj} = 0.036$, $F = 31.03$, $\beta = 0.194$, $p < 0.0005$).

DISCUSSION

One of the main results of the present study, with possible implications for policy, was that respondents wanted to replace nuclear power, mostly because of the risks they perceived associated with producing electricity based on this energy source. They were willing to pay more for electricity perceived as environmentally friendlier, and they appeared to understand the relationship between nuclear power phase-out and levels of electricity consumption. In general, perceived risks were potent predictors of various attitudes, in particular attitudes towards nuclear power. Specific risks related to electricity saving were, furthermore, successful in explaining attitudes towards electricity saving.

Perceived risk was, however, not at all as successful in explaining electricity saving *behavior*. Indeed, it was a main finding that behavior was more difficult to explain with psychological variables, partly because it was to a larger extent a function of practical circumstances (e.g., type of living). Electricity saving behavior is most likely also influenced by electricity prices. Earlier research has shown that energy prices have a great influence on Swedish households' energy demands (Andersson, 1994). The link between attitudes towards electricity saving and electricity saving behavior was weak. It seems as if people are environmentally concerned and positive to electricity saving, but these factors are weakly related to (self-reported) behavior.

It is thus interesting to divide the two main problems of energy policy into two categories. One category involves the study of attitudes, which has been shown to be important for policy, whereas the other category is more related to individuals' behavior.

Based on the fact that perceived risk appeared to be an important factor in forming Swedes' attitudes related to energy policy, it could be useful to conceive of energy policy as a case of risk policy, focusing on risks associated with nuclear power. Policy-makers base their decisions on risk judgments to a large extent provided by experts, but for various reasons (e.g., political

legitimacy) it is also important to consider attitudes and risk perceptions of citizens. A main dilemma that has been noticed in risk perception research is that experts appear to have different risk perceptions and attitudes compared to the public. It has been found that experts' risk judgments have structural *properties* similar to those of the lay public, while they judge the *level* of risk differently as long as it is a risk in their own field of responsibility (Sjöberg, 2002). This seems to be particularly true in the case of risks associated with nuclear power. Experts perceive nuclear risks as considerably smaller than the public does. A relevant question is, then, what causes people to perceive risks as high or low? Since the structural properties of experts' and the lay public's risk perceptions appear to be similar, the claim that experts give an objective and correct assessment of risk, while the public's risk perception is fraught with many biasing factors, does not seem credible.

One common hypothesis is that trust in risk management or experts is an important determinant of perceived risk; that is, the more trust people put in corporations, politicians, and experts, the lower they perceive risks. Perhaps is trust the answer to the mentioned risk policy problem? Would higher levels of public trust allow policy-makers to pursue a rational risk policy (that is, taking advantage of expert knowledge, while at the same time receiving the degree of popular support necessary for technological progress)? Some commentators argue that trust is the solution to many risk policy problems, pointing to the notion that so-called siting processes (of hazardous waste material) often seem to fail as a consequence of people's distrust in risk management. Current research suggests that such an explanation might be inadequate in some important respects. First, in an extensive, yet unpublished, empirical study, Viklund (2002, in preparation) found that trust was a significant, but rather moderate, predictor of perceived risk, within as well as across four West European countries. Sjöberg (2001) showed that an important explanation to the relatively modest explanation value of trust could be people's perceptions of knowledge and science. People may trust experts to be competent and honest, but still perceive risks as high, because they may think that there are limits to science, and, therefore, to experts' knowledge. Furthermore, distrust and low trust are not necessarily the same thing. Luhmann (1988) argued that people trust in order to reduce social complexity. If they choose not to trust, they still have to face complexity and uncertainty, forcing them to pursue different strategies in order to deal with that complexity. Instead of forming positive expectations, people are forced to form negative expectations; that is, they distrust instead of trust. These *negative* strategies give distrust an emotionally tense and often frantic character, which distinguishes it from trust. Thus, while the highly negative state of distrust might be important in explaining why people react with fierce negativity to risky projects, such as the siting of repositories of hazardous waste in their communities, this does not necessarily mean that low levels of trust will be the major predictor of high levels of

perceived risk. Even though it may be beneficial for policy-makers to be perceived as trustworthy by the public, it should hardly be the (only) guiding principle for them in their management of risk policy problems. So far, the most powerful predictors of perceived risk have been found in proximal variables (e.g., perceived risk of nuclear waste is well explained by attitude towards nuclear power).

As to the other main subject of the present study, people's electricity saving behavior, it was found that the general attitude towards electricity saving was weakly related to levels of electricity saving. One argument, based on the results, could be based on a questioning of whether there is much room for psychological factors in explaining electricity saving behavior. Is it possible at all to induce people to increase their electricity savings without monetary incentives? Are people living in small apartments (thus with obvious limits to substantial savings) open to information campaigns about the need to conserve energy, if they perceive few possibilities to do so, and if the possible decrease in levels of comfort is not obviously matched by the amount of money to be saved? And, if there are ways to affect people's electricity saving behavior on a short-term basis, what about long-term habits? Is it possible to educate people to carry out long-term changes in electricity consumption patterns? Looking at the Swedes, environmentally concerned and aware, will they actually act in accordance with their pro-environmental attitudes if electricity prices will stay on low levels or decrease even further?

Based on research conducted previous to the present study, there seems to be room for behavioral changes, based on knowledge of the mechanisms underlying people's consumption patterns. In the present study, it was found that some environmental attitudes were indeed relatively important in explaining behavior. If knowledge of strong pro-environmental attitudes could be combined with knowledge of other important factors, perhaps information and education campaigns could have long-term effects. One possibility would be to induce people's perception of themselves with respect to ethics. In the present study, it was found that an altruistic factor was an interesting predictor of attitude towards electricity saving as well as electricity saving behavior. Cialdini (1993) referred to the fact that the description of people as being environmentally concerned and public-spirited seemed to make them feel more responsible for their energy conservation behavior. Thus, since being pro-environmental in modern society is most likely considered as morally "good", campaigns aiming to combine the environmental and moral aspects could be successful. A contemporary example of an energy conservation campaign that seems to have been successful (at least on a short-term basis, where success is simply operationalized as lower levels of electricity consumption) can be taken from California.

The California energy crisis involved an almost disastrous shortage of energy in 2001. The immediate cause of the crisis was a dramatic increase in

electricity prices on the wholesale market in 2000 (Sioshansi, 2002). The utility companies paid the wholesalers far more for electricity than what is normally the case, while they were forbidden by law from passing along the high costs of electricity to their retail customers. Eventually, this had the consequence that utility companies were unable to provide consumers with sufficient amounts of electricity (and gas, since natural gas prices also spiked during this period), due to the unbearable costs of buying electricity from wholesalers. An interesting aspect is that California officials in 2002 filed a suit against the Federal Energy Regulatory Commission, seeking renegotiations of electricity contracts signed during the state's power crisis. The suit was based on the argument that wholesalers were involved in manipulations of California's electricity markets. The well-known economist Paul Krugman (2002) argued that the situation shows that the energy crisis was not mainly based on a flawed deregulation of the electricity market, as most commentators insist, but rather, "the flaw was in trusting markets too much, not too little". In early 2002, California policy-makers faced two urgent questions (Sioshansi, 2002):

1. How to make it through the summer with demand expected to exceed available capacity for many hours.
2. How to manage the soaring costs of buying power from the independent generators, who were to gain from continued supply shortages.

Since the former question primarily is driven by conservation measures (and also summer temperatures; in California, high temperatures means higher need for electricity-consuming cooling equipment), that is the issue I will discuss henceforth. The demand response programs, in order to reduce demand of electricity in California, that were undertaken in 2001 basically consisted of five factors (Goldman, 2002): (a) higher gas and electricity rates; (b) discount programs directed to consumers who conserved energy; (c) utility companies' energy efficiency and demand response programs; (d) voluntary conservation and curtailment at governmental facilities; and (e) the Flex Your Power media campaign. Thus, in order to reduce electricity consumption in the state, it was considered necessary not only to inform and educate consumers on the matter, but also to offer financial incentives. Few analyses have so far been conducted, as to the effects of different programs. It is, however, very probable that the campaign itself was only one of many factors influencing the vast reduction in demand and consumption of electricity that actually took place in California during 2001, thereby eliminating the shortage of electricity. The media campaign informed about prices on gas and electricity, financial rebates, so-called black-outs in different areas, and how the consumers could conserve energy in the best way possible. It is difficult to directly compare the effects on electricity consumption, caused by the media campaign and economic incentives, respectively. This is because the media campaign and the economic

incentives belong to different categories. Whereas the campaign was a source of information, prices and rebates were obviously very concrete incentives to conserve energy. Although the immediate reason to save electricity often could be due to economic incentives, campaigns are not redundant, since they provide information about how to conserve as much energy as possible and about opportunities to save money by doing so.

Moreover, it is likely that not only increased prices and financial rebates caused Californians to conserve energy, but also the information about black-outs; that is, the fact that in some areas, the electricity was shut off during short periods. People probably understood that if they did not conserve energy these black-outs could continue and perhaps even occur more frequently in the future. There is also a possibility that people regardless of economic incentives and black-outs wanted to conserve energy in order to be "good citizens". This possibility could, however, be partially related to the fact that the state was in a crisis situation, which is a short-term perspective, meaning that the ambition to be a good citizen will not necessarily persist on a long-term basis. One could further speculate about whether the possible willingness to be a good citizen, even in the short-term perspective, during the end of 2001 was influenced by the events of 11 September the same year.

When Californians were surveyed about their reasons for reducing electricity consumption, a large share of them (64%) stated that high energy prices was a very important reason. Fear of shortages and blackouts, environmental concerns, and weather conditions were less important reasons, although still important, since the share of respondents stating these reasons to be very important were 42%, 33%, and 21%, respectively (Hensler, LeBlanc & Seiferth, 2002).

Another important aspect in the California energy situation is that the state-funded (approximately 10 million dollars) Flex Your Power campaign actually provided a relatively small share of media messages, since so much information about the energy crisis was in the news. One could suspect that the reason for the media's large interest in energy conservation was the fact that there was a crisis situation, giving the energy issues unusually high news value.

Summing up, the heavy decrease in electricity consumption in California was most likely due to the acute crisis situation, which almost forced people to conserve more energy and also increased the amount of information in media considerably. The natural question, then, is whether there has to be a disastrous situation in order to make people conserve energy? Indeed, it should be noted that this was a situation in which a gradual increase in energy conservation would not have been enough, but there was an *urgent* need for *much lower* levels of electricity consumption.

Finally, another aspect to reflect upon is the short-term versus long-term aspects. Most actions undertaken to reduce electricity consumption were low-cost behavioral changes, rather than investments in expensive equipment

(Hensler et al., 2002). Low-cost activities do not automatically have long-term effects on electricity consumption. In order to achieve such effects, people need to make a habit out of saving electricity – how this is to be done without long-term economic incentives is still a question that remains largely unanswered.

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ARTICLE 2:

TRUST AND RISK PERCEPTION IN WESTERN EUROPE: A CROSS-NATIONAL STUDY

TRUST AND RISK PERCEPTION IN WESTERN EUROPE: A CROSS-NATIONAL STUDY[1]

Mattias Viklund
Center for Risk Research
Stockholm School of Economics

Submitted to *Risk Analysis*.

ABSTRACT

The relationship between trust and risk perception was investigated, within and across 4 European countries (Sweden, Spain, UK, and France). Survey data were collected in 1996; total number of respondents was approximately 1000 (UK and Spain), 1350 (France) and 2050 (Sweden). Trust was a significant predictor of perceived risk within countries, but the strength of the relationship varied from weak (Spain and France) to moderate (UK and Sweden). General trust was also a significant source of variation in perceived risk among countries, but much of the variation in perceived risk remained unexplained. Correlations between trust and risk perception also varied depending on type of risk (i.e., nuclear risks were more influenced by trust) and trust measure (i.e., general trust explained perceived risk better than specific trust). It is concluded that trust may be an element in models explaining risk perception, but it is not as powerful as often argued in the risk perception literature.

Keywords: trust, risk perception, cross-national, nuclear power.

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CONTENTS

INTRODUCTION

An issue currently very much debated in risk perception research is the relationship between trust and perceived risk. During the 1990s, several studies discussed the relationship, often by conceiving of perceived risk as an indicator of lack of acceptance of hazardous facilities. However, these studies have been criticized for lacking empirical data and for simply assuming a strong relationship (Sjöberg, 1999a). During the last year, the debate has been intensified (Siegrist, 2000; Siegrist & Cvetkovich, 2000; Siegrist, Cvetkovich & Roth, 2000, Sjöberg, 2001). In the present study, recent findings on the relationship between trust and risk perception are discussed and extensive data bearing on the issue from four European countries are presented. The main question is whether trust is an important determinant of risk perception within these countries and whether trust is a major variable when it comes to explaining the rather large differences in perceived risk among these countries. Data were collected within the European Union project RISKPERCOM and included survey responses from citizens of Sweden, France, Spain, and the United Kingdom.

The study of a possible relationship between trust and perceived risk from a cross-national perspective is interesting for several reasons. First, as pointed out by Sjöberg (1999a), earlier cross-national studies have suggested that the relationship is not as clear as one would expect. For example, while French citizens, as reported in a study by Poumadère (1995), were more trusting than Americans, they perceived risks as larger. This is a paradoxical result, since the common assumption in risk research is that higher levels of trust are associated with lower levels of perceived risk. Second, it is also important to increase the knowledge about the relationship between trust and risk perception outside the United States, where most studies on the issue so far have been conducted. Third, even though the countries investigated in the present paper are all from Western Europe, they differ in some respects.

Trust has emerged as an important concept in social science research during the last three decades, and in particular during the last decade. There are various reasons for interest in trust among social scientists. Luhmann (1979, 1988) and Giddens (1990) argue that the role of trust in reducing complexity and uncertainty has become more important in modern society, since technical and abstract systems have become more and more complex. These systems are only partially mastered even by experts, whom we have to trust without knowing in detail why and to what extent this is realistic. Another argument is that the societal interest in the concept of trust has grown, throughout the 1980s and into the 1990s, partly as a 'communitarian' response to the self-serving materialism of the Reagan and Bush era and as a return to social concern (Creed & Miles, 1996). A third reason for the growing interest in trust is most likely the

observation of a decrease in trust in societal institutions since the mid-1960s, although the extent of this decrease is debated.

Some argue that it is only possible to establish a downward trend (in the USA) for approximately a decade, between the mid-1960s and the mid-1970s (Kasperson, Golding & Kasperson, 1999), and it seems likely that different interpretations of trends depend on wording of survey questions and exact time of data collection. When it comes to European data on trust in institutions, the diversity is, naturally, even larger and it is hard to establish any universal trends in trust in societal institutions (for relatively new and extensive data on this issue, see Listhaug, 1995, and Listhaug & Wiberg, 1995).

As to the potential relationship between trust and risk perception, it seems to be clear that trust and risk are related on a conceptual level (e.g., Luhmann, 1979; Seligman, 1997). In fact, some scholars even argue that the act of trusting is equivalent to the act of taking a risk (e.g., Yamagishi, 2000). Most scholars, however, regard the trust concept as more complicated and multidimensional than that (e.g., Frewer, Howard, Hedderley & Shepherd, 1996), but, even so, there is little doubt that the concept of risk is closely related to trust. Interestingly, it seems as if risk is an antecedent of trust, which, in turn, is an antecedent of risk. According to Luhmann, (1979; 1988), trust presupposes a situation of risk and imperfect knowledge. In this situation, you have the choice to trust or not to trust. Trust is then conceptualized as an attitude that allows you to take risks. Thus, there has to be risk to be trust, but the less trust, the less willingness to take risks.

However, to establish a relationship on a conceptual level is not the same as showing that there is an empirical relationship between trust and risk. As noted above, research on trust and risk perception has been criticized for taking the issue of empirical evidence too lightly. Furthermore, conceptual risk taking is not equivalent to empirical risk perception. Risk perception is studied largely because it is assumed that it is driving policy concerns. This idea originated in the 1960s when perceived risk was implicated as a main determinant of public opposition to technology, most notably to nuclear technology, but other early examples can be given as well (Sjöberg, 1992a). The basic logic behind the study of the *perception* of risk is that people do not possess the perfect knowledge and rationality needed to be able to estimate real risks. Slovic (1987) argues that the mechanisms underlying complex chemical and nuclear technologies are unfamiliar and incomprehensible to most citizens. Thus, whereas technologically sophisticated analysts employ risk assessment to evaluate hazards, the majority of citizens rely on intuitive risk judgments, called "risk perceptions".

Real risk is thus only one of the determinants of perceived risk (Sjöberg, 1992b). Yet, no model has been completely successful in explaining perceived risk. The two models probably most well-known in risk perception research, the

psychometric model and Cultural Theory, have both been criticized in various ways.

The logic of the psychometric model is to refer to a number of risk characteristics (Fischhoff, Slovic, Lichtenstein, Read & Combs, 1978), such as voluntariness, dread, and novelty, of which perceived risk is assumed to be a function. The objective of the model is to explain why different hazards are perceived differently. In early papers, very high proportions of explained variance of perceived risk (above 80%) were cited in support of the model. However, these high levels of explanation occur only when average ratings are analyzed across hazards; such an analysis says nothing about individual variation in risk perception, nor about intra-individual perception processes. When individual data are used and each hazard is analyzed in a separate regression model, the proportion of explained variance is typically 20-25%, taken as an average over a set of hazards (Sjöberg, 1999b).

The objective of the Cultural Theory (Douglas & Wildavsky, 1982) is to explain why different people perceive the same hazard differently. It is assumed that different patterns of social relations and corresponding cultural biases (shared values and beliefs) combine to form different "ways of life". By selecting appropriate objects of worry, people strengthen their ways of life and attack other ways of life. The objects of concern vary, depending on which way of life is to be supported. Thus, depending on your way of life, you "choose" to perceive some risks as small and other risks as large. When tested with empirical data, scales based on the Cultural Theory usually account for a very low share (less than 5%) of the variance in perceived risk in European data (Sjöberg, 1999b).

Thus, there is a great need for research leading to other explanations of perceived risk. One possible explanation, which is in focus here, is that trust in those responsible for risk management (politicians, authorities, and corporations) could explain the variation in perceived risk. Research in the area has been especially intense when it comes to explaining perception of nuclear risks, in particular acceptance of hazardous waste facilities. Nuclear risks have a special place in risk perception research, perhaps because of the simple fact that people in general are concerned about nuclear power and related hazards. Adding to that the importance of nuclear power with regard to policy issues over the years, it is natural that nuclear power is an important topic in risk perception research.

EARLIER RESEARCH AND OBJECTIVES OF THE STUDY

The role of trust has often been attended to in case studies. It has, for example, been studied to what extent trust is important in the management of technological hazards. It is often argued that most of these studies indicate that

lack of trust is a crucial factor in explaining failures in the management of hazards (Slovic, 1993). The vast majority of hazards investigated relate to nuclear power and one area that has been extensively attended to is the (mostly unsuccessful) siting processes in the case of storing nuclear waste. One point of critique that has been raised, in relation to the topic of trust's importance for levels of perceived risk, is that the alleged importance of trust is often based on speculations rather than empirical data (Sjöberg, 1999a). The literature review below will not cover all studies on trust in a risk context, since similar reviews have been provided elsewhere (e.g., Slovic, 1993). It is nevertheless important to discuss some of the case studies, in order to illustrate in what areas trust historically has been considered to be important and how the results vary. As noted above, trust (or the lack thereof) has often been considered to be an important factor for the outcome of siting processes, in particular when it comes to storing nuclear waste. Bella, Mosher and Calvo (1988) argued that the failure of nuclear waste siting processes cannot be explained only by a lack of technological solutions to the problem of storing nuclear waste, but that people's trust in institutions of power, relevant in the siting process, plays an important role as well. However, the article is based on interviews with representatives of the parties involved in the process and could hardly be categorized as empirical evidence of a strong relationship between people's trust in institutions and how they perceive risks associated with nuclear waste storage. Rather, it should be treated as giving rise to different hypotheses concerning the relationship between trust and risk perception.

Flynn, Burns, Mertz and Slovic (1992) used structural modeling in order to test the relationship between trust and perceived risks and between trust and opposition to a high-level radioactive waste repository. They found a clear (negative) relationship between trust in repository management and perceived risk; it was also possible to see a substantial effect of trust on opposition to the repository, mediated by the effect of trust on perceived risk. Furthermore, Biel and Dahlstrand (1995) conducted a study, using a net survey sample of 1300 Swedes, living in four municipalities where nuclear waste storage could be possible in the future. They found a very strong negative relationship (correlation coefficient: -0.63) between trust in experts (in the field of treatment and deposition of high-level nuclear waste) and "risk judgment" (which was operationalized as the estimation of the total risk for humans and for Nature of a repository in bedrock in the respective municipalities). To my knowledge, this finding has not been replicated; it seems to be an outlier.

Not all studies on trust in a risk context replicate the findings of Flynn et al. (1992) and Biel and Dahlstrand (1995). Slovic (1993) stated that "numerous recent studies clearly point to the lack of trust as a critical factor underlying the divisive controversies that surround the management of technological hazards". As support for this claim he referred to 15 papers on the issue. Not all of them provide data, however. In some cases there is a matter of hypotheses and

speculations rather than results based on empirical data. For example, Laird's (1989) suggestion that declining deference might be an important explanation of failures of risk communication in cases of siting locally noxious facilities was not based on empirical data and the paper could thus only be treated as one of generating hypotheses. Moreover, Mitchell (1992) based his conclusion about a relationship between trust and perceived risk on hypothetical cases. In sum, some earlier research suggests that trust may be an important variable in explaining people's level of perceived risk and the outcome of siting processes, but the results are by no means unanimous and the research is not conclusive.

The debate during the last year, concerning the relationship between trust and risk perception, has given rise to a number of hypotheses that could help to explain the results that have been reported as well as to illustrate the complexity of the issue.

Siegrist (2000) tested a causal model in which trust was found to have an indirect influence on the acceptance of gene technology, by means of its negative effects on perceived risk of this technology. Furthermore, Siegrist et al. (2000) challenged Sjöberg's (1999a) results, which showed a rather weak relationship between trust and risk perception. They argued that Sjöberg's results were due to his use of a fairly general measure of trust and that a more domain-specific measure of trust would make the relationship much stronger. Sjöberg (2001) tested the effect on risk perception by a general trust measure as well as a specific trust measure. He found that specific trust indeed was more powerful than general trust in accounting for risk perception and related variables. However, he also found that the level of explanation that trust achieved was weak to moderate, regardless of which trust measure was used. His data suggested that the limited importance of trust might be due to the fact that people believe that there are clear limits to how much science and experts know, even though they can be trusted on the basis of being competent and honest.

Moreover, there are great differences in the strength of the relationship between trust and risk perception when different scales are used. Sjöberg (in press) found that attitude scale items yielded a much stronger relationship between trust and risk than the more traditional rating scales for these concepts. Traditional ratings include separate ratings of trust and risk items, by assigning numbers indicating perceived size of risk and level of trust. When Likert type items rather than the traditional ratings of trust and risk were used to measure trust and perceived risk, the common variance of these two dimensions doubled, from 15 to 30%. Finally, there is some variability in the strength of the relationship between trust and risk perception, depending on the type of risks investigated. Generally, the relationship is stronger for nuclear risks than for most other risks. One might speculate about the reasons for this variability. One possible explanation might be that levels of knowledge are important. Siegrist and Cvetkovich (2000) found a rather strong support for this hypothesis in

empirical data: the higher the levels of respondents' knowledge about the risk, the weaker the relationship between trust and risk perception. This finding was replicated by Sjöberg (in press).

To sum up, in the present study the relationship between trust and perceived risk is investigated within four countries in four European countries (Sweden, Spain, France, and the UK), as well as across these countries. The relationship will be tested on extensive data from each country, with survey responses concerning a large number of risks, with a particular focus on risks associated with nuclear power. A distinction is made between measures of general and specific trust, in order to test suggestions raised in earlier research, concerning variations in the strength of the relationship between trust and risk perception. Data regarding respondents' perception of own knowledge about risks will also be used to test whether this factor may contribute to an understanding of the dynamics underlying the relationship between trust and risk perception.

General trust and specific trust are measures of social trust, which means "trust in various groups in society" (e.g., people in general, corporations, and politicians). It is assumed that both general and specific trust generalize; that is, a person who trusts a given social agent is likely to trust also other social agents. There are two main differences between general and specific trust. First, general trust covers several aspects of trustworthiness (e.g., competence and honesty), whereas specific trust is limited to perceived ability to protect citizens against risks. Second, general trust covers several targets of trust (e.g., corporations and politicians), while specific trust is limited to authorities.

The main research question in the present study is, accordingly, whether trust is an important determinant of risk perception within the four countries and whether trust is a major variable when it comes to explaining the different levels of perceived risk among these countries. Related to this main research question are also a number of additional questions:

1. Which measure of trust (general or specific) is the more important determinant of perceived risk within countries?
2. Are there differences among countries concerning levels of trust and perceived risk as well as strength of the relationship between trust and risk perception?
3. Is the relationship between trust and risk perception stronger for nuclear risks than for other risks?
4. Which measure of trust (general or specific) accounts for more of the variation in perceived risk across countries?
5. Are the respondents' perceptions of own knowledge of different risks an important determinant of the strength of the relationship between trust and risk perception?

METHOD

In each of the participating countries, data were collected before, during, and after the tenth anniversary of the Chernobyl accident. The questionnaire was translated from English to other languages, and, basically, the same questionnaire was used for all three waves. The distribution and administration of the questionnaires differed somewhat across countries. For a more detailed description of this procedure in the respective countries, see Sjöberg et al. (2000).

The response rates were lower in France (45%) and in the UK (37%) than in Spain (66%) and in Sweden (57%), possibly due to somewhat different methods for the data gathering. In France and Spain, external survey companies collected data from a panel of respondents, whereas in Sweden and the UK, data were collected from a random selection of the population. There were no apparent differences in number of responses across the three waves. In the present study, mainly data collected in the third wave were used, since questions measuring general trust were included only in that wave. The number of respondents included in the present study ranged from approximately 250 (UK), through 500 (Spain), to 750 (Sweden). It was investigated whether the differences in response rates and number of respondents had any effects on the results. The Swedish sample was in this analysis reduced to the first third (that is, approximately 250 respondents) of the returned questionnaires. This sample was compared with the original Swedish sample, allowing an analysis of sample size as well as the possibility that the most committed (i.e., quickest to respond) respondents assessed levels of trust and risk differently, compared with less committed respondents. This approach was based on the assumption that samples in countries with lower response rates, for example the UK, consist of respondents who are somewhat more committed to and interested in the relevant issues than the rest of the population. The measured effects in this analysis were very small. The largest difference between the samples, in terms of strength of relationship between a trust dimension and a risk dimension, was one case where the amount of variance accounted for in perceived risk was almost 4% higher in the smaller sample. In the French questionnaire, the general trust scale was not included. Some questions were analyzed with data from all three waves. Here, data from the UK and Spain were based on answers from approximately 1000 respondents, respectively, while the number of respondents was higher in France (approximately 1350) and Sweden (approximately 2050). For details about the sample in each country, see Sjöberg et al. (2000). Generally, the sample was fairly well representative of the population in each country.

The questionnaires were very extensive. Here, only the questions relevant for the present study are discussed. The questionnaires consisted of approximately 30 pages. The general trust scale consisted of 42 items, which in earlier research (1) has been shown to form four trust dimensions: (1) belief in

general honesty, (2) belief in social harmony, (3) trust in politicians, and (4) trust in corporations. When considered as one factor, these items form a measure of general trust. The specific trust scale was constructed as an equivalent of the scale of perceived risks and included 19 items. Risk perception was measured using 8-point scales (which included 34 items) ranging from 0 (no risk at all) to 7 (a very large risk), as well as a possibility to answer "Don't know". The answers in the "Don't know" category were treated as missing values in the data analysis. Thus, specific trust was measured on an 8-point scale and it was based on the responses to the question: "How much do you trust the authorities in your country when it comes to protecting people against the following types of risks?" (19 risks included). Trust and perceived risk were, hence, only measured on traditional rating scales and the Likert scales that were previously discussed were not used. These were the most important variables, on which most of the analysis was carried out, but some other measures of trust and perceived risk were also analyzed. These were related to different means of producing energy, in particular nuclear power, and will be described further along with the presentation of results.

RESULTS

General Trust and Risk Perception Within Countries

Levels of perceived risk varied considerably among the participating countries.[2] An aggregated factor of perceived risk, based on estimations of the size of 34 different risks (to oneself and to others) on a scale from 1 to 7, was calculated, showing Swedes to perceive the risks as smallest (M = 3.01, SD = 0.94, N = 741), followed by respondents living in the UK (M = 3.22, SD = 1.07, N = 260), Spain (M = 4.12, SD = 1.36, N = 493), and France (M = 4.49, SD = 1.16, N = 593). The differences in mean among the countries were all significant on a $p < 0.05$ level (no overlapping between confidence intervals for each estimate, with 95% certainty). When levels of perceived risk were calculated in terms of personal risks and general risks on one hand, and in terms of nuclear radiation risks, non-nuclear radiation risks, and other risks on the other hand, the tendency was the same: people in Sweden and the UK perceived risks as smaller than people in France and Spain. The respondents were, however, very similar in their demand on authorities to mitigate risks.

[2] Results in this chapter are based on data collected in wave 3, except for results presented under the heading "The case of nuclear risks", which are based on data from all 3 waves. The reason for this is that questions about general trust were only asked in the third wave, and to enable comparisons between different measures, we used data collected in this wave.

The concept of general trust consists of four dimensions, but the questions indicating general trust were not included in the French questionnaire, thus leaving us with an analysis of general trust and perceived risk for the cases of Sweden, Spain and the UK. Correlations (Pearson's r) among the four general trust dimensions in the present study were between 0.50 and 0.70, as was also the case in Sjöberg's paper (1999a), which should be an indication of low risk for multicollinearity. As can be seen in table 1, it is clear that levels of general trust were somewhat higher in Sweden than in the UK, and levels of general trust were higher in the UK than in Spain. This is true for all dimensions of general trust, as well as for the aggregated (mean) factor of general trust.

Table 1
Means of General Trust, as an Aggregated Factor and as Four Sub-Dimensions, in Sweden, UK, and Spain

Variable	Sweden		UK		Spain	
	M	*SD*	*M*	*SD*	*M*	*SD*
General trust	2.73	0.52	2.55	0.48	2.42	0.40
Trust in corporations	2.59	0.69	2.37	0.59	2.27	0.50
Belief in social harmony	2.70	0.58	2.42	0.54	2.29	0.53
Belief in general honesty	2.83	0.55	2.74	0.50	2.50	0.51
Trust in politicians	2.71	0.64	2.53	0.63	2.52	0.48

Note. The number of respondents was 732 (Sweden), 258 (UK) and 489 (Spain). The differences in average general trust among the countries were all significant on a $p < 0.01$ level.

The results presented in Table 1 suggest that there is a linear (negative) relationship between general trust and perceived risk, since the variation is quite evident and consistent (the lower the trust, the higher the perceived risk). An aggregated factor of perceived risk was constructed, by calculating a mean for each individual, including all items measuring perceived personal and general risk (demand for risk mitigation was not included). Cronbach's alpha was well over 0.90 for all countries. It was found that the relationship between aggregated general trust and aggregated risk within the three countries varied in strength. The correlation in the UK was -0.45 ($p < 0.0005$), while it was lower in Sweden (-0.33, $p < 0.0005$) and in Spain (-0.23, $p < 0.0005$).

The relationship was also investigated by using different measures, or levels, of perceived risk (i.e., personal risks, general risks, and demand for risk mitigation, which in turn were divided into nuclear radiation risks, non-nuclear radiation risks, and other risks). The relationship was on the whole on similar levels for various categories of risks. The concept "demand for risk mitigation" is interesting in a policy attitude perspective, since it gives an idea not only about how people perceive risks, but also about what importance (for themselves as well as for society at large) they assign to these risks. However,

the correlations among different dimensions of general trust and demand for mitigation of different risks were rather low; close to zero in Sweden and Spain and somewhat higher in the UK (approximately 0.20).

Which of the four trust dimensions was most important in explaining perceived risk? The correlations between the different measures of trust and perceived risk revealed few clear and consistent patterns, although in Sweden "trust in corporations" emerged as more important than other dimensions (correlations with perceived risk were mostly above 0.3, compared with levels of approximately 0.20 for the other dimensions). Moreover, there were no clear and consistent patterns as to the question of which risks were most influenced by general trust. Rather, the general conclusion from the discussion about general trust and risk perception within countries is that the relationship was significant in the UK, Sweden, and Spain, but its strength was low in Spain, and moderate at its best in Sweden. In the UK, general trust accounted for approximately 20% of the variance in perceived risk, which indicates an important relationship; still, however, much of risk perception remained unexplained even there.

Specific Trust and Risk Perception Within Countries

The specific trust measure is based on the question: "How much do you trust the authorities in your country when it comes to protecting people against the following types of risks?". In Table 2, it can be seen that one consistent pattern when it comes to levels of specific trust is that these levels are highest in Sweden (aggregated trust as well as trust in authorities' protection against nuclear radiation risks, non-nuclear radiation risks, and other risks, respectively). In France, Spain, and the UK, levels of specific trust were on similar levels.

Once again, the described pattern should indicate a linear (negative) relationship between trust and risk perception, since levels of perceived risk were lowest in Sweden. The relationship is not as easily interpreted, however, as in the case of general trust. For example, in a case of a perfectly linear relationship, we would expect levels of specific trust to be higher in the UK than in France and Spain. The results show that levels of specific trust were actually the lowest in the UK, even though the differences compared to Spain and France were very small.

Table 2
Means of Specific Trust, as an Aggregated Factor and as Trust in Authorities' Protection against Nuclear Radiation Risks, Non-Nuclear Radiation Risks, and Other Risks, respectively, in Sweden, UK, France, and Spain

Variable	Sweden		UK		France		Spain	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Specific trust	3.12	1.23	2.58	1.30	2.73	1.29	2.80	1.19
Trust, nuclear risks	2.94	1.48	2.35	1.55	2.45	1.65	2.35	1.49
Trust, radiation risks	3.11	1.31	2.64	1.36	2.75	1.40	2.83	1.31
Trust, other risks	3.28	1.20	2.73	1.27	2.95	1.23	3.12	1.15

Note. The number of French respondents were 585, to be compared with earlier reported numbers for the other countries. The difference in average specific trust between Sweden and the other countries was the only significant difference ($p < 0.005$) as to levels of specific trust.

When looking at the relationship between specific trust and perceived risk (aggregated factors) within each country, the pattern from the case of general trust was confirmed, although the relationships, interestingly, were somewhat weaker in the case of specific trust.[3] Correlations were -0.32, -0.23, and -0.17, in the UK, Sweden, and France, respectively, while there was a zero relationship in Spain. The reported correlations were significant on a $p < 0.0005$ level. The means of aggregated risk, which included 38 risk items (19 risks to oneself and 19 risks to others), were very similar to the earlier reported means of aggregated perceived risk and will not be presented here.

When looking at the relationship between specific trust and perceived risk by using measures that distinguish between on the one hand personal and general risks and on the other hand nuclear radiation, non-nuclear radiation, and other risks, the differences were very small and negligible in the first case (personal versus general risks). When it came to correlations between different dimensions of specific trust (related to the three categories of risks) and demand for mitigation of different risks (also divided into three categories), the connection was weak. As in the case of general trust, correlations were approximately 0.20 in the UK, but close to zero in Sweden, Spain, and France. In the second case, an interesting finding was that (in France and Sweden) trust in authorities' ability to protect against nuclear risks was by far the most important predictor of people's perceptions of risks – especially their perception of nuclear risks, but also their perception of other risks.

[3] It was tested whether this was the result of specific trust functioning as a so-called suppressor variable (Horst, 1966). That is, specific trust is only slightly correlated with perceived risk, but still increases the amount of variance in perceived risk accounted for, when included in a multiple regression analysis with general trust as the other predictor of perceived risk. It was found, however, that specific trust did not operate in this manner.

The relationship between specific trust and personal risk was clearly most important when it came to nuclear risks in Sweden (specific trust accounted for 12% of the variance in perception of nuclear risks, compared with 3% and 2% for perception of non-nuclear radiation risks and other risks, respectively) and France (9% versus 2% and nothing). In the UK, there was a somewhat different tendency: specific trust accounted for 8% of the variance in perception of nuclear risks, compared with 3% of the variance in non-nuclear radiation risks and as much as 12% in the case of non-radiation risks.

The analysis performed by Siegrist and Cvetkovich (2000), regarding effects of self-reported knowledge on the strength of the relationship between trust and perceived risk, was here repeated for each country. To enable a comparison, only data on general risks were used. The relationships were not, however, in any case as strong as the ones reported by Siegrist and Cvetkovich, although the tendency was there. Besides the aspect of self-reported knowledge, it is also interesting to note that the relationship was particularly strong for risks associated with nuclear power.[4]

The Case of Nuclear Risks

Here, the specific case of nuclear risks is further examined. Data are also presented, from all three waves, about trust in authorities and perceptions of nuclear security, divided on different authorities.

First, correlations between trust in different authorities' competence in case of a nuclear accident and perceptions of nuclear security in several countries were calculated (see Table 3 below). People's perceptions of nuclear security can be conceived of as relatively proximal to perceptions of risks associated with nuclear power.

[4] Correlations for each country can be obtained, upon request, from the author.

Table 3
Correlations between Trust in Different Authorities' Competence in Case of a Nuclear Accident and Perceptions of Nuclear Security in Home Country (Pearson's r)

Authority	France	UK	Spain	Sweden
National government	0.11**	0.65**	0.43**	0.39**
Local/Regional government	0.06*	0.50**	0.41**	0.38**
Municipality	0.02	-	0.35**	0.34**
National radiological protection authority	0.15**	0.60**	0.38**	0.51**
Domestic atomic energy authority	0.14**	0.60**	-	0.55**
National health authority	0.10**	0.50**	0.30**	0.31**
Local health facilities	0.10**	0.45**	0.23**	0.29**

Note. The approximate numbers of respondents were 1300-1400 (France), 950 (UK and Spain), and 2000-2100 (Sweden). Here we only present the correlations pertaining to people's perception of nuclear security in their own country.
* $p < 0.05$. ** $p < 0.0005$.

The table presents rather clear patterns as to differences among countries. The relationship between trust and perceptions of nuclear security was very strong in the UK and also fairly strong within Sweden and Spain. In order to get a clearer picture of the amount of variance in perceptions of nuclear security explained by trust in the different authorities, and also to establish what authority is most important for perceptions of nuclear security, a regression analysis was performed.

It was shown that the amount of variance explained was 41% in the UK (major predictor was clearly trust in the competence of the national government, $\beta = 0.37$),[5] in Sweden it was 28% (major predictor: the domestic atomic energy authority, $\beta = 0.37$), and in Spain it was 14% (no outstanding predictor, but highest β for national government, 0.19).

A similar analysis, involving the prediction of perceptions of nuclear security, was performed with the focus on respondents' trust in authorities' information in case of a nuclear accident. A general result was that trust in information was not as important for perceptions of nuclear security as trust in competence was. No variance could be accounted for, in the cases of Sweden and Spain. In the UK, the relationship was strong, however, with 33% of the

[5] That is, SKI, the Swedish Nuclear Power Inspectorate.

variance accounted for (trust in national government's information was the most important predictor), and the corresponding figure for France was 13%.

Finally, correlations between trust in authorities' competence (in case of a nuclear accident) and perceived risks of nuclear power were calculated.[6] In France and Spain, the correlations were very low, while 11% of the variance was accounted for in both the UK (equally strong predictors were trust in the national government, β = 0.20, and trust in the domestic atomic energy authority, β = 0.19) and Sweden (major predictor was clearly trust in the domestic atomic energy authority, β = 0.31).

Trust as Source of Variation in Perceived Risk Among Countries

Measures of general and specific trust were compared with respect to their ability to account for variation in perceived risk among countries. Aggregated factors of general trust (M = 2.60, SD = 0.49) and specific trust (M = 2.87, SD = 1.26) were computed, which included all items of general trust and specific trust, respectively, in the relevant countries. An aggregated factor of perceived risk, including 38 items of perceived risk (personal and general risk) in the relevant countries, was also computed (M = 3.41, SD = 1.22). When both general trust and specific trust were entered together with country variables (Spain, Sweden, and the UK) into a multiple regression analysis on perceived risk, it was shown that specific trust was not significant in explaining the variation in perceived risk among countries. All other explanatory variables were significant predictors ($p < 0.0005$) of perceived risk in this regression equation ($R^2_{adj} = 0.206$). The correlation between specific trust and perceived risk (Pearson's r: -0.18, $p < 0.0005$) thus seemed to be a consequence of the fact that specific and general trust had some common variance (Pearson's r between general and specific trust in the total data set was 0.41, $p < 0.0005$). It should be mentioned that the correlation between aggregated general trust and aggregated risk (-0.37, $p < 0.0005$) indicates a moderately strong relationship between trust and perceived risk.

The correlation between specific trust and perceived risk was thus a consequence of the relationship between general and specific trust and, even so, the correlation was quite low. It can, for example, be mentioned that the large differences in levels of perceived risk between on one hand France and Spain and on the other hand Sweden and the UK persisted at all levels (0 – 7) of specific trust. In fact, the most trusting respondents in Spain and France (specific trust = 7) perceived risks as higher than the least trusting respondents in Sweden. When it came to general trust, Spanish respondents perceived risks

[6] Correlations between trust and perceived risks of other energy systems (e.g., hydro power and coal power) were zero or close to zero.

(measure based on all risks) as higher than Swedish respondents did at all levels of trust (1 – 5). As can be seen in Figure 1, however, the least trusting respondents in the UK perceived risks as higher than the least trusting respondents in Sweden did, but the most trusting respondents in the UK perceived risks as lower than the equivalent category of respondents in Sweden did. This is due to the fact that levels of perceived risk were more sensitive to changes in trust in the UK than in Sweden.

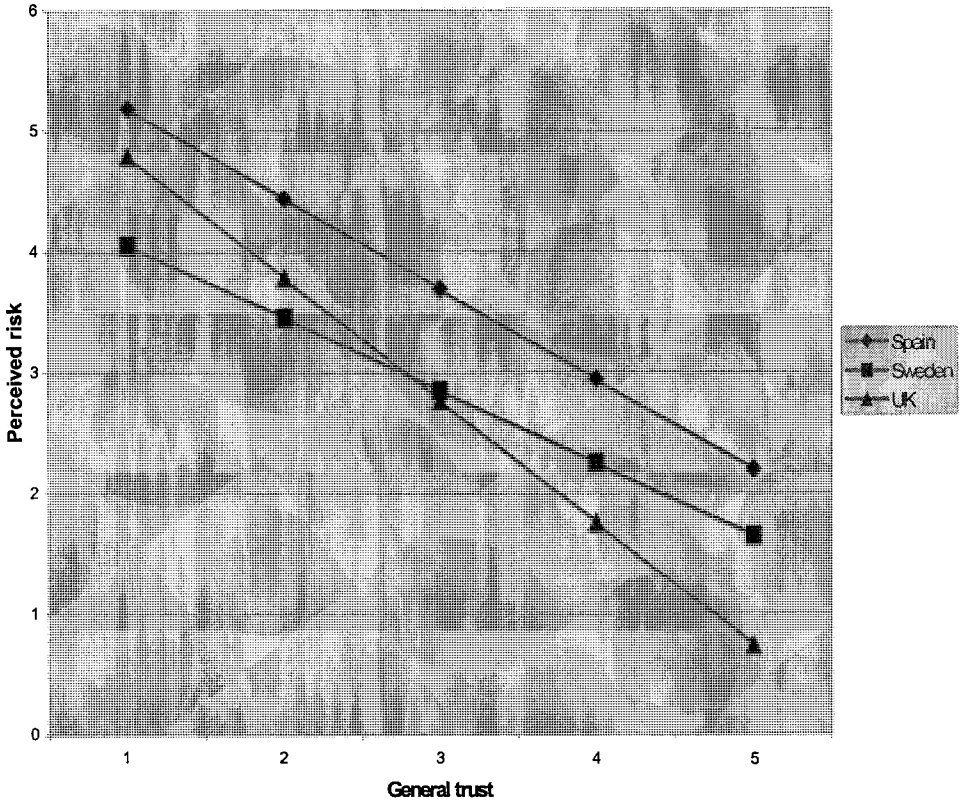

*Figure 1.*General trust and perceived risk across countries.

Summing up, general trust was significant in accounting for variation in perceived risk across countries. There was, however, a clear variation in perceived risk among countries even when trust was held constant.

DISCUSSION

The present study has contributed to making the picture of the relationship between trust and risk perception more complete and possibly more balanced. It was found that trust was a significant source of variation in perceived risk among the countries studied and it was also a significant predictor of levels of perceived risk within most countries. However, the strength of the relationship varied to quite a large extent. In some countries (especially the UK) trust was a very important variable in explaining perceived risk, while its contribution was close to negligible in other countries (i.e., Spain and France). Furthermore, the strength of the relationship was dependent on type of risk, with nuclear risks more affected by trust than other risks. Finally, although general trust was a significant source of variation in perceived risk across countries, most of the variation remained unexplained.

The first of the specific research questions was formulated as: "Which measure of trust (general or specific) is the more important determinant of perceived risk within countries?" When comparing correlations between aggregated measures of general trust and perceived risk on one hand and between aggregated specific trust and perceived risk on the other hand, the tendency was clearly that general trust was more correlated with perceived risk. Correlation sizes decreased approximately 0.1 in Sweden and the UK and 0.2 in Spain, when general trust was substituted by specific trust. Further research is needed to clarify these surprising results.

A possibility is that the scope of specific trust was too limited. Here, specific trust only measured respondents' trust in authorities, thus excluding possibly important actors, such as corporations. Moreover, specific trust was limited to authorities' *ability* to protect against risks. Specific trust accounted for some of the variance in perceived risk, which could be due to the semantic overlap between the variables. General trust's more potent predictive ability could thus be explained by the fact that this factor covered trust in several possibly important actors, such as corporations. Finally, general trust was not reduced to trust in the competence of these actors; dimensions indicating morality (or lack thereof) were also included.

The second research question – "Are there differences between countries concerning levels of trust and perceived risk as well as strength of the relationship between trust and risk perception?" – has been discussed previously. There were important differences among countries in this respect. Generally, one could say that the relationship between trust and risk perception was stronger in countries where levels of trust are higher and levels of perceived risk were lower (i.e., Sweden and the UK). Below, there is a discussion about possible reasons for why trust was more important for perceived risk in some countries and also why the strength of the relationship was partially dependent on the type of risk studied.

The third research question is concerned with how different risks are affected by trust in different ways. It was found that the relationship between trust and perceived risk was generally stronger for nuclear risks than for other types of risks. It was also shown that *proximity* (or semantic overlap) is an important factor. The closer in meaning the independent variable (trust) and the dependent variable (perceived risk) are to each other, the stronger the relationship (c.f., Sjöberg, 1980). For example, correlations were higher when trust was formulated as "trust in authorities' competence in case of a nuclear accident" and perceived risk was formulated as "perception of nuclear security".

One example of the importance of risks associated with nuclear power compared with other types of risks, was that trust in authorities' ability to protect against nuclear risks was clearly the most important predictor of the perception of *all* types of risks (that is, not only perception of nuclear risks). This was the case for France and Spain, but not for the UK. Related to this finding is also the finding that different authorities were important in different countries, when it came to the strength of the relationship between trust and risk perception. In Sweden and France, trust in the domestic atomic energy authority was the dominant predictor of perceived risk, while the national government played that role in the UK.

The fourth research question was formulated as: "Which measure of trust (general or specific) accounts for more of the variation in perceived risk across countries?" The tendency from the within-country analysis persisted, as general trust clearly was a more potent predictor of variation in risk than specific trust was.

The final research question regards whether respondents' perceptions of their knowledge about different risks are an important determinant of the strength of the relationship between trust and risk perception. The tendency of higher correlations between trust and perceived risk when levels of self-reported knowledge were low was replicated in the present study, although it was weaker and also varied in strength depending on country. One interesting aspect of this relationship was that it was higher for nuclear risks than for most other risks. The average level of knowledge about nuclear risks was low and the correlations between trust in authorities' ability to protect against nuclear risks and perceived nuclear risks were high. Thus, the special importance of nuclear risks in the relationship between trust and risk perception is at least partly due to people's low levels of knowledge about these risks. When people lack knowledge, they must rely on risk judgments made by experts and risk management authorities to a larger extent. However, it is likely that the special importance of nuclear power is due to other factors as well. After all, the effect of knowledge was moderate for other risks, thus it is unreasonable to expect it to explain everything in the case of nuclear risks. Furthermore, the special role played by nuclear risks is not restricted to research on trust. Models of risk are often more powerful when dealing with nuclear risks than with other risks

(Sjöberg, in press). One might speculate that people's risk judgments when it comes to other risks are more like general attitudes, influenced by many different idiosyncratic factors. This could, in turn, make it harder to use empirical data on these risk judgments to test models based on theoretical assumptions about the nature of risk. Another possible reason to why attitudes to a technology such as nuclear power are particularly easy to explain with the construct of perceived risk could be that the technology is so often discussed in media that most people perceive it along similar dimensions. This does not, of course, mean that they perceive the risks as similar; in fact, the variations are often great.

The importance of knowledge could possibly explain part of the effect country had on the relationship between trust and risk perception. It is possible that the relationship was weaker in France and Spain because respondents in these countries reported higher levels of knowledge than in Sweden and the UK, thus less need to trust authorities. The differences in levels of self-reported knowledge among countries did not, in general, support this hypothesis. One interesting difference was found to exist between respondents from Spain and the UK, since Spanish respondents reported significantly better knowledge of risks than respondents from the UK did. However, it was also found that the relationship between levels of knowledge, on one hand, and correlations between trust and perceived risk, on the other hand, was weakest in these two countries. Further research is needed to explore why the importance of trust as a predictor of perceived risk differs greatly among countries.

Another aspect of knowledge than respondents' own knowledge is their perceptions of experts' and risk managers' knowledge. It has been shown that the fact that trust only has a moderately strong effect on perceived risk might be related to perceptions of experts' knowledge, or, more important, *limited* knowledge. This possibility needs to be considered in future research.

Thus, there is hardly a universally strong and important relationship between trust and perceived risk. The relationship is, however, in most cases significant and trust could be an interesting element in models of risk perception, but those expecting to find the key solution to risk policy problems in the concept of trust will be disappointed.

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ARTICLE 3:

AN EXPECTANCY-VALUE APPROACH TO DETERMINANTS OF TRUST

AN EXPECTANCY-VALUE APPROACH TO DETERMINANTS OF TRUST

Mattias Viklund
Center for Risk Research
Stockholm School of Economics

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ABSTRACT

An Expectancy-Value model was used to test various attributes of trustworthiness, as determinants of people's trust in 5 Swedish organizations (public and commercial). Trust was conceptualized as an attitude, dependent on respondents' beliefs about and evaluations of the organization with respect to these attributes. A survey was sent out to a sample representative of the Swedish population (response rate: 55.5%; $N = 347$). It was found that the Expectancy-Value Model was powerful in explaining trust in 3 organizations. However, it was also found that a model including only values as predictors of trust was more powerful in explaining trust in 2 organizations: the Swedish Government and advertising firms. The phenomenon of double denial (Sjöberg & Montgomery, 1999) was very strong, which could be an important explanation of these findings. It is discussed whether double denial could be caused by trust ratings based on ideologies (e.g., political or general anti-business) subscribed to and emotional reactions, rather than analytical evaluations of an organization.

Keywords: trust, attitude, organizations, expectancy-value

CONTENTS

INTRODUCTION

It is generally assumed that trust is associated with a multitude of benefits. Social theorists have argued that, for individuals, trust is necessary to be able to handle the increasing complexity and uncertainty of modern society (Giddens, 1990; Luhmann, 1979; 1988). Scholars active in the field of organizational behavior have identified a large number of possible benefits of trust, for commercial as well as non-commercial organizations (for a review, see Kramer, 1999). However, despite of the growing interest in research on trust, there is still low consensus as to the meaning of trust and its antecedents (McKnight & Chervany, 1996). Thus, there is a need to further examine the concept of trust and the determinants of people's trust in organizations. In the present article, an Expectancy-Value model (based on a conception of trust as an attitude) was used to test various attributes, which have been proposed as determinants of people's trust in an organization.

There are several reasons for using this approach when studying determinants of trust in organizations. First, as noted above, there is a lack of consensus among trust researchers on how to define and measure trust. The Expectancy-Value model is an established approach in attitude research and may help to clarify the concept of trust, especially if it is tested on empirical data. Second, the model allows for an estimate of the amount of variance accounted for by what could be conceived of as a latent construct of perceived trustworthiness. It is important to here note that the use of the term trustworthiness in the present study is based on previous research where trustworthiness is described as an attribute of individual parties. A trustworthy organization is one that possesses certain qualities that merit trust (Sanner, 1997). Third, the model gives a possibility to determine different attributes' relative impact on trust. Fourth, although earlier studies have been able to identify the impact on trust, caused by beliefs about attributes (e.g., Peters, Covello & McCallum, 1997), no studies have combined beliefs with values, as postulated by the Expectancy-Value model.

As indicated above, previous studies have concentrated on the determinants of trust. Frewer, Howard, Hedderley, and Shepherd (1996) investigated determinants of trust in information about food risks and found that trust is a multidimensional concept; people do not trust information solely on the basis of perceptions of expertise and knowledge of the information source. Kasperson, Golding and Tuler (1992) also reported research on determinants of trust. Four dimensions of trust were identified: (1) Commitment to a goal (which in turn is based on perceptions of objectivity, fairness, and information accuracy), (2) Competence, (3) Caring, and (4) Predictability. Metlay (1999), partly building on these results, further investigated dimensions of trust in a risk context. Credibility and fairness, besides the factors mentioned above, were considered important dimensions of trust and it was found that these factors

were strongly related to trust and confidence in the Department of Energy in the USA.

One common feature of research on dimensions of trust in a risk context is that trust is based on perceptions or beliefs about whether an organization possesses a certain attribute. This is also the case with another important article on trust (Peters et al., 1997). Here, it was found that perceptions of trust and credibility in a context of environmental risk communication were dependent on three factors: perceptions of knowledge and expertise; perceptions of openness and honesty; and perceptions of concern and care. In the present study, it was tested whether trust is a function of (1) perceptions of different qualities of organizations, and (2) evaluations of how desirable these qualities actually are. Even though it might seem like common sense that, for example, honesty and competence are good organizational qualities, it is not evident to what extent, and whether there are differences between such desirable qualities.

One model that allows for an inclusion of both beliefs/perceptions and evaluations is the Expectancy-Value model, originally developed by Fishbein and Ajzen (1975), resting on the assumption that an attitude towards an object is dependent on beliefs about the properties of that object as well as evaluations of these properties (i.e., whether it is good or bad that the object is associated with the properties). The model is formulated as an equation:

$$A = \Sigma bV.$$

In this equation, b is the belief that the object has a certain property and V the value of that property. Summation is across all salient properties of the object. According to Sjöberg (1999a), a successful application of the Fishbein model may involve up to 40% explained variance of attitude (here: trust in an organization), but a more typical value would be some 25% explained variance. For an excellent and detailed review of attitude research, see Eagly and Chaiken (1998).

In the present study, the Expectancy-Value Model was applied to study determinants of trust in organizations. The basic design was to use people's ratings of trust in five different organizations as dependent variables, representing the observed trust attitude towards each organization, respectively. The independent variables were people's beliefs about whether the organizations have certain attributes and also people's evaluations of these attributes (i.e., if it is good or bad that the organization has a certain attribute). By applying an Expectancy-Value model, through summing all products between belief and value for each attribute, a predicted (or expected) trust attitude towards each organization was calculated. The higher the correlation between predicted and observed trust attitude, the better the model.

The relation between predicted attitude and observed attitude was the main element in the fit of the hypothesized model that was examined in the present

study. The hypothesized model consisted of two independent variables and one dependent variable (Figure 1). If the correlation between predicted attitude (independent variable) and observed attitude (dependent variable) is high for each organization, it is probable that observed trust attitude is in fact, to a large extent, dependent on people's beliefs and evaluations of different attributes of that organization. However, it is also important to make sure that observed trust attitude is indeed a measure of trust. Therefore, it was also hypothesized that general interpersonal trust (measured by the dichotomous question "Do you think that most people can be trusted or that one cannot be too careful when dealing with strangers?") determines observed trust. If significant correlations between interpersonal trust (that is, the second independent variable in the model) and observed trust in organizations can be distinguished, it can be considered likely that these measures have some common "trust" property.

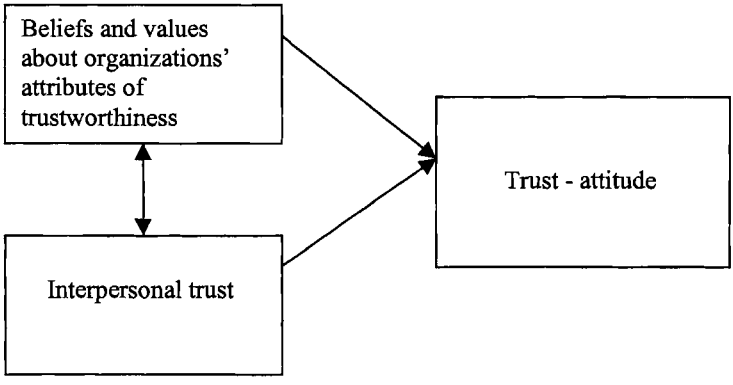

Figure 1. Hypothesized model of determinants of trust in organizations

The five organizations that the respondents were asked to evaluate in different respects were:

- The Swedish Government
- Swedish advertising firms
- Swedish e-commerce companies
- The Swedish Nuclear Power Inspectorate (SKI)
- The Swedish Trade Union Confederation (LO)

There are several reasons why these five organizations were chosen. It was considered necessary to select a variety of organizations, for example commercial versus non-commercial organizations, in order to be able to generalize the results. All these organizations were also seen as relevant to individuals, in different respects. Many people are organized in unions in

Sweden and there are many possibilities for people who put high trust or low trust in these unions to affect the unions. One obvious way people can demonstrate their opinion is by being members of a union or not. Further, apart from organizing many people, the unions have considerable political power in Sweden, a phenomenon often referred to as corporativism (Bäck & Möller, 1990). The Swedish Trade Union Confederation will henceforth be referred to as the Workers' Union, as it organizes workers in Sweden.

The Government is an obvious selection when it comes to important policy-makers. Energy policy and the management of nuclear power are important issues to Swedes, thus making it interesting to incorporate the Nuclear Power Inspectorate.[1] When it comes to commercial organizations, distrusting consumers usually have the choice to show their opinion by simply not buying products offered by the particular organization. This is the case for e-commerce companies, which are interesting to study due to both the obvious element of risk in the business transaction and the fact that these are fairly new actors on the market. The impact of advertising firms is usually less easy to avoid; in modern society it is hardly possible to escape all forms of advertising. Trust in advertising firms is also interesting to study based on the fact that they often handle the communication from commercial organizations to individuals.

In total, there were eleven attributes to evaluate. All attributes listed below were hypothesized to correlate positively with high trust, except for "acting in self-interest" and "part of a power elite".[2]

- Competence
- Efficiency
- Commitment to a goal
- Part of a power elite
- Openness
- Consistency
- Honesty
- Credibility (promise-keeping)
- Fairness
- Concern/care
- Acting in self-interest

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[1] I have unpublished data indicating that trust in the Nuclear Power Inspectorate is more important in explaining levels of perceived risk than trust in any other organization studied (e.g., national governments and radiological protection authorities), often not only in the case of nuclear risks, but also when it comes to non-nuclear radiation risks and other risks.

[2] It was not hypothesized that there would be a negative correlation between trust and "being part of a power elite" in the case of the Government. It is probably an accepted fact that the Government has much power in society.

Most of these attributes have been mentioned above. It is important to note that different authors have interpreted some of these concepts differently. For example, according to Metlay (1999), low credibility in an organization is equivalent to its acting on perceived self-interest. Lipset and Schneider (1983) argued that credibility is largely a function of perceived self-interest, but the two concepts are not the same thing according to them. Here, it is argued that credibility rather should be defined as "A person is credible if he or she does what he or she says he or she will do", in accordance with Stack's (1978) interpretation. Hence the dimension of credibility (in the questionnaire operationalized as "promise-keeping") is included, with a different meaning than that suggested by Metlay. Perceived self-interest is also included as an attribute of trustworthiness.

Another note regards the consistency attribute. This attribute is interpreted as being similar to predictability. It should be noted, though, that the concepts are not entirely identical (Kasperson et al., 1992). Consistency is not always desirable, since it may lead to bad decisions, perhaps due to a lack of flexibility. However, consistent is the best term to use in Swedish questionnaires ("konsekvent") and it is probable that people mainly perceive it as being non-arbitrary. Efficiency is an attribute related to competence, but it is not its equivalent. According to Lipset and Schneider (1983), institutions regarded as efficient are generally more trusted than institutions regarded as inefficient. Finally, one important result reported by Lipset and Schneider was that people do not trust institutions which are regarded as part of a power establishment. Thus, concentration of power (operationalized as the belief that an organization is part of the power elite in Sweden) is one attribute of possible importance for people's levels of trust in an organization.

Summing up, two main questions were asked in the present study:

1. Is the suggested model supported by data? That is, is there a high correlation between predicted and observed trust attitude, and is there a substantial correlation between interpersonal trust and observed trust?
2. What attributes are the most important determinants of trust? That is, what attributes are most correlated with observed trust, and are there any differences between beliefs and values when it comes to the strength of the relationship with observed trust?'

METHOD

Pre-test of the Questionnaire

A mail survey was used as means of collecting data. Because the Expectancy-Value model had not previously been used in attempts to explain trust ratings, it was decided that the approach would be pre-tested in order to determine if the method had potential to yield interesting results. Other aspects of the questionnaire were also tested, such as formulations of questions, layout, and organizations and attributes to be included.

A first version of the questionnaire was developed, which was evaluated by approximately ten colleagues at the Center for Risk Research and Section for Economic Psychology, Stockholm School of Economics. The changes that were made after this first evaluation mainly pertained to layout. The new version of the questionnaire was then distributed to 20 persons, a mix between colleagues, students at the school and friends. The final step was to conduct interviews with some of the people who had completed the questionnaire. Six respondents were asked about their thoughts on the concept of trust, reasons for why they trust someone or something, their thoughts behind their ratings of trust in organizations, and general thoughts about the questionnaire. Furthermore, two people who had not completed the questionnaire were interviewed, by means of the think-aloud technique. These two persons filled out the questionnaire as they were observed; before the interview they were instructed to talk out loud, as much as possible, what they were thinking as they filled out the questionnaire. When appropriate, respondents were asked to clarify or to specify what they were thinking. The results from these interviews were very satisfying and resulted in many constructive proposals and ideas. In this stage, the final organizations to be included in the questionnaire were chosen. One attribute (commitment to a goal) was also added to the list of possible attributes of trustworthiness. This inclusion was a result of the fact that many respondents stated that a main reason for them to trust an organization was that "they are trying to do their best". By using "commitment to a goal", the purpose was to catch this reason. "Commitment to a goal" is assumed to signal ambition and intentions to carry out work in the best way possible. The questionnaire was also simplified and made easier to understand for respondents as a consequence of the interviews (for example, a clarifying text about Internet and e-commerce firms in the questionnaire was included). Some items in the questionnaire were also reformulated (both new items and items from earlier used scales), in order to make them easier to understand.

Questionnaire

The final version of the questionnaire was quite extensive and the respondents were asked to answer a total of 245 items on 33 pages. The following variables were included and analyzed in the present study:

1. Items regarding beliefs and values about the eleven attributes of trustworthiness of each organization
2. A dichotomous question measuring interpersonal trust
3. Trust ratings for each organization
4. Self-reported knowledge of each organization
5. Personal experience of each organization
6. A scale measuring general trust, developed by Rotter (1967)
7. A scale measuring general trust, developed by Sjöberg (1999b)
8. A scale measuring general trust, developed for the present study, with a focus on behaviors thought to represent high or low trust
9. Demographic variables

Sample Procedures and Data Collection

A sample of 750 respondents was bought from SPAR (Statens Person- och Adressregister).[3] This sample included respondents in the age range 20–75, but some people had turned 76 when they responded to the questionnaire. A fairly large proportion of the respondents was excluded from the sample because the address had been wrong, and the net sample finally consisted of 625 respondents. The purpose was to work with a sample representative of the population. Based on the sample distribution of some important demographic variables (e.g., level of education, sex, and age), the purpose was achieved, since the numbers were similar to those reported for the population as a whole. However, the average level of education was somewhat higher for the sample, which is often the case in these types of surveys. As to the statistical possibilities of representativity of a sample of this size, it has been shown that such samples can be basically as representative of large populations as larger samples (Viklund, 1999).

The questionnaires were sent out in March 2001 and after three reminders 347 respondents had completed and returned the questionnaire, yielding a response rate of 55.5%. A while after the completion of the survey process, a subsample of 20 non-respondents was also interviewed over the phone to check

[3] SPAR is an official register that includes basic data about Swedish citizens and people living in Sweden. It is among other things used to produce samples, e.g., for research and direct advertising.

their similarity with the attitudes of the respondents on a few of the questions. The telephone interviews showed that the non-respondents had very similar views to the respondents. One difference was, however, that e-commerce firms were less trusted among the respondents in the subsample. This could possibly be due to the fact that IT companies suffered from substantial financial setbacks during the survey period.

Data Analysis

Most variables were measured on five or seven step Likert scales. Beliefs and values about organizational attributes were measured on scales with seven steps, ranging from -3 ("very unlikely", for beliefs, and "very bad", for values) to +3 ("very likely" and "very good"). The other Likert scales also included seven steps (no numbers were assigned to the steps), except for the scales developed by Rotter (1967) and Sjöberg (1999b), which included five steps. Demographic variables (e.g., gender) were measured by using traditional nominal scales with different categories (e.g., male or female).

The Expectancy-Value Model allows for a construction of a measure of predicted trust. The maximum predicted trust score for an organization is +9 (+3 * +3 or -3 * -3, for each of the eleven attributes, respectively) and the minimum score is -9 (+3 * -3). The correlation between predicted and observed trust is a measure of the quality of the Expectancy-Value Model for each organization. Correlation analyses were important means of analyzing data for other variables as well. The other main tool for data analysis was calculation of means.

The general trust scales developed by Rotter (1967) and Sjöberg (1999b) have been used in earlier research and are in the present study referred to as A and C, respectively. Items in these scales are basically attitudes towards different social agents, such as corporations, politicians, and the fellow man. General trust scale B was developed for the present study, including items measuring both trusting behavior and trusting attitudes.

Due to a printing mistake, trust scales A and C could not be used in the analysis of data from the first 270 collected questionnaires. The mistake was that the word "not" was omitted from the question headings, causing the wording of two opposite response alternatives to be identical. Fortunately, these scales were not the main topic of the present study, but mainly intended to be used for validation purposes. The validation analysis was performed on the remaining 67 questionnaires.

RESULTS

The levels of interpersonal trust were fairly similar to levels earlier reported in Swedish data. A majority (60.5%) of the respondents agreed with the statement that most people can be trusted, in contrast to those with the opinion that one can not be too careful when dealing with strangers. Interestingly, there were large differences in levels of interpersonal trust, related to some important demographic variables.

These demographic variables were mainly related to social class. For example, highly educated respondents (at least some education after secondary school) were more trusting (75.6%) than people with lower education, where only approximately 50% of the respondents agreed that most people can be trusted. This tendency is even clearer when it comes to membership in unions. Respondents who reported to be members of the union for college-educated people (SACO) were very trusting (96.2%). White-collar workers (TCO) were also trusting (77.4%), while the levels for blue-collar workers (LO) were much lower (52.5%). Moreover, respondents were divided into three equally large categories depending on reported household income and there were large differences between these categories. Respondents with the highest income were more trusting (78.4%) than respondents in the middle category (61.1%), who, in turn, were more trusting than respondents with the lowest income (50.5%) were.

There were also interesting differences in interpersonal trust related to political preferences. The respondents were asked to mark their position on a scale measuring their political preferences from left (1) to right (5), where 3 was neither left nor right. According to the results, respondents to the left were more trusting. However, the respondents marking the extreme options (1 and 5) were relatively few, thus making it important to treat these figures with some caution. The percentages for the categories 1 to 5 were 86.7, 64.0, 64.7, 58.6, and 58.3, respectively. There were also interesting differences related to respondents' political party preferences, although most figures should be treated with caution, because of relatively few respondents choosing most parties. The two major political parties, the Social Democratic party and the Moderate party, attracted enough respondents to make the reported trust percentages (62.8% and 54.1%, respectively) statistically certain. The Liberal party (n = 23) attracted more trusting respondents (82.6%) than any other party and the share of trusting respondents was also relatively high for the Left party (69.7%) and the Christian Democrats (66.7%). People who did not chose any of the listed, established, political parties (n = 17) were the least trusting (41.2%).

When it came to other demographic variables (e.g., gender, single/not single, and place of living), there were no or small differences in interpersonal trust. Interpersonal trust in different age categories is an interesting aspect. Although the differences related to age were not dramatically large, the main

tendency was that younger (< 30) and in particular older respondents (> 60) were less trusting than middle-aged respondents. Rothstein (1997) found the same pattern in a large sample, representative of the Swedish population.

People put different levels of trust in different organizations. In Table 1, average trust is reported for the five organizations. Both observed trust, on a scale from 1 to 7, and mean ratings of all beliefs and values are included. When mean ratings of beliefs and values were calculated, individual ratings of beliefs were corrected on the basis of direction of values and individual ratings of values were corrected on the basis of direction of beliefs. That is, if an attribute was considered negative (-3 to -1) for a given organization, the scale measuring ratings of beliefs was reversed. Thus, if an individual considered it very likely (+3) that organization X possessed the negative (-3 to -1) attribute Y, the rating of belief was reversed to -3. To possess a negative attribute is as bad as not possessing a positive attribute. The same logic was applied to values; if it is very positive to possess an attribute that it is unlikely that the organization possesses, this is equivalent to it being very negative to possess an attribute that it is likely that the organization possesses. Neutral ratings (0) were excluded from the analysis.

Table 1
Levels of observed trust and mean ratings of beliefs and values for the five organizations

Organization	Observed trust		Beliefs		Values	
	M	*SD*	*M*	*SD*	*M*	*SD*
Government	3.69	1.25	4.51	1.01	4.51	1.42
Advertising	2.77	1.19	4.47	0.88	4.52	1.07
E-commerce	3.01	1.18	4.45	0.89	4.55	1.19
Nucl. Insp.	4.27	1.39	4.98	0.83	5.48	1.15
Union	3.64	1.32	4.66	0.99	4.93	1.41

Note. All scales ranged from 1 to 7.

The pattern in levels of trust was to some extent similar between observed trust, on one hand, and mean ratings of beliefs and values, on the other hand, which might indicate significant correlations between observed and predicted trust. For example, on the average, people put considerably higher trust in the Nuclear Power Inspectorate than in any other organization, and the mean ratings of beliefs and values were also highest for this organization. However, it is interesting that the differences among advertising firms, e-commerce firms, and the Government, with respect to beliefs about and values assigned to attributes of trustworthiness were negligible. Based on an assumption about high correlations between observed trust and predicted trust, ratings of observed trust imply a considerably higher (than was the case) mean of beliefs about trustworthiness for the Government as compared to e-commerce firms. E-

commerce firms, in turn, should receive higher (than was the case) ratings of beliefs as compared to advertising firms.

When looking at ratings of beliefs with respect to separate attributes, it was found that respondents on average considered it much more likely that advertising firms are competent, efficient and committed to a goal, compared with e-commerce firms, the Government, and the Workers' Union. On the other hand, advertising firms were also considered less likely to be honest and caring. Interestingly, the Government was rated lowest in credibility and consistency.

An interesting finding was also that the mean value ratings were considerably higher for the Nuclear Power Inspectorate and the Workers' Union, compared with the other organizations. Considering that these organizations also were rated relatively high on observed trust, the evaluations could partly be a consequence of wishful thinking. It is also possible that respondents are less positive towards success for organizations that they dislike and/or distrust. For example, some respondents might be ambivalent when asked about whether it is good or bad that the Government is competent and keeps its promises. If the Government would be perceived as very competent, this would most likely increase its chances to be re-elected, which is not necessarily desirable. And if the Government would keep its promises, it would mean decisions that some people know they would dislike. The same logic could be applied to e-commerce and advertising firms.

As in the case of interpersonal trust, there were differences in observed trust in organizations, related to demographics. Some of the same tendencies as in the case of interpersonal trust could also be found for trust in organizations, but the pattern varied depending on organization. Aspects of political ideology apparently came into play. Left-wing respondents put higher trust in the Workers' Union and the (Social Democratic) Government, while right-wing respondents put higher trust in advertising firms and e-commerce firms. Income was still an important variable. An interesting result was the clear relationship between income and trust in the Government. The higher their income, the more trust respondents put in the Government, which might give support to a hypothesis about better-off citizens being more pleased with the state of society. Another interesting result was the clear relationship between age and trust in e-commerce firms. On the whole, the younger the respondents, the more trust they put in e-commerce firms. This might be explained by the newness of these firms and the fact that younger people probably are more used to the new technology and more experienced when it comes to shopping on the Internet.

The effects of knowledge and personal experience of an organization on trust in that organization were tested. There were no effects of experience, except for in the case of the Workers' Union (Pearson's $r = 0.17$; $p < 0.005$) and the case discussed above; e-commerce firms (Pearson's $r = 0.34$; $p < 0.0005$). The effect of self-rated knowledge on trust was significant for all organizations. The correlations were moderate for the Government and advertising firms (0.18,

$p < 0.005$; 0.14, $p < 0.05$), slightly higher for the Nuclear Inspectorate and the Workers' Union (0.24, $p < 0.0005$; 0.20, $p < 0.0005$), and rather high for e-commerce firms (0.38, $p < 0.0005$).

The hypothesized model in Figure 1 was tested. The assumptions were that there would be high correlations between predicted trust in an organization and observed trust in that organization, but also substantial correlations between interpersonal trust and observed trust in organizations. In Table 2, correlations are presented for these relations. Predicted trust in an organization was calculated by summing the products of beliefs and values about each attribute, respectively. Cronbach's alpha for predicted trust was above 0.80 for all organizations, except for advertising firms (0.77).

Table 2
Correlations (Pearson's r) between interpersonal trust and observed trust in organizations and between predicted and observed trust in organizations

	Observed trust				
Variables	Government	Advertising firms	E-commerce firms	Nuclear Power Insp.	Workers' Union
Interpersonal trust	-0.33***	-0.12*	-0.17**	-0.32***	-0.13*
Predicted trust	0.39***	0.26***	0.31***	0.44***	0.58***

* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

The hypothesized model appeared to work very well for the non-commercial organizations. For advertising firms and e-commerce firms, the correlations were significant but rather moderate. The only case where there was a significant correlation between interpersonal trust and predicted trust was for the Nuclear Inspectorate (-0.21, $p < 0.0005$).

The next step was to estimate the influence of different attributes of perceived trustworthiness on observed trust. In Table 3, the correlations between beliefs about organizational attributes and trust in each organization are presented.

Table 3
Correlations between respondents' beliefs about attributes of trustworthiness and observed trust in organizations

	Government	Advertising	E-commerce	Nuclear Power Insp.	Workers' Union
Competence	0.65***	0.24***	0.34***	0.45***	0.60***
Efficiency	0.49***	0.11	0.26***	0.29***	0.55***
Goal	0.53***	0.11*	0.27***	0.30***	0.40***
Power elite	0.18**	-0.06	-0.02	-0.15*	-0.03
Openness	0.41***	0.14*	0.18**	0.24***	0.40***
Consistency	0.41***	0.27***	0.21***	0.30***	0.46***
Honesty	0.57***	0.36***	0.31***	0.44***	0.60***
Promise	0.49***	0.38***	0.33***	0.42***	0.53***
Fairness	0.55***	0.38***	0.31***	0.30***	0.57***
Care	0.50***	0.27***	0.27***	0.20***	0.56***
Self-interest	-0.37***	-0.12*	-0.02	-0.40***	-0.33***

* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

The average strength of the correlations between beliefs and observed trust was on higher levels for the Government and the Workers' Union, compared with the other organizations. When looking at the predictive power of different beliefs on trust in the five organizations, an interesting pattern could be observed. It appeared as if two important dimensions of beliefs were important for levels of trust in an organization. The first dimension was related to perceived competence and included beliefs about competence, efficiency, and commitment to a goal. The other dimension was related to morality and included perceptions of honesty and credibility and to a slightly smaller extent also perceptions of fairness and care. The strength of the impact of the beliefs varied depending on organization, but the general pattern was clear. One exception, however, was advertising firms, where the competence dimension was rather weakly related to observed trust. Perceptions of honesty, credibility, and fairness were more important for trust in advertising firms, but, even so, it is clear that the Expectancy-Value Model worked better for the other organizations. Perceptions of openness and consistency were important for observed trust, but less important than the attributes discussed above.

In Table 4, the correlations between values associated with organizational attributes and trust in each organization are presented.

Table 4
Correlations between values assigned to attributes of trustworthiness and observed trust in organizations

	Government	Advert. firms	E-comm. firms	Nuclear Power Insp.	Workers' Union
Competence	0.35***	0.13*	0.20***	0.31***	0.19**
Efficiency	0.31***	0.18**	0.23***	0.27***	0.23***
Goal	0.36***	0.15*	0.22***	0.27***	0.22***
Power elite	0.26***	0.00	0.04	-0.09	0.23***
Openness	0.25***	0.05	0.04	0.14*	-0.02
Consistency	0.27***	0.11	0.15*	0.20***	0.17**
Honesty	0.30***	0.11	0.15*	0.23***	0.13*
Promise	0.24***	0.14*	0.17**	0.20***	0.16*
Fairness	0.24***	0.11	0.16*	0.12*	0.14*
Care	0.24***	0.06	0.11*	0.09	0.13*
Self-interest	-0.06	0.06	0.02	-0.16*	-0.01

* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

The pattern regarding effects of evaluations on trust was basically the same as the pattern regarding effects of beliefs on trust. The average levels of correlations were higher for the Government, the Nuclear Power Inspectorate, and the Workers' Union, compared with advertising and e-commerce firms. It was also found that values in general had a weaker correlation with trust than beliefs, independent of the type of organization.

In relation to Table 2, it was concluded that the Expectancy-Value model seems to work fairly well, in terms of explaining observed trust by means of multiplying beliefs and values for each attribute and combining the products into a measure of predicted trust for each organization, respectively. However, it is also important to test whether the sum of beliefs and/or the sum of values was better than the sum of products of beliefs and values in explaining observed trust. Correlations for these relationships are presented in Table 5. Individual ratings of beliefs were here corrected on the basis of direction of values and individual ratings of values were corrected on the basis of direction of beliefs, according to the earlier described method.

Table 5
Correlations between sum of beliefs and observed trust and sum of values and observed trust

Variables	Observed trust				
	Government	Advertising firms	E-commerce firms	Nuclear Power Insp.	Workers' Union
Sum of beliefs	0.35***	0.27***	0.25***	0.42***	0.55***
Sum of values	0.44***	0.35***	0.29***	0.45***	0.53***

*** $p < 0.0005$.

When the sum of beliefs and the sum of values were compared with the original Expectancy-Value Model, some interesting results could be observed. It is, for example, important to note that the differences in explanatory power between commercial and non-commercial organizations persisted. It is also clear that the combination of beliefs and values (as postulated by the Expectancy-Value Model) did not add much explanatory power, as compared to when separate measures of sum of beliefs and sum of values were tested. In fact, in the cases of the Government and advertising firms, the sum of products of beliefs and values was considerably worse in explaining observed trust compared with the sum of values. The importance of values may indicate that the Government and advertising firms are particularly influenced by people's values and ideologies (related to business and politics) subscribed to.

One possible reason, related to the aspect of ideological considerations, for this relative failure of the Expectancy-Value Model could be a process of double denial (Sjöberg & Montgomery, 1999). This phenomenon occurs when people, while expressing their attitude toward an object, deny both the probability of attributes that would speak against the attitude and the value of these attributes. In a context of trust in organizations, this could be the case for a person who puts low trust in the Government, according to the observed trust rating. When asked about the probability for the Government to keep its promises, this person might, logically consistent with his or her low trust, assign low probability to this event. When asked about whether it is good or bad that the Government keeps its promises, the respondent might assign this event a low value, since he or she dislikes the political program of the Government and/or wishes that the Government would consist of representatives with the same political ideology as he or she instead (assuming that a Government that keeps its promises is more likely to stay in power). However, according to the logic of the Expectancy-Value Model, low probability combined with a negative value should result in a positive attitude (trust) toward the Government. The reason for double denial to occur is based on the assumption that the individual does not consider the combined effect of probability denials and value denials, but uses each type of denial as a supportive argument for his

or her attitude. Hence, double denial is assumed to arise in an argumentative mode of information generation, in contrast to an analytical mode of information integration.

Sjöberg and Montgomery (1999) assumed that belief statements are made with reference to received values, not the values that the person explicitly expresses when making value judgments. Received values are culturally given, and they are the values that a person assumes to belong to the generalized other, who is considered to be a potential opponent when in the argumentative mode. The concept of received value was operationalized by them as the mean value rating of an attribute, based on the assumption that the evaluations made by the imagined opponent represent the majority view.

In the present study, the methodology used by Sjöberg and Montgomery (1999) was used, in order to investigate the possible tendency of double denial among respondents. Respondents were divided into three categories, depending on the value they assigned to an attribute (negative value, neutral value, and positive value), and the correlations between observed trust and probability assigned to each attribute were calculated, for each of these categories, respectively. Mean value ratings for all attributes were also calculated, in order to present a measure of received value.

It was found that a strong form of double denial (same sign of mean value rating and correlation between probability assigned to the attribute and observed trust, for value ratings with signs opposite to the sign of mean value rating) occurred for 40 out of 55 (5 organizations, 11 attributes) cases. A weak form of double denial (same sign of mean value rating and correlation between probability assigned to the attribute and observed trust, for zero value ratings) occurred in 13 of the remaining 15 cases. Thus, double denial was observed in 53 of 55 possible cases. The two cases where people answered fully in accordance with the Expectancy-Value Model were both in assessments of the Swedish Nuclear Power Inspectorate. One of the organizations for which the sum of values was much more strongly correlated with observed trust than the sum of products of beliefs and values, the Government, was interesting, due to the fact that strong double denial could be observed for all cases.

In order to see whether the different attributes could actually be grouped into different dimensions, as assumed above, some explorative factor analyses were performed. For each organization, the attribute items were subjected to a factor analysis, first with regard to beliefs about these attributes and then with regard to values. Generally, the items were grouped into two or three factors. One factor usually included the competence, efficiency, and "commitment to a goal" attributes, which might be interpreted as a general competence or professional dimension. When three factors were extracted, one factor included the "part of a power elite" and "act in self-interest" attributes, which makes it possible to speculate about a dimension of perceived corruption. The other attributes grouped into a dimension that could be conceived of as a general

morality dimension, more focused on how the organization actually works in everyday life than the corruption dimension.

The main focus of the present study was to investigate the relationship between measures of predicted trust, in terms of the sum of products of beliefs and values related to attributes of trustworthiness, and observed trust. However, it is clearly also of interest to find out what other variables affected observed trust. In order to maximize the amount of variance in observed trust accounted for, regression analyses were performed, including the following possible explanatory variables.

1. Interpersonal trust (dichotomous question)
2. Observed trust in organizations (that is, except for the organization that is the dependent variable)
3. Experience with the organization
4. Knowledge of the organization
5. General trust scale A
6. General trust scale B
7. General trust scale C

Furthermore, since it was found that the sum of products of beliefs and values was not always the best predictor of observed trust, the sum of beliefs together with the sum of values was included in the regression analyses. When the sum of beliefs and/or the sum of values were better in explaining observed trust, the sum of products of beliefs and values was excluded as a possible regressor. The reason for including three scales measuring general trust in the questionnaire was to enable a validation of different trust measures.

To begin with, analyses were performed only on the basis of the share of respondents that received the correct versions of general trust scales A and C. It was found that these measures of trust were not significant independent variables in any of the final regression models, with the exception of explaining the observed trust in the Government. Here, trust scale C accounted for as much as 31.1% of the variance in observed trust (n = 59), which most likely can be explained by the fact that this scale to a large extent includes items measuring trust in politicians. Therefore, Table 6 below is based on the entire sample (n = 347) and does not include trust scales A and C.

Table 6
Amount of variance in observed trust in five organizations accounted for

Variables	Government	Advertising	E-commerce	Nuclear Insp.	Union
BV	-	-	+1.1(0.16)[1]	-	33.3(0.47)
B	-	-	-	-	-
V	18.8(0.32)	+8.4(0.28)	-	20.4(0.32)	-
IT	+0.3(-0.14)[2]	-	-	+1.7(-0.17)[1]	-
T. gov.	-	-	-	+6.1(0.23)	+9.1(0.28)
T. adv.	-	-	18.4(0.32)	-	-
T. e-com	-	18.4(0.35)	-	+7.3(0.20)	-
T. nuclear	+6.5(0.19)	+0.5(0.11)[2]	+3.8(0.20)	-	+1.7(0.15)[1]
T. union	+12.7(0.25)	-	-	-	-
Experience	-	+0.9(-0.17)[1]	+10.9(0.17)[1]	-	+1.6(0.13)[1]
Knowledge	-	+1.8(0.15)[2]	+2.5(0.16)[2]	+3.4(0.19)	-
T. B-scale	+3.7(-0.17)	-	-	-	-
R^2 adj (%)	42.0	29.9	36.7	38.9	45.7

Note. For each column (organization), the most potent predictor (= accounting for most variance in observed trust) is presented, followed by the second best predictor (the variable adding the most of remaining variance accounted for), and so forth until none of the remaining explanatory variables are significant in accounting for more of the variance. B stands for beliefs, V for values, IT for Interpersonal trust, and T for trust. Beta values are presented within parentheses. All regressors are significant on a $p < 0.0005$ level, except for regressors marked with [1] ($p < 0.005$) and [2] ($p < 0.05$).

From the table above, it can be concluded that trust in organizations generalizes. People who put high trust in one organization were more likely than low-trusters to also put high trust in other organizations. This is particularly true when it comes to similar types of organizations (e.g., commercial organizations, such as advertising and e-commerce firms, or organizations based on the same type of political ideology, such as the Government and the Workers' Union). Beliefs and evaluations of organizations' trustworthiness in different respects (attributes) were also important predictors of most trust ratings, which is illustrated by the explanatory power of predicted trust. A general trusting stance towards other people had some importance for trust in organizations, which is reflected in the contributions from trust scale B and the question measuring interpersonal trust. It is also plausible that this general trusting stance is reflected in the fact that trust in organizations generalizes.

Finally, it is interesting to note the cases where experience and knowledge of the organization were important determinants of observed trust. Experience of e-commerce firms was important for levels of trust in these organizations; the more experience, the higher the trust. Knowledge was to some extent a function

of experience,[4] but not entirely, which can be seen in the case of e-commerce firms, where knowledge gives a unique contribution to variance accounted for (2.5%). It is perhaps logical that knowledge is a contributing factor in explaining trust in the Nuclear Power Inspectorate, since this is the organization of which respondents reported the lowest levels of knowledge (M = 2.58, compared with e-commerce firms, M = 2.88, advertising firms, M = 3.26, the Workers' Union, M = 3.44, and the Government, M = 3.94).

Trust scales A, B, and C were validated by estimating the strength of the relationship between these scales and observed trust in organizations as well as interpersonal trust. The correlations reported in Table 7 are based on the share of respondents who received the questionnaire with correct versions of scales A and C.

Table 7
Correlations between general trust scales and trust in organizations and interpersonal trust

	Gov.	Adv.	E-C.	Nucl.	Union	Interpers.
Rotter	-0.34*	-0.16	-0.07	-0.07	-0.37*	0.21
Sjöberg	-0.57***	-0.13	0.06	-0.29*	-0.39**	0.37**
Viklund (B)	-0.26*	-0.11	0.04	-0.16	0.01	0.29*

Note. N=61.
* $p < 0.05$. ** $p < 0.005$. *** $p < 0.0005$.

Generally, it can be concluded that all scales measured some aspect of interpersonal trust (correlations were on average 0.3), while mainly scale C, and to some extent also scale A, fairly well caught a political trust dimension, based on the correlations with trust in the Government and the Workers' Union. However, there were no significant correlations between the three scales of general trust and trust in advertising firms and e-commerce firms. Once again, this indicates that trust in commercial organizations to a large extent is explained by other mechanisms than the attributes of trustworthiness and scales measuring general trust traditionally referred to in trust research. The correlations between the trust scales were 0.23 (A vs. B), 0.46 (A vs. C), and 0.59 (B vs. C).

[4] Correlations between knowledge of and experience of an organization were 0.24 (Government), 0.50 (advertising firms), 0.59 (e-commerce firms), 0.36 (Nuclear Power Inspectorate), and 0.51 (Workers' Union).

Trust scale B was constructed for this questionnaire and the aggregated measure (based on the average of eight items) correlated, as mentioned above, the most with interpersonal trust.[5]

DISCUSSION

The Expectancy-Value Model was evaluated on the basis of a comparison between different organizations and on the basis of a comparison between different measures for each organization, respectively. As to the two commercial of organizations studied, advertising firms and e-commerce firms, it was shown that beliefs about and/or values assigned to attributes as explanatory variables left much of the variance in observed trust unexplained. Ratings with regard to attributes of trustworthiness were better predictors of trust in non-commercial organizations.

It was shown that the sum of products of beliefs and values about attributes of trustworthiness was a better predictor of observed trust in the Workers' Union and e-commerce firms, as compared to the sum of beliefs and the sum of values. The three measures had about the same explanatory power for the Swedish Nuclear Power Inspectorate. However, the sum of values was decidedly better in explaining observed trust in the Government and advertising firms. It should, however, be noted that correlations between the measures of predicted trust and observed trust were substantial in all cases. These findings give rise to a number of interesting points of discussion, related to the appropriateness of the Expectancy-Value Model, the way in which organizations are perceived, and the nature of trust.

Earlier research (reviews in e.g., Eagly & Chaiken, 1998; Sjöberg, 1999a) has shown that the Expectancy-Value Model is not always appropriate in attitude research. In the present study, one might wonder whether the distinction between beliefs and values was completely clear for all respondents. It should be noted that some respondents commented about this difficulty after having

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[5] The following items were significantly correlated (Pearson's r) with interpersonal trust: (1) I can trust that people who have a professional secrecy will not break that secrecy (-0.22, $p < 0.0005$), (2) If I would lose my wallet on the street, I would not see it again (0.19, $p < 0.005$), (3) One had better check the receipt after having made a purchase (0.19, $p < 0.0005$), (4) When I play a game, I expect the other players to cheat, if the opportunity is given (0.27, $p < 0.0005$), (5) I am probably more jealous in close relationships than most other people (0.11, $p < 0.05$), (6) I would not dare to ask a stranger to watch my bag for five minutes, while I'm doing an errand (0.20, $p < 0.0005$), (7) If I send an important letter by mail, I can hardly be sure that it arrives properly. Often, it is best to call the receiver just to check (0.29, $p < 0.0005$). It should be noted, however, that there was a sufficient variation across response alternatives only for items 1, 2, 6, and 7.

completed the survey. This could mean that they rated the organizations high (or low) in beliefs as well as values, which would predict high trust, even though this might not actually be the case, as reflected in ratings of observed trust. This possible misunderstanding is, however, hard to separate from the tendency of wishful thinking, which was found to exist among respondents. Correlations between beliefs and values were high, especially high for organizations in which respondents put most trust. The average correlations between beliefs and values for respondents who actually put low trust in an organization were lower and ranged from approximately 0.13 to approximately 0.20.

Moreover, the value component can be discussed, since it may not be entirely clear whether the evaluation is to be based on the attitude object or on the respondent. It could be the case that some respondents interpreted "good" (or "bad") as being good for the organization studied (or good for society), rather than good for themselves. Thus, in future research it is probably important to specify the scope of the value. It can be mentioned that in risk perception research, it has been found that it is crucial to specify whether the risk respondents are asked to rate is a risk for themselves (personal risk) or a risk to others/society (general risk) (Sjöberg, 2000). An interesting aspect is also the phenomenon of so-called labile values; that is, when people do not *know* what they want (Fischhoff, Slovic & Lichtenstein, 1988).

The discussed flaws of the model could possibly (at least partly) explain the finding that the phenomenon of double denial was very strong, thereby making the Expectancy-Value Model less powerful as an instrument to conceptualize trust as an attitude. Double denial occurs when people, while expressing their attitude toward an object, deny both the probability of attributes that would speak against the attitude and the value of these attributes. The presence of double denial is assumed to arise in an argumentative mode of information generation, in contrast to an analytical mode of information integration.

It is very interesting to also consider psychological explanations to why double denial occurs and how it could be related to people's perceptions of organizations. It is possible that double denial is more likely to occur when people are to evaluate an attitude object that is strongly "ideologically loaded"; that is, people evaluate the object based on a fairly strong personal ideology. This could be the case when certain political organizations (e.g., the Government) are evaluated, where a political ideological component may be important. It could also be the case for certain commercial organizations (e.g., advertising firms), where a general anti-business ideology prevents people from evaluating the organization by means of an analytical mode of information integration. A public, but not politically controlled, organization, on the other hand, such as the Nuclear Power Inspectorate, may be perceived as neutral and not as ideologically loaded as the above mentioned organizations. A perception

of the Nuclear Power Inspectorate as fairly neutral could possibly partly explain why this organization was rated highest in observed trust. Even ratings of organizations that do represent a certain ideology could be (relatively) less influenced, by ideology and values, compared with the Government and advertising firms. Interesting examples are the Workers' Union and e-commerce firms.

It is possible that the aspects of values and ideologies are less salient for the other political organization (the Workers' Union) and the other commercial organization (e-commerce firms). Most working Swedes are organized in unions and, although they do not always subscribe to the same ideology as the Social Democratic Workers' Union, they might believe that unions are necessary and on the whole a positive aspect in society. The Government, on the other hand, could be substituted by another government, with a different political program. As will be discussed below, one might also speculate about important differences between e-commerce firms and advertising firms.

One might assume that the ideological component of trust is rather political in the case of the Government, which is run by people from the Social Democratic movement. This is illustrated by the fact that the political ideology component of trust was more salient in ratings of trust in the Government (Pearson's r between the political scale from left to right and trust in this organization was –0.24, $p < 0.0005$) compared with ratings of trust in the other organizations (no significant correlations, except for the Workers' Union: -0.22, $p < 0.0005$). Thus, it is possible that some respondents put low trust in the Government, based on the fact that they subscribe to a different political ideology than the official political ideology of the Government.[6] When asked about whether the Government is competent, it is plausible that the low trust is reflected in an assignment of low probability of the Government being

[6] However, a person can put high trust in an organization, even if he or she fundamentally dislikes the official ideology of the organization. In particular, this can be true for public institutions, such as the Government, in which people feel that they must put trust, even though they would rather see that the institution would be based on another political ideology. An illustrative finding is that left-wing respondents in general put higher trust in the Government than respondents to the right, but that respondents sympathizing with the Liberal Party put higher trust in the Government than respondents sympathizing with the Left Party. This could be due to respondents in the first category being generally more trusting, but it could also be due to different conceptions of the Government. It is possible that some respondents think in terms of the government currently in power, which increases the likelihood of a trust rating influenced by political ideology, while other respondents (e.g., those sympathizing with the Liberal Party) consider the government a more timeless institution, more related to the political system as a whole than to political ideology. In accordance with this reasoning, such respondents might feel more obliged to trust the Government, as it is a prime symbol of a system that they trust and believe in.

competent. In an argumentative mode, however, the respondent might also assign low value to the Government being competent, arguing that the more competent the Government, the greater the probability that this Government will continue in office and hence consist of people with a different political ideology than that of the respondent.

Similarly, ratings of trust in commercial organizations might reflect a general attitude to business (based on an anti-business ideology), or at least an acknowledgment of the conditions under which commercial organizations operate. Consider a respondent who puts low trust in advertising firms, based on the fact that he or she dislikes the way commercial organizations operate (anti-business ideology). Such a respondent could, in line with the low trust, assign low probability to advertising firms being honest, but also assign a low value to honest advertising firms, because advertising firms that are too honest would possibly be less competitive, and less likely to maximize profit. The aspect of whether respondents interpret value as valuable for them personally or valuable for the organization is particularly relevant here.

Thus, ratings of trust in organizations could reflect some ideological considerations of their main interests and *raison d'être*. This could, in turn, cause the strong effects of double denial. When the organization is fairly neutral, ideological considerations might be less important. Double denial could still occur, but it could then be less of an effect of ideology and more of an effect of, for example, people's striving for consistency.

It is also possible that double denial is based on respondents' initial emotional reaction when they are asked to evaluate an organization. A strong right-wing respondent's gut feeling when asked to rate his or her trust in the (left-wing) Government might be a strong sense of dislike, causing him or her to almost automatically assign a low trust rating to this organization. When asked to assign probabilities and values associated with attributes of trustworthiness of this organization, the respondent might feel a need to legitimize his or her rating of trust, causing the phenomenon of double denial. This explanation is related to the account based on ideology, but its character is less cognitive.

Attributes of trustworthiness and general trust scales were more successful components in explaining trust in non-commercial organizations (i.e., the Government, the Workers' Union and the Nuclear Power Inspectorate) compared with commercial organizations (i.e., advertising firms and e-commerce firms). Moreover, trust in commercial organizations was less correlated with measures of general trust. This indicates that traditional trust research may lack important components necessary to explain trust in commercial organizations. One component that was found to be important in explaining trust in e-commerce firms was the respondents' personal experience of these firms; the more experience, the more trust. It is possible, of course, that those who trust e-commerce firms more also more often trade with them.

One explanation of the relative failure of the Expectancy-Value Model in explaining trust in commercial organizations could be based on the attributes included in the model. It is possible that people may perceive an organization as competent and efficient, yet not trust it, because of the perception that the organization works in its self-interest rather than in public interest. However, it was found that beliefs about whether commercial organizations work in their self-interest were not related to trust in these organizations, perhaps because most respondents realize that the task of maximizing profit is one of the corner stones for commercial organizations. Thus, if a commercial organization works in its own interest to maximize profit, this is not a reason not to trust the organization, because it is only acting according to the expectations on organizations operating in a competitive environment. It could be the case, though, that some commercial organizations are perceived as working actively against the public good. Perhaps such an explanation is especially appealing in the case of advertising firms, since one could imagine that some people might perceive these firms as organizing campaigns intended to "poison people's minds".

In a comparison between advertising firms and e-commerce firms, it was found that the Expectancy-Value Model explained trust in the latter category better than in the first category. Values were a better predictor of trust in advertising firms. Furthermore, one might assume that advertising firms should receive higher ratings of observed trust than e-commerce firms, based on the finding that advertising firms were perceived as considerably more competent and efficient trust. However, e-commerce firms were more trusted, according to the measure of observed trust. Some form of antagonistic relationship between some of the respondents and advertising firms might explain the interesting finding that high levels of perceived competence is not always sufficient in order to gain the public's trust.

It can be concluded that people's trust in an organization to a large (but, depending on the organization, varying) extent is a function of their general tendency to trust (trust tends to generalize), their beliefs about the organization's trustworthiness, and their evaluation of (attitude towards) the organization based on these beliefs. However, as discussed above, other factors may contribute to the understanding of the bases of trust in organizations, such as possibly ideology and emotional reactions. It can also be noted that earlier research (e.g., Barber, 1983), pointing towards two general dimensions as being especially strong factors of trustworthiness, was supported. These dimensions were related to perceptions of competence and morality. However, there were also signs of a third dimension, possibly related to perceptions of tendency to corruption (in a broad sense). This dimension included items about an organization being part of a power elite in society and working primarily in its own interest. These attributes have been suggested as important factors for explaining declining levels of trust in the USA (Lipset & Schneider, 1983). It is

possible that they are less important in a Swedish context, where levels of corruption probably are lower. Americans' political attitudes are, moreover, probably more influenced by a stronger focus on personal freedom and low levels of federal intervention. The European Union may evoke similar aspects in the future.

Because of the fact that results varied depending on type of organization studied, practical implications are also different depending on organization. Respondents put the highest levels of trust in the Swedish Nuclear Power Inspectorate. If this organization, as suggested above, is perceived as relatively neutral (not politically controlled or working primarily in self-interest), it could possibly be easier to reach and maintain relatively high levels of public trust. This is an important aspect to consider for discussions on nuclear policy. However, some organizations involved in nuclear policy, such as producers of nuclear power or those responsible for the management of nuclear waste, are most likely perceived as less neutral. The implications for these types of organizations (possibly including both political organizations and commercial organizations) are more complicated. For people opposing the use of nuclear power, producers of nuclear power could actually be perceived as actively working against public good, since they make a profit by providing "disliked" energy to society and are believed to expose people to serious risks. Measures to build public trust based on perceptions of trustworthiness are not likely to be sufficient in such cases.

Future research should investigate whether people's trust in organizations is related to ideology. One important insight of theory about inter-attitudinal structure is that an attitude may be formed as an implication of or a deduction from a more general attitude (ideology) that has already been formed (Eagly & Chaiken, 1998). One factor of possible importance is how much influence in society people want different organizations to have. Another interesting factor is whether people consider an organization to work for the public good or actually work against public good.

An interesting task for the future could also be to investigate people's emotional reactions to different organizations. A possible angle could be based on the concept of stereotypes. This concept is important in research on attitude formation and group perception (e.g., Mackie & Hamilton, 1993). Experimental research has investigated the effects of stereotypes on person perception. One interesting approach to person perception is based on Anderson's (1996) Information Integration Theory. Within the framework of this theory, Anderson found good fit of multiplicative models, which examined effects of perceptions of different attributes on person perception. An interesting question is whether the concept of stereotypes and experimental methodology could also be applied to research on people's trust in organizations.

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