JYVÄSKYLÄ STUDIES IN EDUCATION, PSYCHOLOGY AND SOCIAL RESEARCH

177

Tapio Litmanen

The Struggle Over Risk

The Spatial, Temporal, and Cultural Dimensions of Protest against Nuclear Technology

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2001

JYVÄSKYLÄ STUDIES IN EDUCATION, PSYCHOLOGY AND SOCIAL RESEARCH 177

Tapio Litmanen

The Struggle Over Risk

The Spatial, Temporal, and Cultural Dimensions of Protest against Nuclear Technology

Esitetään Jyväskylän yliopiston yhteiskuntatieteellisen tiedekunnan suostumuksella
julkisesti tarkastettavaksi yliopiston Villa Ranan Blomstedt-salissa
huhtikuun 7. päivänä 2001 kello 12.

Academic dissertation to be publicly discussed, by permission of
the Faculty of Social Sciences of the University of Jyväskylä,
in the Building Villa Rana, Blomstedt Hall, on April 7, 2001 at 12 o'clock noon.

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2001

The Struggle Over Risk

The Spatial, Temporal, and Cultural Dimensions of Protest against Nuclear Technology

JYVÄSKYLÄ STUDIES IN EDUCATION, PSYCHOLOGY AND SOCIAL RESEARCH 177

Tapio Litmanen

The Struggle Over Risk

The Spatial, Temporal, and Cultural Dimensions of Protest against Nuclear Technology

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2001

Editors
Esa Konttinen
Department of Social Sciences and Philosophy/sociology, University of Jyväskylä
Pekka Olsbo and Marja-Leena Tynkkynen
Publishing Unit, University Library of Jyväskylä

URN:ISBN:978-951-39-8027-6
ISBN 978-951-39-8027-6 (PDF)
ISSN 0075-4625

ISBN 951-39-0860-7
ISSN 0075-4625

Copyright © 2001, by University of Jyväskylä

Jyväskylä University Printing House,
Jyväskylä and ER-Paino Ky, Lievestuore 2001

ABSTRACT

Litmanen, Tapio
The Struggle Over Risk: The Spatial, Temporal, and Cultural Dimensions of Protest against Nuclear Technology.
Jyväskylä, University of Jyväskylä, 2001, 72 p.
(Jyväskylä Studies in Education, Psychology and Social Research
ISSN: 0075-4625; 177)
ISBN: 951-39-0860-7
Yhteenveto: Kamppailu riskistä. Ydinteknologian vastaisen protestin tilalliset, ajalliset ja kulttuuriset ulottuvuudet.
Diss.

This thesis examines the social struggle over nuclear risks. The birth and subsequent development of anti-nuclear protest are closely interwoven with the creation of nuclear risks, the public perception of risks, and the ongoing debates over the acceptability of these risks. The spatial scope of the anti-nuclear movement has varied from international protests against nuclear weapons to national protests against nuclear power and local protests against the siting of nuclear waste facility. The focus of these protests has also varied in the course of time. The protest against nuclear weapons emerged immediately after World War II, whilst the use of nuclear power for civilian purposes was at that time greeted with satisfaction. However, public enthusiasm over civilian applications declined rapidly at the end of the 1970s when the anti-nuclear power movement expressed serious doubts about the safety of nuclear power plants. The next phase of the anti-nuclear protest in the 1980s and 1990s involved disputes over the siting of nuclear waste facilities. The long struggle over nuclear technology has created a special global nuclear culture, which is actively constructed in interaction between anti-nuclear protesters and pro-nuclear actors. This global nuclear culture consists of knowledge, beliefs, and values, which are compressed into interpretative packages for and against nuclear technology. At the core of this nuclear culture is the concept of 'risk', which creates collective consciousness on the one hand, and is itself a collective construct on the other hand. One of my findings is that the societal evaluation of any new technology is always carried out in varying political, social, and cultural contexts. The thesis consists of five articles and a summary article. The first article deals with international anti-nuclear protest, which is composed of the anti-nuclear weapons and the anti-nuclear power movement. The second article is a study of local nuclear waste conflicts in three Finnish municipalities. The study of local conflicts is continued in the third article; this time from the viewpoint of risk perception. The fourth article is a joint effort of my Swedish colleague, Rolf Lidskog and myself. It is a comparative analysis of Finnish and Swedish nuclear waste conflicts in the context of national nuclear power and nuclear waste policies. In the fifth article, I examine the development of the nuclear issue by analyzing several time-series of people's attitude surveys as well as previous studies of the nuclear debate.

Keywords: risk, nuclear power, nuclear waste, nuclear weapons, anti-nuclear movement, globalization, social constructionism

Author's address

Tapio Litmanen
Department of Social Sciences and Philosophy / sociology
University of Jyväskylä
P.O. Box 35 FIN-40351 Jyväskylä
FINLAND
E-mail: tlitmane@dodo.jyu.fi

Supervisors

Professor Kaj Ilmonen
Department of Social Sciences and Philosophy / sociology
University of Jyväskylä, Finland

Professor Martti Siisiäinen
Department of Social Sciences and Philosophy / sociology
University of Jyväskylä, Finland

Senior Lecturer Esa Konttinen
Department of Social Sciences and Philosophy / sociology
University of Jyväskylä, Finland

Reviewers

Professor of Social Science Timo Järvikoski
Department of Behavioral Science
University of Oulu, Finland

Docent Pekka Jokinen, Ph.D.
Department of Regional Studies and Environmental Policy
University of Tampere, Finland

Opponent

Docent Pekka Jokinen, Ph.D.
Department of Regional Studies and Environmental Policy
University of Tampere, Finland

ACKNOWLEDGEMENTS

Why are disputes about high-level nuclear waste and the siting of repositories so common? I have contemplated this question for over a decade. My academic curiosity on the issue was first aroused in 1989, when I chose opposition to the proposed siting of a nuclear waste facility in Sievi as the subject of my master's thesis. Sievi was one of the five Finnish municipalities where the nuclear power company Teollisuuden Voima Ltd. (TVO) carried out on site surveys in 1987–1992 in an attempt to identify a geologically qualified location for the siting of spent nuclear fuel.

Now, in March 2001, the Finnish Nuclear Waste Management Program has finally reached the stage where the parliament will make a decision in principle on the final disposal of high-level nuclear waste. In all likelihood Eurajoki, a small municipality in the West Coast of Finland, will host the facility, if the parliament agrees with the Finnish nuclear waste management company, Posiva Ltd., and the Municipality of Eurajoki. Today, both of these cases–nuclear waste management and my doctoral thesis–are ripe for judgment.

I am indebted to many individuals almost too numerous to mention. However, here are some of the people who have contributed to my research project and my work as a sociologist at the Department of Social Sciences and Philosophy. First of all, I wish to express my gratitude to Senior Lecturer Esa Konttinen, who has played several roles in my work. He has served as my supervisor, project manager, and nearest colleague. But equally inspiring for me have been the moments of leisure that I have spent sailing, hiking, or swimming with Esa. As an outdoor person, I have also enjoyed the excursions our Environmental Research Group has made to different nature parks and nature reserves. I would also like to thank Professor Martti Siisiäinen, who has furthered my academic career in many ways. For example, he was the person who encouraged me to participate in international conferences and present my findings to a wider scientific community. Furthermore, my deepest thanks to Professor Marjatta Marin. I have a very high regard for the support of such an experienced sociologist. In particular, I want to mention that she was the one who believed that I would be able to teach sociology and she encouraged me to undertake doctoral thesis research at my home department after my graduation. My thanks are due also to Professor Kaj Ilmonen for his advice on my research during the later stages of my work. Whenever I needed to discuss a problematic subject, I could turn to him.

Already in my undergraduate days I became acquainted with Pertti Jokivuori, who has been one of my closest friend and colleague ever since. We have discussed research, sociology, and life in general on numerous occasions. Also Professor Risto Alapuro from the University of Helsinki had an opportunity to closely follow the early formulations of my thesis during his stay at the University of Jyväskylä; and whenever we have met after that he has showed keen interest in my work. Furthermore, many thanks to Senior Fellow Kimmo Jokinen and Researcher Matti Nieminen, for their useful comments in the final stages of the production of this thesis.

It has been a true privilege and pleasure to work in a community, which comprises so many good-natured personalities, close friends and enthusiastic students.

Special words of thanks are due to Professor Yrjö Haila and Associate Professor Pekka Jokinen, both from the University of Tampere. Professor Haila is an estimable graduate school director, who always trusted that I would complete my research, whilst Pekka Jokinen afforded me useful comments on the final version of my thesis. Critical observations by him and the other preliminary examiner of the thesis, Professor Timo Järvikoski, guided me in the finalization of the summary article.

Cooperation with Professor Rolf Lidskog from the University of Örebro was very pleasant, because we shared an interest in the same theoretical questions and cases studied. I am also grateful to Professors Eugene A. Rosa and Riley E. Dunlap for their warm welcome and hosting my visit to Washington State University in 1996. Their comments on my papers were a great help. Also Professor Joop van der Pligt from the University of Amsterdam has had a significant influence on my work. My meetings with him in Amsterdam in 1994 and 1996 yielded several important clues for my research. Also discussions with Ph. D. Adri Albert de la Bruhéze at the University of Twente about his doctoral thesis on nuclear waste strengthened my confidence on social constructionism as an appropriate approach to this issue.

Over the past few years I have participated in many inspiring and enjoyable discussions with Research Fellows Pekka Hokkanen and Matti Kojo from the University of Tampere. Their discipline is political science whereas I study Finnish nuclear waste management from a sociological perspective, but it has always been easy for us to reach an understanding. Thanks also go out to Jouko Peltomäki for the task of language checking this summary article and his valuable comments on the manuscript.

My membership in the Cooperation Committee for the Research on Social Sciences, a part of the Publicly Administrated Nuclear Waste Management Research Program (JYT 2001) funded by the Finnish Ministry of Trade and Industry, provided me with firsthand knowledge on the development and implementation of the Finnish nuclear waste management policy.

Financial support from the Academy of Finland from 1993 to1997 and from 1997 to 2000 facilitated the completion of this thesis.

Finally, special thanks go out to Malla. We have advanced side by side in our academic careers, which has meant that we have often faced the same kind of obstacles at the same time. It has been easy for us to share all these experiences and find an understanding whenever necessary. Our son, Elias, always kept our feet on the ground by asking simple questions such as "Why are you taking me to the day-care center?"

Jyväskylä, March 2001

Tapio Litmanen

CONTENTS

LIST OF ORIGINAL PUBLICATIONS

Thesis is based on the following articles, which are referred to in the text by their numbers.

1. Tapio Litmanen (1998a), 'International anti-nuclear movements in Finland, France and the United States', *Peace Research. The Canadian Journal of Peace Studies*, vol. 30, no. 4 (November 1998), pp. 1-19.

2. Tapio Litmanen (1996a), 'Environmental conflict as a social construction. Nuclear waste conflicts in Finland', *Society & Natural Resources*, vol. 9, no. 5, pp. 523-535.

3. Tapio Litmanen (1999a), 'Cultural approach to the perception of risk. Analyzing concern about the siting of a high-level nuclear waste facility in Finland', *Waste Management & Research*, vol. 17, no. 3, pp. 212-219.

4. Rolf Lidskog and Tapio Litmanen (1997), 'The social shaping of radwaste management. The cases of Sweden and Finland', *Current Sociology*, vol. 45, no. 3 (July 1997), pp. 59-79.

5. Tapio Litmanen (1999b), 'From the golden age to the valley of despair. How did nuclear waste become a problem', in Esa Konttinen, Tapio Litmanen, Matti Nieminen and Marja Ylönen (eds) *All Shades of Green. The Environmentalization of Finnish Society*, SoPhi, Jyväskylä, pp. 111-128.

1 INTRODUCTION

This study stands at the intersection of two overlapping sociological research traditions. First, it deals with *social movements*; more precisely, I have focussed on *the protest against nuclear technology*. The anti-nuclear weapons and the anti-nuclear power movement are among the most influential international movements and they have mobilized millions of people in different parts of the world during the past few decades. There are some earlier studies of these movements that have contributed significantly to the overall development of the research of social movements (see e.g. Touraine et al., 1983; Rüdig, 1990; Meyer and Kleidman, 1991; Meyer, 1993; Flam, 1994; Kriesi et al., 1995; Klandermans, 1997).

Second, my study may grouped into a new subdiscipline of sociology, namely *environmental sociology* (see e.g. Dunlap and Catton, 1979; Dunlap, 1994; Eder, 1996; Lash et al., 1996). The increasing political importance of environmental issues has drawn sociologists' attention to a variety of questions, which basically deal with the social dimensions of environmental problems, or the complex relationship between human societies and their physical environment. One of the current research orientations environmental sociology emphasizes the analysis of societal reactions to environmental hazards, both natural (e.g. floods and earthquakes) and man-made (e.g. technological risks; see Perrow, 1984; van der Pligt,1992; Bruhèze, 1992; Lidskog, 1994; Dunlap et al., 1994; Bauer, 1995; Rosa & Clark, 1999). Since I focus on *societal reactions to different uses of nuclear technology* it is obvious that I consider my thesis among the orientation described above.

These two fields of study (research on social movements and environmental sociology) are linked together by two major themes-*globalization* and *risk*. In my thesis, I have used the term 'globalization' to refer to my interest in the broader spatial dimensions of local conflicts and to the historical roots of controversies over the use of nuclear power. In addition, it refers to the process where the arms race and the threat of a global nuclear war accelerated the development of a societal phenomenon. Another societal consequence of the application of nuclear technology for military (and civilian) purposes was the rise of an anti-nuclear protest, which has today become virtually self-sustaining. Thanks to the growth of global risk awareness it has created a special nuclear culture.

My commitment to the theoretical approach called social constructionism, which has greatly influenced the study of social movements (e.g. Eyerman and Jamison, 1991; Bash, 1995; Klandermans, 1997) and environmental sociology (e.g. Hannigan, 1995), is a major methodological undercurrent in this work.

The conceptualization of nuclear culture as a semi-independent field where pro- and anti-nuclear actors advance their views in the context of specific cultural traditions and trough mass media led to the formulation of the following three elements that characterize my constructionist research orientation: (1) the idea of anti-nuclear protest as a dynamic interplay between different actors; (2) the importance of the cultural characteristics and contexts of the protest; and (3) the importance of the struggle over the risks of nuclear technology at different spatial levels.

This doctoral thesis comprises five articles (Litmanen, 1996a; Lidskog and Litmanen, 1997; Litmanen, 1998a, 1999a, and 1999b) and this summary article.[1] Instead of presenting the articles in chronological publication order I have chosen another principle. I have rearranged the articles to better reflect my general research objective, which is to study the spatial, temporal, and cultural aspects of anti-nuclear protest. The first article (Appendixes; Article 1) on anti-nuclear protest crystallizes my interest in spatial and temporal questions. Actions against nuclear technology have continued for decades at the international, national, and local level. In my conceptualization of the protest, activities at all these levels contribute to its formation. The first article deals mainly with international and national movements, while the focus shifts to local communities and cultural questions in the second and third articles. The unique character of each conflict is also discussed (Article 2). Furthermore, individual and collective reactions towards the plans to site a nuclear waste storage facility are studied in the framework of the cultural characteristics of each community (Appendixes; Article 3). Although cultural questions are in the forefront, the articles also deal with temporal dimensions. For example, in Article 2 I demonstrate how local struggles over nuclear waste have been transformed over time. Also spatial questions are briefly discussed with reference to the development of a national and an international nuclear culture, which often shape the local perception of risk (Articles 2 and 3). The fourth article (Appendixes; Article 4) on Finnish and Swedish nuclear waste policies and conflicts focuses on spatial (national policy vs. local reactions), temporal (the development of a national nuclear policy) and cultural (the local definition of the nuclear issue) questions. Finally, in the fifth article (Appendixes; Article 5), I return to the international character of nuclear culture, not to forget the role of national and local levels. In addition, I discuss the long-term definitional struggle over the nature of risks associated with nuclear technology in the framework of the global nuclear culture.

2 OBJECTIVE OF RESEARCH

Since the start of *the nuclear era* after World War II, social reactions towards the adoption and use of nuclear technology have ranged from passionate enthusiasm to deep suspicion. Nuclear technology has given rise to numerous controversies with people arguing for and against this technology. In this thesis, my emphasis is on analyzing the opposition to nuclear technology. My research objective is to study anti-nuclear protest, which includes all publicly expressed objections to, or criticism towards, the use of nuclear technology, the implementation of pro-nuclear a policy, or the plans to site a nuclear waste facility. In this thesis, anti-nuclear protest is understood as a cultural phenomenon, which ranges spatially from local and national activities to international and global ones, and which started shortly after World War II in 1945, and which pursues at a more comprehensive societal evaluation of nuclear technology and its risks.

I have divided *anti-nuclear protest* in three analytical groups on the basis of the focus of anti-nuclear protest, i.e. anti-nuclear protest may be directed against *nuclear weapons, nuclear power, or nuclear waste.* In the 1950s and 1960s, public criticism was mainly directed at nuclear weapons, including the development of nuclear weapons technology, nuclear weapons tests in the atmosphere, the adoption of new nuclear weapons systems, the siting of nuclear weapons bases, the arms race between the two superpowers, and the ever-present threat of a nuclear holocaust. Meanwhile, the protest against the civilian use of nuclear power grew slowly in parallel with the protest against nuclear weapons, and did not peak until the 1970s and 1980s. The new target for the anti-nuclear movement developed gradually as the utilization of nuclear technology increased in different countries. These two protest movements often overlapped, but sometimes the popularity of one of the protests caused a drop in the following of the other. Protests against nuclear waste emerged mainly in the 1980s and 1990s, when governments embarked upon a search for locations that would be suitable candidates for nuclear waste storage facilities, and also because a number of serious problems with existing nuclear waste reprocessing facilities were revealed. The three preconditions for the opening of a public debate on nuclear waste were: (1) the large quantities of spent nuclear fuel; (2) a decline in the demand of nuclear waste

for reprocessing by the nuclear weapons industry; and (3) the relaxation of secrecy on nuclear issues related to national defense and foreign policy.

Anti-nuclear protest is carried by *social movements and social movement organizations*[2] working at several different spatial levels. Each social movement consists of a minimum of two parts: (1) networks of groups and organizations, which are ready to mobilize protest actions to advance or oppose social change (which is the ultimate objective of the movements), and (2) individuals who take part in the protest actions or give support without participating in groups or organizations (Rucht, 1996, p. 186). Obviously, continuity and good organization are vital for social movements, and the presence of hundreds or thousands of associations, which consider themselves a part of the movement and conduct campaigns in the name of the movement is always a positive indication. These associations are parts of the social movements and they are often regarded as the cornerstones of the movements (Lofland, 1996, pp. 3-11). The distinction between a social movement (SM) and a social movement organization (SMO) may be objectified in the following manner: The latter usually has a permanent office. In this office, they generally have all the equipment they need to effectively organize their activities and, furthermore, they may have adopted the legal form of a registered association. In contrast, a social movement is not as easy to pinpoint geographically as a movement organization, because a movement consists of hundreds or thousands of movement organizations, persons, activity groups, and networks at different spatial levels. Lofland's (1996, p. 12) simplification aptly illustrates the difference between a movement and a movement organization: "SMs cannot be located in any single place or simply dialed . . . Instead, of you want to speak by phone or visit with such a conglomeration, you have to perform visiting activities with hundreds or thousands of organizations (and individuals and activities)."

Researchers studying anti-nuclear protest have conventionally focused on national movements (see Article 1; Litmanen 1998b). In my opinion, also the international aspects of national movements have to be considered in the analysis, since anti-nuclear protest is characterized by the joint prominence and cooperation of national movements in several countries. This approach highlights the overt international character of anti-nuclear protest. In addition to international movements, also supranational movements, such as Greenpeace or Friends of the Earth, promote their views globally with little regard for national borders. On the other hand, anti-nuclear protest also comprises many local movement organizations where actions are generally restricted to one community or county, but which are associated with national, international, and supranational movements. Through these connections even the smallest movement organizations are able to spread the word of a local protest to the general (nationwide or international) public. In summary, anti-nuclear protest is an active interplay between movements and movement organizations working at different spatial levels.

The division of anti-nuclear protest in three groups on the basis of the objective of protest (as presented above) is also applicable to movements, since some of them direct their activities against nuclear weapons, while others oppose nuclear power, or nuclear waste. However, I would like to make three remarks

with reference to this classification. Firstly, we must note that it is not self-evident that a single movement categorically opposes a single type of nuclear technology because movements are subject to transformations and they may reorient their activities from one goal to another, or they may expand their activities and set themselves several goals. Secondly, we must remember that an anti-nuclear movement is a network consisting of different types of organizations, which are not all single purpose organizations. Multipurpose organizations,[3] such as political parties or churches, may also have an important role in anti-nuclear protest. Thirdly, the support of other ideologically related movements, such as the peace movement and the environmental movement, is essential to the success of an anti-nuclear movement.

I studied the varying content of anti-nuclear protest from the perspective of social movements, social movement organizations, and conflicts. In my analysis, the terms 'social movement' and 'social movement organization' refer mainly to the national, international, and supranational levels, whilst the term 'conflict' is mainly applied at the local and regional levels. An analysis of the interaction between actors and within networks at these levels is one part of my study.

My second objective was to explore the social origins of anti-nuclear protest. In trying to understand the social reactions against nuclear technology, I used cultural risk theory (see e.g. Douglas, 1992; Milton, 1996, pp. 88-105; Lupton, 1999a, pp. 36-57; Lupton, 1999b, pp. 1-11). I undertook to grasp the cultural perception of (1) risks associated with nuclear waste (Article 3); (2) nuclear policy (Article 4); and (3) nuclear technology (Article 5). In other words, I did not restrict my research solely on the social movement, which in this case is more or less a product of a highly negative perception, instead I attempted to study a wide variety of cultural perceptions, which may take different forms in different places and different points of time.

Cultural risk theory facilitated closer examination of the cultural basis of local interpretations and definitions–a great help, since it has been very difficult for some actors in nuclear waste conflicts to understand why some people oppose the plans to site a high-level nuclear waste storage facility in their community. That is to say, I have tried to understand the cultural rationale used by local residents in evaluating the siting project. This approach is most visible in the article titled '*Cultural approach to the perception of risk. Analyzing concern about siting of a high-level nuclear waste facility in Finland*' (Article 3).

I am interested in cultural risk theory because lay people's views of risk and their suspicion of scientific risk calculations are at the heart of anti-nuclear protest. Now that risk research has started to proliferate also in humanities and social sciences, we have begun to understand how the general public and different communities react to risks and how they perceive risks. Sociological, social psychological, social anthropological, and psychological risk research has broadened the perspective of risk analysis formerly dominated by natural sciences and economics (see e.g. Douglas, 1986; Adams, 1995; Raivola, 1995; Kamppinen et al., 1995). The earlier one-dimensional picture of risks, and particularly of the public risk perception, has today more nuances. For me, cultural risk theory afforded an opportunity to examine the standards of rationality that prevail in some communities and influence people's risk perception. While studying local

nuclear waste conflicts in Finland (Eurajoki, Kuhmo and Äänekoski; location - see Article 2, Figure 1) I realized that risks associated with the waste management project were perceived differently in each of these communities, and that the definition of risk was partly based on local circumstances. Cultural risk theory offered me a powerful instrument for trying to grasp the substance of the protest. I realized that the standards of rationality vary from one culture to another, but inside each distinct culture these standards change very slowly since they have a solid basis in the social structure of the community. Thus, the established ways of reasoning do vary, but not arbitrarily.

In summary, risk is a polymorphous concept, which may be applied to numerous different contexts. For me, risk is a pivotal concept, which has helped me to understand (1) the social origins of anti-nuclear protest; (2) the development process of collective consciousness and related actions; and (3) the continuity of nuclear culture. The risks of nuclear technology have been subjected to a global societal evaluation process where the public has presented its demands on nuclear risks, ranging from the elimination of the causes of risk to wishes of improving the present risk management systems.

I regard anti-nuclear protest as a part of *a global nuclear culture*, which (1) is actively constructed in interaction between anti-nuclear protesters and pro-nuclear actors; (2) is a product of an interplay between actors at different spatial levels; (3) has a history consisting of historical developments within the nuclear industry and the government (nuclear policy); (4) consists of knowledge, beliefs, and values, which are compressed into tight interpretative packages for and against nuclear technology; (5) offers interpretative packages that facilitate the meeting of new events and changing circumstances; (6) is promoted through mass media; (7) is created by individuals (e.g. experts, activists, journalists, and artists), organizations, and movements; (8) must resonate with the culture of contemporary societies; and (9) is partly determined by external factors, such as changing economic and political cycles.

The concept of nuclear culture helps to understand the propagation of anti-nuclear protest in time and space. For instance, the article '*International anti-nuclear movements in Finland, France and the United States*' (Article 1) demonstrates how greatly local nuclear waste conflicts are indebted to international anti-nuclear power and anti-nuclear weapons movements. The movements of the previous decades established organizational structures, trained activists, tested a variety of actions, sharpened the arguments, educated the public, and created the means of symbolic opposition. All these activities have provided later generations of local activists with a wide range of techniques for opposing the siting of nuclear waste repositories.

The term 'globalization' is an inclusive label that covers all my interests in international questions treated in this thesis (for details on the sociology of globalization; see e.g. Featherstone, 1990; Robertson, 1992; Waters, 1995; Featherstone et al., 1995; Spybey, 1996; Scott, 1997). During the research process I became convinced of the dialectic relationship between local, national, and international levels in the nuclear issue. The local character of nuclear waste conflicts is interestingly intertwined with national and international developments in nuclear culture (see e.g. Eiser and van der Pligt 1988, 150-178; Eiser et al. 1995).

One fascinating aspect of nuclear culture is the global character of the attitudes toward nuclear issues. As I demonstrate in my article titled *'From the golden age to the valley of despair. How did nuclear waste become a problem?'* (Article 5), the residents' attitudes in the potential siting communities do not develop in isolation; instead, they closely reflect prevailing international trends in attitudes toward the nuclear issue. This is not to say that local circumstances do not matter, but I want to stress the importance of international influences on local attitudes and the importance of locally expressed attitudes in the formation of the international opinion climate. Even the smallest local organizations opposing a proposed nuclear waste storage facility have to be considered in the context of the nuclear era and large anti-nuclear movements. In order to understand local nuclear waste conflicts and local anti-nuclear protests we have to find out why local communities no longer are local in the traditional sense of the word, and exactly how the construction of anti-nuclear protest is an interplay between different spatial levels.

I studied the spatial and temporal dimensions of anti-nuclear protest in the framework of *constructionist theory* (see e.g. Berger and Luckmann, 1967; Latour and Woolgar, 1986; Woolgar, 1988; Burr, 1995; Bash, 1995; Collin, 1997; Velody and Williams, 1998; Gergen, 1999). My constructionist analysis of anti-nuclear protest consists of five levels: (1) a reconstruction of the history of Finnish anti-nuclear protest, including a comparison with international anti-nuclear protest (Article 1); (2) an analysis of the linguistic struggle over nuclear waste in local communities (Article 2); (3) a study of the interaction process between the opponents and proponents of nuclear waste in local nuclear waste conflicts (Article 2); (4) an examination of local Finnish nuclear waste conflicts in the context of the Finnish national nuclear policy, including a comparison with Swedish conflicts and nuclear policy (Article 4); (5) an investigation of international trends in attitudes toward the nuclear power and nuclear waste issues, and an analysis of the construction of the social definition of the risks of nuclear technology (Article 5).

As I described above, I tried to grasp local conflicts by setting them in a broader societal context. In my Licentiate Thesis (Litmanen, 1994), I applied constructionist theory to local circumstances, the residents' definitions of nuclear waste, and social interaction in nuclear waste conflicts. At that time, my research question was formulated in the following way: What kind of a conflict is a nuclear waste conflict and what have the different parties in the conflict accomplished. Later, when analyzing local nuclear waste conflicts for my Doctoral Thesis, I realized that the widespread debate on NIMBY phenomena (Not-In-My-Backyard Syndrome; see Armour, 1984) had turned the attention of earlier researchers to the wrong direction (for criticism on NIMBY, see e.g. Rabe, 1994; Articles 2 and 3). Therefore, instead of being trapped to a biased concept, I decided to adopt a constructionist perspective, which provided more room for local views on the issues, helped to grasp the complex dynamics of the conflict, and was more culturally sensitive.

Since the goal of the research was to construct a credible picture of the spatial, temporal, and cultural dimensions of the protest against nuclear technology, it is hardly surprising that I have not stuck to any single research method or coherent perspective from the beginning to the end of the process. This kind of openness to different methods and selective use of reference material is not an exception among

the members of the social constructionist school of thought[4] (see e.g. Dean, 1998, pp. 184-190; Mackenzie, 1998, pp. 204-206). Since my goal was to study wide societal processes and complex interaction between movements an their opponents, I always gauged the usefulness of my research methods by considering my current research stage and research questions. As Burr (1995, pp. 13-14) noted, multiplicity and varying situational factors are in the center of constructionism. Hence, my commitment to pluralism (earlier) and contextualism (later) had a tangible effect on my methodology.

In Chapter 3, I will review the attached articles in more detail and describe the methods I have used. After that, I will discuss the general framework of my study. In Chapter 4, I will discuss the spatial, temporal, and cultural elements of my analysis. It starts with the description of the development of global risk awareness and goes on to analyze various applications of the concept of risk. After that, the chapter deals with the political and academic functions of social constructionism and its epistemological assumptions. In the end, we return to the beginning and demonstrate how risk not only produces collective consciousness and action, but it is in itself a social and collective construct. Finally, Chapter 5 draws this study to a conclusion.

3 SUMMARY OF FINDINGS AND METHODS

3.1 International anti-nuclear protest

The first article (*'International anti-nuclear movements in Finland, France and the United States'*) serves three functions. Firstly, the article includes an explicit description of the spatial and temporal dimensions of anti-nuclear protest. For instance, in the case of Finland[5] where nuclear technology was not used until the 1970s, I examine the importance of the international context and its influence on the national anti-nuclear weapons movement. The origins of the national movement can be traced to the year 1949, when representatives of Finnish peace movement organizations attended the Paris Peace Conference. Secondly, anti-nuclear protest is analyzed in the context of three nations, which have dissimilar cultural and political histories, as well as different nuclear policies. Basically, the difference between Finland and France (or the United States) is that in Finland nuclear policy has never been as closely integrated to national defense, foreign, and security policies as in France or the United States, which posses nuclear weapons. Thirdly, the study constructs a broader spatial and temporal context for local nuclear waste conflicts in Finland. Social reactions towards the plans to site a high-level nuclear waste facility in Eurajoki, Kuhmo and Äänekoski did not develop in isolation, but they reflect the long-standing international struggle over nuclear technology as well as local cultural circumstances.

The goal of the article is to analyze (1) the development of the international anti-nuclear movement,[6] and (2) the interaction between national anti-nuclear weapons and anti-nuclear power movements. In the case of Finland, the anti-nuclear weapons movement was very strong as early as in the 1950s because three influential peace movement organizations carried the protest during the decade. The Marxist-Leninist faction that dominated the peace movement was favorably inclined to nuclear power, which meant that the emerging anti-nuclear power movement did not gain any support from the anti-nuclear weapons movement. Also the most important environmental movement organizations were headed by members of this faction. In this situation, the movement opposing nuclear power

was forced to establish relations with other environmental movement organizations to which the dominance of the Marxist political faction did not extend. Activists working against nuclear power also took recourse to the support of other Scandinavian environmental organizations in the beginning. Although cooperation between the two movements was strenuous to start with, the anti-nuclear power movement eventually did support the protest against nuclear weapons and the activities of peace movement organizations in the end of 1970s and in the beginning of the 1980s.

Both movements have had three periods of active mobilization. Mass mobilization of the anti-nuclear weapons movement has taken place during the Cold War from 1957 to 1964, during the process of stationing cruise missiles in Europe from 1979 to 1987, and during the French nuclear tests in Muroroa from 1995 to 1996. Meanwhile, the emergence of local groups during the years 1971–1976 denoted the first phase of the anti-nuclear power movement. The second phase occurred at the end of the 1970s, when a social movement with a more widespread following was established. At the same time, the growth of the national anti-nuclear power movement soon led to increased international cooperation. The last peak in anti-nuclear power mobilization occurred after the Chernobyl nuclear accident in 1986 and it lasted for a couple of years.

At the end of the 1970s and in the beginning of the 1980s the mass mobilization of both movements peaked simultaneously. Both the civilian and the military use of nuclear technology were criticized, but partly for different reasons. The oil crisis had given the impetus to the expansion of nuclear power industry, but it was accompanied by increasing suspicion of the security and economy of nuclear power plants. Simultaneously, the new Cold War between the Superpowers and the continuing arms race heightened public criticism against nuclear weapons. Supporting one movement was no longer incompatible with supporting the other; instead they strengthened each other. The spillover from one movement to another was possible because both movements supported a ban on of nuclear technology exports in the fear of new nuclear weapons states.

The principal method used in this article is secondary analysis of academic research literature. For instance, the construction of the Finnish cases is based on relevant academic studies, books, and articles. The problem with the Finnish anti-nuclear weapons movement was that (1) it was not treated as a separate issue in the texts dealing with the Finnish peace movement; and (2) the peace movement consisted of three influential peace movement organizations, which were usually described and analyzed separately, and not in the context of the whole peace movement. To get an overall picture of the anti-nuclear weapons movement in Finland, I had to analyze various miscellaneous texts and reconstruct a completely new picture of the movement. Analyzing the anti-nuclear power movement was likewise difficult, but for a different reason. The anti-nuclear weapons movement was a part of the influential peace movement, which was relatively well documented in history books and academic studies. However, the anti-nuclear power aspect was largely unexplored and my reconstruction of the history of the anti-nuclear power movement is therefore only based on a few texts. As a result of that, my picture of the movement and its relationship to the other movements is not as elaborate as it could have been. Furthermore, I could not verify all the facts

from different sources since there were so few texts available. The only primarily data I used in Article 1, which focused on the anti-nuclear weapons movement, were news items and other texts on the French nuclear tests in Muroroa during the years 1995–1996 (15 June 1995–12 February 1996). The data consists of texts on nuclear tests, comments on the French policy and descriptions of the protests against nuclear tests around the world. The data (total N= 265) was gathered from the national newspaper *Helsingin Sanomat* (N=110); *Keskisuomalainen*, the leading newspaper in the County of Central Finland (N=64); *Hufvudstadbladet*, the largest newspaper of Swedish speaking minority in Finland (N=33); *Demari*, the newspaper of the Finnish Social Democratic Party (N=28); and *Kansan* Uutiset, the newspaper of the Left Alliance Party (N=30).

3.2 Anti-nuclear protest in the localities

The second article (*'Environmental conflict as a social construction. Nuclear waste conflicts in Finland'*) is a reworking of my licentiate thesis, and it serves as a summary of my earlier findings (see Litmanen, 1994). Hence, the article deals with both theoretical and empirical questions. On the one hand, I was dissatisfied with biased NIMBY theories, and my goal was to develop a new theoretical framework for analyzing environmental conflicts. I realized that I would have to come up with an approach that would focus on the interpretations and meanings of local actors, instead of viewing the dispute solely from the perspective of government authorities or power company representatives. The main argument of the article is that in order to understand nuclear waste conflicts we must focus on the social interaction and social interpretations that constitute the conflict. This kind of a constructionist research design ensures the unprejudiced treatment of both conflict partners, although my primary concern lay with the local residents and parties opposing the siting of a nuclear waste facility in their community. On the other hand, I applied constructionist theory to selected empirical nuclear waste conflicts in Finland. In the 1980s, the Finnish power company Teollisuuden Voima Ltd. (TVO) surveyed the bedrock in three different locations in the search for a site for a high-level nuclear waste storage facility. Local residents in these municipalities (Eurajoki, Kuhmo and Äänekoski) did not eye the geological surveys and the plans of the company with pleasure. Gradually these local debates escalated into a lengthy struggle over nuclear waste.

My constructionist analysis focuses on the struggle over definitions. I made an analytical distinction between the social definition of nuclear waste and the social definition of a nuclear waste conflict. The struggle over definitions is at the heart of the conflicts since nuclear waste as a material object is not familiar to the public, and the definitions constructed by the nuclear industry or experts (which dominate public debate) ignore most of the difficult social, psychological, and ethical questions intertwined with the issue. The key concept that helps to overcome the problems of naïve realism is the interpretative flexibility of a material object. This idea is characteristic of constructionism, and it implies that meanings and interpretations associated with an artifact are always produced in social

interaction where different parties give different linguistic definitions to the artifact. Different parties always view an artifact from different perspectives.

Each party involved in a conflict construct definitions, which are influenced heavily by the lifestyle, living environment and, generally speaking, social background of the party. In my analysis of the data I reduced the broad spectrum of different definitions to three main alternatives: scientific-technical, economic, and political definitions. At the beginning of a conflict the scientific-technical and economic definitions held by experts and authorities tend to dominate, but local residents may later shake the foundations of these definitions by modifying them to suit their purposes. They may also politicize the issue by arguing that nuclear waste as a material object cannot be perceived solely from the perspective of natural science–instead, the social, psychological, and ethical aspects of nuclear waste should also be taken into consideration.

My study of the nuclear waste conflicts in Eurajoki, Kuhmo and Äänekoski comprised the analysis of the debate in local newspapers, and interviews with local activists and authorities (N=16). Additionally, I reviewed all official municipal documents dealing with the nuclear waste issue (and in the case of Eurajoki also the nuclear power issue). Local newspapers turned out to be good sources–particularly so for the purposes of examining social interaction in a conflict situation and the struggle over definitions. All articles on the nuclear waste issue were gathered from the local newspapers in Kuhmo (*Kuhmolainen*, N=244, consisting of news items, letters to the editor, etc. from the period 1985–1993), Eurajoki (*Satakunnan Kansa* and *Länsi-Suomi*, N=64, 1990–1993) and Äänekoski (*Sisä-Suomen Lehti*, N=108, 1985–1993). Although I could not construct a full picture of the complex interaction process of a conflict by limiting myself to these newspapers, I would say that together with the analysis of the interviews I was able to create a reliable chronological timeline of the most important events, writings, and speeches in these municipalities. This kind of a reconstruction of historical processes from various sources facilitated the formation of an overall picture of the definitional struggle over nuclear waste. The resulting lengthy descriptions of each case were subsequently reduced to shorter chronicles. My emphasis was on scientific, economic, and political definitions, and the contextual factors behind each local conflict.

Before presenting my principal findings I want to mention that the prominence of contextual factors is an important element in constructionist analysis (see Chapter 4 for details on constructionism). My analysis of the data showed that characteristic contextual features were different in each case.

In Eurajoki, the debate on high-level nuclear waste was characterized by the presence of the nuclear power station. The root cause of the nuclear waste conflict can be traced to the 1970s, when the local authorities welcomed the nuclear power plant, but said no to nuclear waste. In the 1970s, the votes on the construction of the power plant were almost equal in the local council. One of the reasons why the supporters of the project won the vote (by one vote only) was that the power company (Teollisuuden Voima Ltd., TVO) had assured they would solve the waste problem by selling high-level waste abroad. This historic debate was recalled every time local people discussed high-level nuclear waste. In Eurajoki, the disputes revolved around the sizeable economic benefits of nuclear technology for the

community, and the political nature of high-level nuclear waste. Subsequently, several successive local councils made a decision in principle not to give their approval to the siting of nuclear waste in Eurajoki until the policy was finally reversed in 1994.

Meanwhile in Kuhmo, the idea of siting a nuclear waste facility in the community was in 1985 interpreted from the conflicting perspectives of positive economic values, ecological risks, and interregional inequity. Interplay between the supporters and opponents of the project was entrenched in the same patterns for years. Both parties tried to disprove the arguments of their opponents. Pro-nuclear arguments emphasizing the economic importance of the project for the prosperity of the municipality were criticized by arguing that the economic impact of the project in Kuhmo, particularly on agriculture and tourism, would be negative. Between 1985 and 1993, the power company had a dominant role in the struggle over definitions. The power company made a great effort to keep scientific-technical and economic definitions working in the project's favor. Among other things, it tried to prove that the risks of nuclear waste were minimal, and that the project would increase tourism to the municipality. One of my findings was that in Eurajoki, the conflict was debated in the local council already at an early stage, but in Kuhmo a lengthy political battle was fought before the issue of nuclear waste was brought to the municipal council.

The case of Äänekoski differs from the two cases above in the sense that the setting of the conflict changed dramatically during the period between 1985 and 1993. The proposed location of the waste disposal facility, the small Municipality of Konginkangas, was merged into the neighboring town of Äänekoski, and two strong nature conservation associations from neighboring Äänekoski and Saarijärvi joined in the conflict. Consequently, the conflict escalated from a local issue to a regional one. In Eurajoki and Kuhmo, the conflict remained more or less in the hands of local residents, but in case of Konginkangas the debate spilled over to the neighboring municipalities of Äänekoski, Saarijärvi, Kannonkoski and Suolahti. The scene of the conflict changed, and this resulted in changes in the definition of nuclear waste. First, the Citizen's Initiative campaign and two Nature Conservation Associations managed to challenge the dominant scientific-technical definition of nuclear waste. Second, the nuclear waste disposal project was now perceived in Äänekoski (including Konginkangas) from the perspective of a town with industrial traditions, not from the perspective of an agricultural community.

In addition to these empirical results, the summary section of the second article also includes theoretical deductions. In a constructionist analysis of nuclear waste it is essential to focus on the process with which waste is constructed as a meaningful social object within each community. The material object, nuclear waste, is interpretatively so flexible that local residents are able to attach a variety of different meanings to it. These new meanings stem, e.g. from everyday experience, local traditions and special circumstances. As a result, these meanings also embody cultural symbols through which they are linked to value and belief systems. The role of culture as the provider of values and beliefs for individuals is discussed in more detail in the other articles (e.g. Articles 3 and 5).

3.3 The cultural perception of the risks of nuclear technology in the localities

The third article ('*Cultural approach to the perception of risk. Analyzing concern about the siting of a high-level nuclear waste facility in Finland*') deals with the cultural perception of risks. I argue that in order to understand the nature of anti-nuclear protest, we should focus *on the cultural perception of nuclear technology*. In the article, I take up the cases of Eurajoki, Kuhmo and Äänekoski, i.e. the finalists in the siting process of the Finnish high-level nuclear waste storage facility. These were the municipalities where the nuclear power industry made preliminary geological surveys for the final disposal of nuclear waste over the years 1993–1996. The method of my study was the statistical analysis of empirical survey data gathered in 1994 (a total of 1,500 randomly selected adult people in the three municipalities and a control group of 200 people). The level of response to the survey was 52%.

One indication of the way local people perceive the plans to site nuclear waste in their vicinity is the existence of conflicts where the inhabitants actively raise a debate over the issue. The aim of article three is to determine the social basis of these pro- and anti-nuclear groups and to understand the cultural logic of their activities. First of all, I rejected the idea of simple individualistic risk perception and replaced it with a more collective one. I also acknowledged the fact that differentiated knowledge and the rational calculation of selfish interest are a part of risk perception, but it is important to note that they are always based on collectively shared social values, beliefs, and norms. Hence, the views people express on nuclear waste have not developed in isolation, but they are founded on the social background, social networks and local circumstances of each individual. Although I focus on the social background of individuals and the role of the local community, I also briefly discuss the importance of external factors and events on the assessments of community members. These issues are discussed in more detail in the fourth and fifth articles.

Local attitudes toward the plans in Kuhmo were very similar to those in Äänekoski. In these municipalities, almost 50% of the residents were very concerned about the health, safety, economic, social and environmental impacts of the proposed facility. The same factors were also surveyed in Eurajoki, where the figures varied from 25 to 35 percent, i.e. the majority of the residents were not concerned or were only slightly concerned. My conclusion based on these empirical results is that the cultural perception of nuclear waste in Kuhmo and Äänekoski differs from its perception in Eurajoki. In the end, I derive an explanation for these results from cultural risk theory: familiarity with nuclear technology is the decisive factor. In Eurajoki, people were familiar with living with two nuclear power stations, whereas in Kuhmo and Äänekoski this type of technology was not a part the local culture and people's way of life.

This is not to say that the project is perceived as trouble-free in Eurajoki. The question of becoming the host of a high-level nuclear waste repository divides opinion, and the number of opponents almost equals the number of supporters. Additionally, there is a large group of people who did not express their views, had not yet made up their minds, or were simply indifferent. From a cultural

perspective it is quite understandable that Eurajoki as a traditionally agricultural community has not yet completely embraced nuclear power as an undisputed issue. In Eurajoki, the production of nuclear energy has continued for twenty years, but even today a part of the residents are suspicious of or even hostile towards the plans to site a nuclear waste storage facility in the municipality.

My analysis of the survey data showed that social background is closely linked to attitudes toward nuclear waste. The supporters appear to be better off in general, whilst the opponents are more likely to be found among the underprivileged. It was very surprising for me personally to discover during the survey of the residents' attitudes that overall societal inequality, societal divisions and the division of power were so clearly evident also in this issue. The results indicated that the cultural logic of risk perception is also a question of the perceiver's position in societal structures, i.e. the social position of each individual seemed to predict his or her attitudes toward the nuclear waste issue. The attitudes toward the nuclear waste issue are probably evaluated in the context of several previous and contemporaneous societal projects that affect people's well being.

3.4 Local protests in the context of national nuclear policy

The fourth article (*'The social shaping of radwaste management. The cases of Sweden and Finland'*) was written together with my Swedish colleague, Rolf Lidskog. The article is a comparative study of nuclear waste policies and nuclear waste conflicts in Sweden and Finland. The constructionist theoretical framework we used was adopted from our earlier studies (see Lidskog, 1994; Litmanen, 1994), but now we set out to study the social shaping of nuclear waste management in these two countries, and how the national nuclear waste policy is perceived in the municipalities that qualified for the siting of the repository. Our main argument is that in order to grasp local conflicts we also have to explore the shaping and implementation of national policies. For us, each local conflict revealed the dynamic interplay between the local and national levels.

Both of us had already analyzed empirical data from our respective local conflicts, but now we embarked upon the task of placing this information in the broader contexts of national policies. Among other things, this denoted that we had to make a constructionist policy analysis before being able to compare the cases. During the process of writing the article I collected and analyzed both primary and secondary data. Re-examination of my earlier analysis of local conflicts gave me an opportunity to amend the results and sharpen my argumentation; but on the other hand, I could also introduce completely new sources of data. I had started gathering press cuttings on the nuclear power issue systematically when I took up research on anti-nuclear protest in 1993. For several years I monitored two major newspapers; *Helsingin Sanomat*,[7] which has the largest circulation of all newspapers in Finland, and *Keskisuomalainen*,[8] which is the largest newspaper in the County of Central Finland. Based on this newspaper data I made the observation that the Finnish nuclear waste policy changed drastically over the period (1993–1997) my data (N=855) was gathered. One of the reasons for the change was the pressure

foreign environmental groups and politicians put on the Finnish government to ban the export of high-level nuclear waste to Russia, because severe environmental and health hazards had been discovered in the reprocessing facilities where the Finnish waste was destined to go. This process was well documented in the newspapers. Furthermore, I studied official documents and earlier academic theses on the subject to construct an overall picture of the Finnish nuclear policy from the 1950s to the 1990s. The secondary analysis of these documents and earlier studies enabled me to reconstruct the development of the national nuclear power and waste policies.

In our analysis of local nuclear waste conflicts we concentrated on three cases. In Sweden, we picked Storuman, while in Finland the chosen municipalities were Kuhmo and Äänekoski.[9] After initial comparison we concluded that local nuclear waste conflicts should be viewed in the context of broader historical and structural circumstances, because local conflicts are always a part of the historical development of a nuclear policy. In both countries, the national nuclear waste policy had progressed to the same stage. The owners of nuclear power plants were carrying out research in order to find a suitable site for a high-level nuclear waste storage facility. Furthermore, in both countries, the issue was open for discussion before final decision-making. Particularly the residents of the candidate municipalities were obliged to take the plans up for consideration.

During the research process we found out that local people were carried away by the ongoing debates on the national and international nuclear waste problem. Although we consciously focused on the role of local definitional struggles in the social shaping of a national nuclear waste policy we immediately noticed that also extra-local actors were involved in these conflicts. For instance, representatives of the nuclear industry, technical experts, various national level authorities, and national environmental organizations took part in local debates–either directly or through the media. One of our most important findings was the co-existence of economic, scientific-technical, and political definitions. We concluded that in addition to these definitions, we are also dealing with strategic argumentation in varying social and cultural circumstances. Arguments for and against the nuclear waste storage facility are shaped in the interaction between all actors involved in the conflict. We emphasized the importance of each locality, but we were also well aware of the fact that the creation of a local consciousness and sociospatial identity takes place in a broader context and involves external social structures and practices.

3.5 Anti-nuclear protest as a part of a global nuclear culture

The last article (*'From the golden age to the valley of despair. How did nuclear waste become a problem'*) deals with the question of how and why nuclear waste has become a global problem in all nations using nuclear power. In the article, I construct an imaginary trajectory of the nuclear issue by analyzing previous studies, attitude surveys, and nuclear debate in the press. After that, I briefly

review the most common explanations, and finally I sketch a more extensive theoretical framework for understanding the controversial nuclear issue.

One way of characterizing the debate on *nuclear technology* after World War II is to divide it in three temporal phases: (1) the age of dualism; (2) the rise of the anti-nuclear discourse; and (3) the period when life imitates art (cf. *'The China Syndrome'*). The age of dualism begun when the USA dropped the atom bombs in Hiroshima and Nagasaki with the world as a witness of the destructive power of nuclear weapons. A few years later, the memories of these tragic events turned into a strong enthusiasm about the civilian applications of nuclear technology. However, the bright prospects for civilian applications were always shadowed by nuclear weapons tests in the atmosphere, which raised strong criticism. During the second phase of nuclear debate protests against the civilian use of nuclear technology gained momentum as the oil crises opened a lively debate on energy policy in the beginning of the 1970s. Furthermore, the nuclear weapons states tried to prevent the proliferation of nuclear weapons to new countries, the inadequate safety standards of nuclear power plants were taken under discussion, and anti-nuclear activists stressed the dangers of radioactive material in the atmosphere regardless of whether it originated from a nuclear reactor or a nuclear weapons test. The third phase of the debate started in the end of 1970s, when the Hollywood film *'The China Syndrome'* was released only eleven days before the nuclear meltdown in Harrisburg on March 28, 1979.

As a result of the negative publicity and increased criticism the public became more interested in nuclear technology, especially *nuclear power*. In the United States, attitude surveys indicated a shift from enthusiasm (at the beginning of the 1970s) to ambivalence (at the end of the 1970s), and later another shift from ambivalence to opposition (in the 1980s). In Europe, the monitoring of public attitudes towards the nuclear power question was not as systematic as in the United States, but the result of the first standardized opinion surveys at the end of the 1970s and in the beginning of the 1980s confirm the fluctuations described above. The only exception is France, where the majority of citizens were in favor of the expansion of nuclear industry. The effects of the 1986 Chernobyl accident on public attitudes are thoroughly documented in several studies, which indicate that public support for nuclear power collapsed immediately after the accident, but in the course of time there has been some recovery (there was also a direct relationship between the geographical distance from Chernobyl and public attitudes). Attitude surveys conducted in Finland in the 1980s and 1990s show that a period of decreasing opposition between the years 1983 to 1985 was followed by a sudden peak in opposition in 1986 and 1987. After that, between the years 1988 and 1991, attitudes were stabilized.

Also public attitudes toward *nuclear waste* reflected the growing doubts about nuclear technology and the sluggish development of nuclear waste management. At the end of the 1970s, the public was not yet truly concerned about nuclear waste, but in the early 1980s the attitudes were in transition. Strong anti-nuclear and environmental movements criticized the nuclear industry and questioned the future of all nuclear technology. This criticism was one of the factors that led to the serious search for a solution to the problem of nuclear waste. During the 1980s governments and the nuclear industry searched for places that would qualify for

the siting of nuclear waste facilities, but in most municipalities they were met with strong local opposition supported by national movements. According to studies, the majority of West Europeans at that time opposed the siting of such facilities in their localities. Thanks to the development of nuclear waste management public attitudes have started to change. Attitude surveys conducted in Finland indicate that opposition to nuclear waste in the proposed localities has gradually decreased. However, as late as in the beginning of the 1990s the principal conclusion that could be drawn from such surveys was that the only possible places for siting storage a facility would be communities where nuclear industry has established its position and generated prosperity for the local residents. In Finland, this prognosis was proven correct now that the nuclear waste management company, Posiva Ltd., suggested that all high-level nuclear waste should be buried in the bedrock of Eurajoki, which hosts two of Finland's four nuclear reactors.

In order to chart the basic reasons for negative attitudes toward nuclear waste we must also take notice of the physical substance of nuclear waste. Ultimately, people are afraid of new nuclear accidents that could release radioactive material in the atmosphere and subject them to radiation. Hundreds of nuclear reactors all over the world produce radioactive waste, and without proper management it could have dangerous, even fatal consequences to people and the environment. In Article 5, I also discuss the most common sociological explanations for the negative attitudes toward nuclear waste. To summarize, academic studies currently favor four types of interpretations. They emphasize (1) the historical roots of nuclear fears; (2) the negligence of the issue of nuclear waste management by the nuclear industry; (3) the spillover effect from the nuclear weapons movement; and (4) the transformation of our society from an industrial society to a risk society.

In the end, I outline a cultural approach to the understanding of attitudes toward nuclear technology in general. The concept of nuclear culture refers to a semi-independent field, which has its own frame of reference, symbols, metaphors, meaningful events, discourses, and established patterns. In a manner of speaking, it is a kind of pool or store where the actors may retrieve crystallized rules of interpretation for events and issues. Long-standing interaction between the actors has created this pool of pro- and anti-nuclear interpretative packages, which are employed whenever new events are encountered, and which may be updated if circumstances inside or outside the field change. Indeed, we should never forget the world outside nuclear culture, because the development of these interpretative packages parallels general struggles over the development of modern societies.

4 THE SOCIETAL EVALUATION OF NUCLEAR RISKS

Anti-nuclear protest is a complex process that takes place at several spatial levels. It is a unique cultural phenomenon with a long history. In my analysis of the spatial and temporal dimensions of the protest I have focused on local, national, international, supranational, and global levels after World War II. As my treatment of globalization in the previous chapter indicated, the spatial levels are closely interconnected or even intermixed. Also, the latest sociological research[10] on globalization has shown that the term 'globalization'[11] has today become established as an expression reflecting the development of the human experience and social integration into a new phase where nation-states and their citizens are increasingly dependent on each other (Kilminster, 1997, p. 272). Recurrent debates on topics that cross national borders have increased the sense of dependence among people. For instance, topics such as global warming and the threat of a nuclear war have demonstrated to us that a single nation-state is often quite powerless in the face of these problems. At the same time, differences between nation-states have decreased now that ideas, information, capital, and labor can move freely almost anywhere in the world (Eade, 1997, p. 2). In this chapter, I will discuss the spatial, temporal, and cultural dimensions of anti-nuclear protest in more detail.

As I demonstrated in Chapter 3, the long-standing debate on nuclear technology has given birth to a unique nuclear culture, which is a kind of a pool of interpretations for opponents and proponents alike to use. I will analyze this nuclear culture from the viewpoint of risk. In a way, risk is a sociological paradox since it can be studied as a collective construction on the one hand, but on the other hand so-called 'objective risks' construct collective consciousness (see e.g. Lupton, 1999a). As a rule, sociological risk research[12] has previously focussed on the question of how risks are socially constructed and why we accept certain risks and not others. However, my research on the anti-nuclear weapons movements has shown that risks also construct our collective consciousness–even new collectives and communities–which declare the eradication of risks, reduction of risks, more equal distribution of risks, or better societal management of risks as their goals (Article 1).

My research orientation in this thesis is characterized by contextual, procedural, and holistic social constructionism (see also Collin, 1997, p. 230). In order to understand the complex dynamics of a construction process, we cannot reduce the production of meanings only to the level of an individual, nor to the collective level. On several occasions I put forward that in order to understand peoples' perception of risks we have to leave room for individual actors and their interpretations of the issues at stake (e.g. article 4); and, second, we have to pay attention to the collectively shared perceptions of risks (article 3); third, we must remember that these interpretations are formed and reformed in prolonged interaction between the actors (article 2 and 5); and, fourth, we have to consider the contextual and embedded nature of individual and collective interpretations, which means attaching them into the relevant societal, historical, and geographical contexts (e.g. article 1).

What I found particularly useful in constructionism in the analysis of anti-nuclear protest is that it offered me a promise of polyphony and self-reflection. In modernist tradition, people are typically positioned in debates as unified egos, singular and coherent selves. Also, different parties to a conflict are usually conceptualized as one-dimensional actors, who would soon reach a dead end in any conversation. However, constructionist analysis of conflicts has demonstrated that parties to a conflict, in fact, speak with many voices, are self-reflective, question their own attitudes, learn in a dialogue, and change their argumentation in response to changed circumstances. Language is not only a descriptive tool used in relating to the outside world, but it is also a tool, which is used to establish powerful meanings. Constructionism is based on the assumption that our understandings of various issues are not homogenous and unambiguous, but complex, ambiguous, and liable to change. Hence, cultural understandings also contain incoherence, disputes, and different ways of reasoning (Mackenzie, 1998, p. 217).

4.1 The rise of global risk awareness

Theorists have presented many analytical classifications[13] of the varied dimensions of globalization, but for the purposes of this thesis I will rest on Kilminster's (1997, pp. 258-259) division. He analyzed sociological debate on globalization from economic, cultural, and military perspectives. Kilminster established that the neo-Marxist theory of (economic) world systems[14] is currently the most influential theory on globalization. In this study my emphasis is on the cultural and military dimensions of globalization, since these two aspects are vitally important when trying to analyze the social construction of anti-nuclear protest. Instead of focussing on economic globalization,[15] I take the view that rapid military globalization after World War II together with gradual cultural globalization produced ideal preconditions for the rise of a global collective consciousness, which also included social movements acting against nuclear technology (cf. Robertson, 1992, p. 184).

Scholars who have studied the consequences of survival and status struggles of the Cold War parties under the threat of nuclear war, have stressed that its was during the Cold War that mankind became a single unit and globalization produced a new level of social integration. Van den Bergh (1992, pp. 42-44) writes that World War II was the first truly global war. After the war, competition between the Superpowers penetrated all parts of the world and gave birth to a global dependence on other nations (van den Bergh, 1992, p. 44). When the Superpowers attempted to gain control over large territories, it called for the development of efficient means of communication, but also the development of economic and monetary dependency. These differentiated, dense, and extensive networks of global dependency made both the Superpowers as well as smaller nations increasingly vulnerable to many kinds of disturbance. Consequently, the maintenance of a global military order and dependency called for more mutual coordination. Cooperation was also required in order to maintain the social structure of all societies involved and for settling any conflicts peacefully.

The introduction of nuclear arms not only revolutionized weapons systems and upset the arms race between the Superpowers, but it forced the Superpowers to cooperate with each other at an unprecedented scale, even to the extent that they were forced to take responsibility for global security (van den Bergh, 1992, p. 249). As a consequence of the threat of a nuclear holocaust, rapid global economic development, dependency on scientific-technological development, and the gradual awakening to environment crises we have become aware that the world is our common home (van den Bergh, 1992, p. 259).

Extensive cultural globalization, which is an important precondition for global social movements, took place in parallel with military globalization. The development of a global awareness and the creation of a global perspective were important processes in the advancement of the ideologies of peace, anti-nuclear, or environmental movements. The way in which an individual's awareness of the threat of nuclear war or environmental problems was transformed to a global awareness was essential for the success of the movements. Also, the rapid development of electronic media and international communications technologies created favorable circumstances for new kinds of social phenomena. For instance, television companies adopted satellite technology, which gave them the opportunity to report events live from the other side of the world. Consequently, when hundreds or thousands of people gathered on the streets to demonstrate against nuclear arms in one country, television coverage of the event multiplied the effects of the protest (Spybey, 1996).

The developments detailed above broadened our perspective of the world and introduced a new sense of proportion to local experiences. For example, Kilminster (1997) notes that modern communications technologies and access to global information are changing both the world and us. Symbolic representation, political culture, information technology, global communications, and social movements are all important factors in this process. Particularly global communications and electronic media, such as television, have introduced a new world of images of faraway places, people, and events to us. Cultural globalization has challenged traditional cultural concepts, such as the ideas of a national culture and a local culture, because global cultural developments tend to overrun local

communities (Albrow et al., 1997, p. 28). It also forces us to reconsider the concept of 'community', since it is no longer possible to analyze a community and assume that everything local is primal, original, and more real. The new way of conceptualizing a community involves detaching the concept from its traditional geographical framework and understanding that non-local and non-spatial factors are structuring and shaping communities. In place of, or parallel with, traditional communities we today have new forms of collectivity, which have arisen on the basis of global social and cultural developments assisted by the media and new communications technologies. Researchers have even attempted to classify the new communities by assigning them descriptive names, such as imagined, diasporical, or hybrid communities. Globalization has also created new contacts with culturally different, far away places, and the whole world has become articulated as an arena for commercial, intellectual, environmental, and other practices. Modern communications technologies have accelerated the separation of communities and local cultures from their historical roots, and this has denoted profound changes in the concept of culture in general (Albrow et al., 1997, pp. 23-29).

Let us consider the effects of globalization on local cultures and communities. A classical way of conceptualizing a community is to enunciate that local culture connects a community to a particular place. The validity of these traditional conceptualizations of local social landscapes in terms of a community or a neighborhood needs rethinking in the era of globalization. Today, the shaping of a community does not take place in a specific locality where all people share the common local culture. According to Albrow (1997, p. 52), this implies that people take part in a cavalcade, in a manner of speaking, where they are near each other, but where the amount of life they spend together is reduced to the minimum. Furthermore, Albrow (1997, p. 51) argues that the maximum amount of global experiences a community is able process is determined by the number of parties that enable the understanding of worldwide events, and the amount of information at their disposal. Of course, events that take place at the global level are also manifest at the local level. Also, human networks may be very extensive as long as there are enough resources and a willingness to communicate. The contraction of time and space presents people with the possibility of sustaining family ties even if family members are separated by thousands of miles. In summary, resources and means currently available to local people offer them a possibility to be a part of numerous globally institutionalized practices and processes.

This brings us to the complex problem of interaction between universalism and particularism in the process of the development of mankind's global awareness. On the one hand, cultural influences flow across the borders of nation-states, and it has become increasingly difficult to pinpoint the originators of ideas, but, on the other hand, local communities also contribute to global culture. For instance, protest movements that have risen from traditional communities are as important in the development of global culture as international agreements between institutions. Deeper awareness of our world as the common home of mankind can be produced objectively by increasing integration and subjectively by increasing cultural understanding, which is enhanced by the discourse on globalization (Robertson, 1992, p. 60, p. 113).

The rise of global risk awareness was a complex process; in the first place it was stimulated by military globalization (the dynamics of nuclear militarism and geopolitics), which initially raised the awareness of a few hundred people, who decided to take action by forming local, national, and international social movements (cf. Roseneil, 1997, p. 56). The first individual cases of anti-nuclear protest were subsequently publicized to a worldwide audience by the means of mass media, which in return generated to more local cases of protest.

The above description of the rise of global risk awareness bears close resemblance to Spybey's (1996) idea that the global awareness behind social movements is reproduced through the penetration of universalist influences. For him, universalist influences originate from supranational networks, and they are reproduced in a particularistic manner at the local level (cf. Spybey, 1996, pp. 147-154). However, Roseneil's (1997, p. 55) suggestion that globalization should be understood more as a dialectic process between global and local actors, which does not exclude the personal level, is an important addition to this theory. Local movements, such as the peace camp at Greenham Common, were a part of the overall process of globalization. The movement at Greenham Common was both a product of globalization and a promoter of globalization. The movement came into being as a reaction against the threat of a global nuclear war and the proliferation of nuclear arms. It was made up of several global streams of actors, ideas, and images. Furthermore, the movement played an important part in producing global identities, global awareness, and new networks of political actors (Roseneil, 1997, pp. 70-71). Roseneil argues that the original motives of the women in Greenham Common were personal fears and anxieties for themselves and their families, but when they received visitors from all over the world and media interest on their activities grew day by day, their perspective was broadened and their ideology developed further. Gradually, the women identified themselves as members of the international peace movement, part of a worldwide movement against continuous military globalization (Roseneil, 1997, pp. 69-70).

This holds true also for local nuclear waste conflicts. Looking at social interaction in local conflicts we notice that local opposition groups may be regarded as agents of global anti-nuclear protest in the sense that they are a part of a series of events on a global scale. Of course, I do agree with Roseneil in her suggestion that local groups are also products of globalization. Consequently, I noted that the preconditions for a social protest reaction by local residents, e.g. in Kuhmo in Finland, were produced over a period of several decades. The anxieties they expressed were not completely their own, but they were constructed in a long struggle over the use of nuclear technology. For me, the local nuclear waste conflicts offered an opportunity to analyze both particular cases (Articles 2-4) and the universal case (Articles 1, 3 and 5). In many respects these conflicts are culturally specific, because each local protest draws strength from a unique local culture, but they can also be understood in terms of universal trends, because they are 'composed of global streams of ideas and images' (cf. Roseneil, 1997, pp. 70-71). Some researchers regard the development of new and transitional forms of hybrid identities as a possible consequence of the global exchange of ideas and images (Lupton, 1999a, p. 132). These hybrid ideas and images, which are constantly in the flux, may offer an alternative to particularism and universalism–a third way (cf.

Robertson, 1992, p. 100). Ideas and images develop in continuous global interaction, which blurs and transgresses traditional cultural boundaries and mixes different spatial levels.

4.2 The societal selection of acceptable risks

The study of risk in general is found as an undercurrent in all my articles. The birth and evolution of anti-nuclear protest were closely interwoven with the creation of technological risks and the ongoing negotiations about the acceptability of these risks. Hence, the historical development of anti-nuclear protest can without doubt be studied from the viewpoint of risk. Generally speaking the situation was the following.

Nuclear weapons were the first practical application of human knowledge on nuclear fission, and their horrible destructive power was unforgettably displayed in the end of World War II. This innovation became an instrument of international politics between the two Superpowers–the United States of America and the Soviet Union. During the Cold War the risks associated with the possible outbreak of a nuclear war became even more obvious and the proliferation of nuclear weapons increased the risk to a global level. The general public reacted to the increased risk by initiating an international protest movement against nuclear weapons. The intensity of this movement has varied over decades, but as recently as in the 1990s it mobilized thousands of people in different countries to demonstrate their anger against French nuclear tests in Muroroa.

As I have already stated in this summary article, the idea of harnessing nuclear fission for civilian applications was met with great enthusiasm in the 1950s and 1960s. At that time, risk was associated with nuclear weapons, not with nuclear power in general. However, all the use and development of nuclear power took place during the Cold War. In many industrialized countries nuclear technology was closely linked to national defense and security policy, therefore it was not politically neutral. In some countries the spent fuel from nuclear reactors was reprocessed for use in nuclear weapons. These links between civilian and military applications of nuclear technology, which became more obvious in the 1970s, made spillover from one anti-nuclear movement to the other possible. The links acted as spillways, but we cannot either forget that a debate on civilian nuclear industry was going on at that time. In the late 1970s, the safety problems of nuclear reactors were under scrutiny first by the experts and later by the general public. As a result, high risks were also associated with the use of nuclear power from the 1970s onwards. Nuclear accidents, such as the one in Harrisburg in 1979 and in Chernobyl in 1986, clearly illustrated that notable risks are associated with many different types of nuclear power plants.

High-level nuclear waste had an interesting role in the development of anti-nuclear protest. In the 1970s and 1980s, the risks of nuclear waste were not widely discussed. The nuclear waste issue was considered to be under the control of governments and enterprises, since the number of nuclear power plants was small and the quantity of nuclear waste grew slowly. Many experts believed that spent

fuel could be utilized in nuclear weapons industry through reprocessing. However, the Cold War era ended in the early 1990s and the nuclear waste issue also reached a turning point at the same time. During the Cold War, public debate on nuclear waste management was considered undesirable, because, at least in the countries in possession of nuclear weapons, it involved secrets about national defense and security policy. The first public attempts to solve the problem of high-level nuclear waste were met with furious public opposition (Blowers et al., 1991). People defined the problem in the context of the Cold War period; i.e. the risks associated with nuclear waste management were perceived as a part of the overall problems of nuclear technology, not as an isolated risk issue.

To a certain extent this still holds true even today, though the situation has changed greatly. Open public discussion about the nuclear waste issue in the 1990s increased political pressures to develop a socially acceptable model of nuclear waste management (cf. Herzik and Mushkatel, 1993; Vari et al., 1994; Easterling and Kunreuther, 1995). Enterprises and governments invested huge amounts of money in scientific waste management research. These investments in risk management and the accumulation of expertise in nuclear waste risk management were partly a response to public anxiety. Governments and the nuclear industry understood that the development of nuclear waste management is no longer the monopoly of a political or technocratic elite. Hence, the development of waste management is today characterized by interaction between different parties (see e.g. Rabe, 1994). Also legislation has been revised, and these changes have contributed to the increased interaction between experts and laymen (e.g. the effects of the EIA (Environmental Impact Assessment) Law in Litmanen, Hokkanen and Kojo, 1999).

Despite the recent trend towards a socially acceptable model in waste management, nuclear waste is still an unwanted byproduct of nuclear power, and its risks still arouse anxieties, even collective action. The risks of nuclear technology are still undergoing a societal evaluation process, through which the selection of acceptable and unacceptable risks is made. Public demands for the elimination of the causes of risk, for the lowering of risk levels, better risk management, or more equal distribution of risks, are an integral part of this process.

4.3 Polymorphous risk

As the above description of the societal evaluation of nuclear risks indicated, risk is a polymorphous phenomenon. In my research, I have utilized five different views on risk: (1) the cultural perception of risk; (2) the social construction and definition of risk; (3) risk as a creator of collective consciousness and action, i.e. the historical development of risk awareness; (4) the societal assessment and selection of risk; (5) the societal management of risk.

First of all, I studied *the cultural perception of risk* (e.g. Article 3). I focused on the following particular questions: What is the social basis of pro- and anti-nuclear attitudes in the communities where a high-level nuclear waste facility could have been built, and how can we culturally understand these attitudes and concerns?[16]

Article 3 is influenced by Mary Douglas and her cultural risk theory, which in many respects bears close resemblance to typical post-structural anthropological theories[17] (Milton, 1996, p. 89), or typical functional structuralist analyses of sociocultural phenomena (Lupton, 1999a, 56). Her theory has greatly furthered my attempt to study the disputes over the siting of a nuclear waste as a sociological problem. As Deborah Lupton (1999a, p. 56) put it:

> For those interested in questions of risk that goes beyond the individualistic to a fundamentally shared, cultural and symbolic approach to risk, Douglas' writings provide a firm basis.

As Lupton (1999a, p. 37) writes, Douglas is trenchant in her critique of cognitive and other techno-scientific approaches to the understanding of risk. She believes that it would be naïve to think that every individual is a prisoner of his/her own cognitive scheme. We simply cannot forget the social circumstances of human life. A person dealing with risks is not cold, calculating, selfish, and always looking after her/his own interests.[18] That is to say, family, friends, and many other external forces have affect in an individual's risk calculations.

> What has gone wrong is that the public response to risk has been individualized. Public perception of risk is treated as if it were the aggregated response of millions of private individuals. Among other well-known fallacies of aggregated choice, it fails to take account of persons' interaction with one another, their advice to one another, their persuasions and inter-subjective mobilization of beliefs. (Douglas 1992, p. 40)

In summary, the cultural theory of risks offers a relevant sociological perspective and framework for criticizing other approaches that emphasize the role of isolated individuals and formal technical rationality in the perception of risks.[19] Individuals do not perceive risk as experts do, instead, people have moral obligations and relationships of loyalty, which affect their risk perception, and which give the public a possibility to discuss the political nature of risk calculations.

When observing groups or communities we note that each group socializes its members to perceive the world in a specific way. Risk perception is a social process where a number of norms and rules governing social behavior affect the subjects' judgement of the most threatening danger, of the type of risks that are worth taking, and how risks are confronted.[20] In cultural risk theory, each community and its debates on values and beliefs is viewed as a system. In practice, this means that we have to analyze communities, compare different kinds of communities, and, most of all, study the presumptions involved in risk evaluation (see Article 3; Litmanen, 1994; Litmanen, 1996d).

People's views and actions are founded on clusters of values and beliefs. These values and beliefs are shared with other people; this way they may turn into common sources of fear. The moral acceptability of an issue is important in all risk disputes, since the wisdom of a community is condensed in its moral rules, which protect the social structure of the community. Community-wide risk assessments reflect the types of activities that are held morally acceptable or condemnable by the community. Consequently, communities do not apply the normal logic of rational risk assessment in risk evaluation, because risk evaluation in spatially defined local communities is in many cases based on the moral acceptability of the

risk ('right and wrong'), not on what is dangerous. In other words, what is held morally wrong is also considered a danger to the community. In the case of siting high-level nuclear waste, the evaluation of risk consists of moral judgements, which are very different from the viewpoint of the planners of waste management and the residents of potential host communities. That is to say, the moral judgments of different parties are not wrong–they are culturally relative and partly dependent on institutional and social contexts (Douglas, 1992, p. 42; Douglas, 1986, pp. 54-55).

Even though Douglas' theory helps to overcome some problems in analyzing risk disputes, it is based on a relatively static picture of culture, and the idea that the freedom of an individual is very limited. The static structuralist emphasis is, for example, visible in the way the culture behind risk perception is determined by social organization.[21] According to Douglas, culture[22] is a commonly shared collection of principles and values, which legitimize the behavior of a person. Douglas argues that the principles and values of people do not develop by themselves, but that public institutions are behind many of these.

Also the douglasian perspective on cultural risk perception stresses the role of public institutions. This emphasis entails that individuals are considered to perceive risks in a relatively passive way, whereas I strive to cover such questions as citizens' active participation in *the social construction of risk and the definitional struggles over risk* (my second perspective on risk, see Articles 2 and 4). I have replaced the deterministic overtones of Douglas' cultural theory by a more voluntarist emphasis.[23] My approach to the sociological study of risk focuses on the social construction of risk disputes, and the social definition of risk (cf. Clarke 1991). As a matter of fact, in addition to the structuralist emphasis, the Douglas' theory also displays a constructionist emphasis.[24] In her theory, Milton (1996, p. 96) stresses that public anxiety is produced and sustained not only by objectively existing preconditions, but also by demands expressed by groups and individuals. Both her and mine main idea is that knowledge and understanding is constructed in daily interaction between people who are dependent on each other.

The formation of an international or a global collective consciousness calls for a common 'language', which facilitates the crossing of cultural borders. Collectives, such as anti-nuclear movements, are formed as a result of the very fact that there is a threat to world peace or a person's individual safety. After that, this threat may be discussed in terms of risk and, eventually, new social collectives against that threat may develop through debate (for details on my third perspective, *collective consciousness and action created by risk*, see Articles 1 and 5). Risk discourses offer a system that enables generalizations about the threats to human life in the construction of collective consciousness.[25] With this type of reasoning we are able to handle different types of danger together, and make comparisons between them without paying undue attention to the particular characteristics of every individual issue. Now that most industrialized societies are becoming increasingly globalized and interaction between countries is intensified, we have developed new concepts to better describe the changed world around us. Or it might be more appropriate to say that old concepts and ways of thinking, which were previously used by some marginal groups, have now been adapted to wider use.

Today, most small local communities have merged to larger societal systems and people are getting used to identifying themselves as members of these larger societal organizations. In this process, they need common language of symbols or concepts, which would facilitate better communication and understanding. Risk is one of the words that carries the same meaning in different cultures, and with the help of the word 'risk' we can bridge the divides between cultures. Mary Douglas put it nicely:

> To perform well in a new culture, a word must have a meaning consistent with the political claims in vogue. When the direction of change is the shift from little local communities to a larger world community, the key words need to justify leaving old constraints and commitments. The sense of the word risk works because it can be strongly biased toward emancipation. (Douglas, 1992, p. 24)

The increasing popularity of the word 'risk' is visible everywhere. Also statisticians have witnessed how probability calculation and probability assessment, fields that used to be their specialties, have continued their triumphant march.[26] Today, risk research is an integral part of many fields of science, and risk discourse has become general in people's everyday life. In everyday usage, the term is used to refer to the possibility of a dangerous, harmful, or unpleasant event. These days, individuals are much more aware of risks than in the old days, and they also prepare themselves for the probability of risks by taking insurance.

The popularity of risk discourse is not a fad, but it is a reflection of our time.[27] Life in late modernity is characterized by global interaction. We have witnessed the continuous spreading of the industrial mode of production, the internationalization of the division of labor, and the opening of new markets for goods and services. The expansion of production and consumption is followed by a steadfast companion–risk (Jaeger et al., 2001; Rosa et al. 1995). As a consequence of global interaction relationships we today share many risks with people living geographically distant communities (Douglas, 1992, p. 22). For instance, let us consider the uproar about the so-called 'Mad Cow Disease' (BSE). Consumers all over Europe were suddenly forced to calculate the risks of beef and beef products in every visit to the local grocery shop. Meat products, which were thought to be safe, became a source of fear in many parts of the world.

My fourth perspective on risk is the idea of *the societal assessment and selection of risks* (Articles 1-5). It is founded on the epistemological premise that individuals and institutions process risks and that most of the processing takes place in broader sociocultural, political, and economic contexts. This evaluation and selection process is a normal part of the functioning of every society, but there is always a possibility of cultural bias or distortion (Douglas, 1986, pp. 91-101; Bauer, 1997).

Cultural risk theory argues that cultural bias is found in every social organization.[28] Thus, risk taking and risk avoidance, shared trust and shared fears, are all dialogues on the arrangement of social relations. Mary Douglas (1986) asks the question: How do we select the risks that we take seriously? Her answer is that we choose risks at the very same time we choose social institutions, i.e. institutions and the values of individual persons are important factors in risk perception. The logic is that an individual cannot look at all directions at once, therefore, people arrange their lives around a social perspective.

At the societal level, we find that every form of society produces its own, selective view of the environment, and this is reflected on what kinds of issues are considered as dangers. Every society develops a unique system of responsibility, which observes certain hazards. Some dangers are collectively underestimated or forgotten, whilst others are considered worthy of attention and brought to public debate. According to Douglas, societal criticism is voiced mainly in situations where trust on the societal control of dangers has disappeared and fear has become the dominant factor. In such situations, criticism may serve as a way of identifying and changing issues that are believed to be the causes of fear and the disappearance of trust. In other words, the principal targets of societal criticism denote the most important social anxieties (Douglas and Wildavsky, 1983, p. 7).

Consequently, it may be argued that societies, social institutions, social groups, and individuals are continuously arranging and valuing information about dangers. Hence, we are continuously assessing, singling out, and identifying certain phenomena as risks, something that we have to be aware of. For instance, Lupton (1999a, pp. 13-14) has identified six major categories of risk that currently predominate the concerns of individuals and institutions in western societies: (1) environmental risks; (2) lifestyle risks (related to consumption); (3) medical risks (related to medical care or treatment); (4) interpersonal risks (related to intimate relationships); (5) economic risks; and (6) criminal risks. The introduction of these risks to the political agenda by different actors usually also involves the demand that society should try to eliminate the causes of these risks, take measures to minimize these risks, manage these risks better, or develop ways to ensure more equal distribution of these risks.

Quite often *the societal management of risk* (my fifth perspective on risk, see Article 4) is markedly improved as a direct result of publicly expressed criticism or the criticism at least accelerates efforts to develop better management systems (see e.g. Jacob, 1990; Vari et al., 1994;). As I set forth in the article '*The social shaping of radwaste management. The cases of Sweden and Finland*', there was no clear nuclear waste management model in Finland at all during the early days of nuclear power. At that time, nuclear waste was conceptualized as an unsolved technical issue, or as merchandise with potential commercial value. It was mainly due to the increased concern over the risks of nuclear power that the government and the nuclear power companies developed a more specific strategy for the control of risks associated with nuclear waste. Thus, societal criticism resulted in a governmental decision in principle (1983) that established a two-dimensional nuclear waste management model in Finland. This decision also gave the starting shot for the development of a national strategy for the management of nuclear waste. Until 1996, the government-owned nuclear power company Imatran Voima Ltd. (IVO) exported its waste to the Soviet Union in accordance with an agreement between Finland and the Soviet Union. In contrast, the privately owned Teollisuuden Voima Ltd. (TVO) was forced to prepare detailed plans for the final disposal of nuclear waste, in case waste exports would become impossible. Soon it was discovered that the company would not able to export their spent nuclear fuel at reasonable expenses, so they had to initiate a research program to locate a qualifying site for the final disposal of nuclear waste. Meanwhile, the government-owned nuclear company, IVO, could export its waste to the former Soviet Union

(or Russia), but intense public pressure forced the government to make amendments to nuclear power legislation to introduce the principle that the exportation as well as importation of high-level nuclear waste is forbidden. Today, the companies have established a joint nuclear waste company called Posiva Ltd., which is responsible for the management of all Finnish high-level nuclear waste.

Posiva Ltd. believes constructing a nuclear waste facility in Eurajoki, where the nuclear reactors of TVO are situated, is the best way to solve with the problem (see Posiva, 1999). For the opponents of Posiva's plans, the final disposal of nuclear waste in bedrock about 500 meters below earth surface is not acceptable. For them, there are too many unsolved risks associated with the idea of sealed and uncontrolled rock caves where the radioactive nuclear waste is supposed to lay for thousands of years. Some opponents have suggested various ways of improving the plans (e.g. by monitoring the waste in the rock caves or by improving the means of retrieving the waste from the caves instead of sealing it permanently), whilst others support the view that it would be preferable to wait for new solutions (technological innovations) (for criticism of the plans, see e.g. Simes, 1999; Richardson, 1999). Also the argument that the best way to eliminate some of the risks is to shut down the present nuclear reactors to prevent them from producing more nuclear waste is frequently heard.

4.4 The political function of social constructionism[29]

Scientific research has introduced the issue of nuclear technology in our lives: nuclear physics enabled the development of nuclear weapons and the use of nuclear power for the production of electricity, but it also created the problem of radiation–an invisible threat that we cannot otherwise sense or perceive. Like all scientific facts, also the sum of our knowledge about radiation is a construct of scientific research. However, as Jamison (1996, p. 224) writes, much more than just scientific construction is required before global environmental problems become politically important problems. The social construction of nuclear risks as a political issue requires intermediary actors who translate the scientific facts into issues of public concern; i.e. waking public awareness is a task that requires a range of intermediary organizations between scientists, the media, and the public. They translate expert discourses into politics, and offer interpretations of scientific facts for the man on the street.

The societal evaluation of the risks associated with nuclear technology has now continued for over fifty years. Different actors, such as anti-nuclear movements and the nuclear industry, have tried to establish a dominant position in the debate. However, despite of the vast amount of research done in technical and natural sciences, debate over the issue continues, and there is not consensus in sight. For the opponents of nuclear technology, the risks are much too high to accept, and for the proponents the risks are controllable and thus at an acceptable level.

For a sociologist, it is a challenging tasks to study this kind of a controversy where each party claims they are absolutely right and that they are the only ones who hold the truth about an issue. What does the disagreement indicate? Why have not the parties found a solution, or a reasonable compromise? Which of them holds the truth? Is there a truth in this issue? One answer to these questions is that the parties often speak about different issues. For example, Adams (1995, p. 50) argues that the long-lasting controversies on high risks drag on because they are scientifically unresolved, and non-resolvable within the time-scale needed for decision-making. As a result, the parties continue to voice their contradictory views and the clamorous debate is characterized, not by irrationality, but by parallel rationalities. The debate will go on until it is understood that the parties are arguing from different premises. Van der Pligt (1992, p. 35) makes an analytical distinction, which helps to understand these kinds of controversial subjects. In technological projects that contain risks, the parties usually dispute over (1) data and statistic; (2) evaluations and probabilities; (3) premises and definitions; (4) risk-cost-benefit trading; (5) equal division of risks, costs, and benefits; and (6) general social values.

The classification above may appear naïve, but we have to recall that only two decades ago our knowledge about environmental conflicts was scarce. The first attempts to understand these conflicts between the nuclear industry and citizens lead to highly biased theories. The first theories emphasized the expertise of authorities and the representatives of the nuclear industry and ignored local residents. These so-called 'NIMBY' theories (Not-In-My-Back-Yard) blamed those who opposed industrial projects for egotism and local patriotism (see e.g. Articles 2 and 3). Of course, there are a few grains of truth in the NIMBY theory, but the implied conclusion that planners should not have to take local residents into consideration is incorrect.

Finnish nuclear waste management is an elucidatory example of the overall lack of knowledge on environmental conflicts. As late as in the early 1990s, social distance between local people and national authorities or waste management planners was long. The players showed very little understanding for the opposing party. At that time, the theory used by parties responsible for nuclear waste management was quite similar to the NIMBY theory, and industry representatives as well as government officials frequently referred to this theory. In practice, the political function of the NIMBY theory was the legitimization of attacks on the residents' views, and the maintenance of the prevailing power structure. This biased perspective influenced the plans, decisions, and actions taken by authorities and industry representatives.

Any study of the juxtaposition between the conflicting parties calls for reflection: Should the researcher take a stand or should he/she strive for neutrality? In the early 1990s, it was easy to give a positive answer to both of these questions. On the one hand, the moral obligation of a scholar is to criticize and improve a biased theory, e.g. by emphasizing the views of local people opposing technological projects and risks. One of the principal political functions of constructionism was the legitimization of people's anxieties, and the emancipation of individuals though the analysis of the complex configurations of environmental conflicts (for details on the political function of constructionism, see Shakespierre,

1998, p. 176)[30] On the other hand, a scholar has to disengage himself/herself from juxtapositions because the sociological understanding of these conflicts without prejudice is intellectually a more challenging question than determining who is right.

The debate on risks was one-sided, the attitudes were fixed, and interaction between the parties was characterized by mutual suspicion. In this context, social constructionist theory[31] gave me a promise of polyvocality, relativity,[32] pluralism, and tolerance. The relativity and contextual nature of 'truth' became natural starting points for my study of nuclear waste conflicts.[33] Furthermore, the assumption that truth is not something that can be possessed by any single institution or society implicates that we have to accept multiple or even clashing views (Gergen, 1999, p. 167).

Studies that focus on normal reasoning instead of ideal reasoning deal with natural rationality. Some theorists bring up the concept of 'tolerant theories of rationality', which implies that cultural phenomena should never be stigmatized as irrational, but they should be studied intraculturally. Their hypothesis is that all institutional beliefs and action systems involve a natural rationality. In this regard, even science cannot be considered a non-partisan outsider, but it can be studied with the very same methods and techniques as other cultural phenomena. Hence, any naturalistic study of rationality has to be tolerant (Roth, 1998, p. 72).[34] Another important characteristic of constructionism is the observation of multiplicity and varied situational lifestyles (Burr, 1995, pp. 13-14). The former might also be called pluralism and the latter might be considered contextualism.

With the help of constructionism, I set out to deconstruct local nuclear conflicts, produce a detailed description of each conflict,[35] and reconstruct an overall picture of environmental conflicts. The process involved tearing down many old myths and beliefs, but in the end, my research served both an academic and a political function by questioning issues that had previously been considered self-evident, and by helping to overcome stereotypical ideas.

4.5 The academic function of social constructionism

I base my study of anti-nuclear protest on the constructionist assumption that it is a dynamic process, in which it is more important to gain an understanding of the continuous interaction between the parties rather than get a sharp, but static, still-life picture of the conflict. Constructionism puts more emphasis on dynamic development processes than, for example, structural theories where reality is viewed in terms of relative stability and slow change (Burr, 1995, p. 7).[36] My focus is on the ongoing flow of social interaction, social interchange, social practices, debates, negotiations, arguments, and other processes which constitute a conflict.[37] This perspective presents us an opportunity to observe continued change, sudden ruptures, as well as progressive transformations (Gergen, 1999, p. 64).[38] It also facilitates the study of complex and manifold relationships between events and processes where the dominant definitions of an object or event are generated (Dean, 1998, p. 189). Anti-nuclear protest becomes more understandable when

events, definitional struggles, relationships, and social forces are all considered together.[39] During the research process, event analysis questions the natural character, inevitability, and earlier explanations of historical epochs and events in order to discover all contributing factors, relations, and strategies that have shaped each event. The more we deconstruct the ostensibly inevitable character of a given event and unveil manifold development paths, the better we are able to construct the external circumstances that are elementary to understanding the phenomenon (Dean, 1998, pp. 187-188).

I applied the approach presented above in Articles 2 and 4. Next, I will discuss my approach to constructionism in the other articles where these ideas are embedded in other theoretical frameworks.

In article 1, some my theoretical tools originate from the research of social movements. I attempt to understand the ebb and flow of two movements and their mutual relationships from the point of view of political opportunity structures. My structuralist focus is intertwined with a constructionist study of the historical development of the anti-nuclear weapons movement and the anti-nuclear power movement, and their mutual relationships. Both of these movements kept a close watch on nuclear technology and they played a central role in the historical process of the definition of nuclear risks. On the one hand, periods of active mobilization may be regarded as results of a successful definition of increased nuclear risk, but, on the other hand, highly visible mass demonstrations in different countries have contributed even more to the increased risk awareness of the public. The time-series of attitude surveys (see Article 5) illustrate that the effects of these movements are quite durable, although both movements have experienced long periods of latency. However, the sudden outburst of collective action against the French nuclear tests in Muroroa in the middle of the 1990s is clear indication of the continuous presence and influence of these movements.

In Article 3, weak constructionism forms an important part of the cultural risk theory I chose to apply. The basic assumption in my weak constructionism or weak realism[40] is that the objective risks of nuclear technology can be assessed, but only in the context of social and cultural processes. The evaluation of a risk always takes place in specific sociocultural and historical contexts (Lupton, 1999a). Risk analysis is never socially neutral because it is always produced in a specific institutional setting and it is subject to disputes and political struggles. Technical and economic risk calculations, for example, include a great number of presumptions–at worst they may suffer from an inordinately narrow view of humanity and a superficial idea of society. Meanwhile, few sociologists would fail to make the elementary observation that the public does not interpret risks as risk analysts presume it does,[41] and that societies do not function the way analyst presume they do. This is why the contribution of human and social sciences is indispensable in risk analysis[42] (Douglas, 1992, p. 40).

In Article 5, my mainstream constructionist perspective is not in the forefront, instead my research question (*'How did nuclear waste become a problem?'*) draws its strength from main stream constructionism where the issue of the social construction of a social problem is quite common (see e.g. Merton and Nisbet, 1976). One of the conclusions of my analysis of attitude survey time-series is that people's risk awareness is not a rectilinear representation of the so-called 'objective

risk'. That is to say, there are intermediary social and cultural factors between the risks of nuclear technology and people's risk perceptions. Hence, changes in attitudes primarily reflect changes in risk perception. The actors struggle, negotiate, and try to assess the risk of nuclear technology in interaction with each other. As a result, they produce and reproduce a special nuclear culture, which might be visualized as a pool of pro- and anti-nuclear interpretative packages.

4.6 The struggle over meanings

Hiroshima, Nagasaki, Harrisburg, and Chernobyl are all toponyms, which produce strong associations in people's minds all over the world. The semantic content of these names is largely determined by a series of globally well-known events. As we all know, at least one shade of the meaning of these names is associated with the tragic consequences or constant risks of nuclear technology. These are not just any random place-names; they refer to notable nuclear disasters or accidents, and they are often used as symbols of the dangers of nuclear technology by its opponents. In most cases, the users of these words do not wish to make a reference to the actual geographical place, but to a social or moral community, which shares the same anti-unclear values as they do.

In the article *'Environmental conflict as a social construction. Nuclear waste conflicts in Finland'* (Article 2), I have shown that the task of constructing a risk object is partly a rhetoric process.[43] It is performed in specialized texts and public arenas, and it usually involves intense struggles over meanings and definitions between the actors. Needless to say, this orientation also indicates that I may be regarded as a member of the constructionist movement,[44] which strives for the re-evaluation of the traditional idea of the function of language as a representation of the world. Constructionists have challenged the idea that language is a precise and objective reflection of the world (Gergen, 1998, pp. 34-35).[45] Constructionism has also shaken the foundation of the realistic concept that causal or generative structures are found behind all events (Gergen, 1994, 75). It has also weakened the cognitive view that mental processes or structures produce the actions of a person through a causal mechanism (Burkitt, 1998, p. 124). Rather, descriptions and constructions of the world highlight some social practices and exclude others (Burr, 1995, p. 5). Constructionists oppose the naïve idea of representation, but instead of abandoning it they have developed it further. Constructionists stress that objects of knowledge cannot be independent of their characterizations, and that we cannot separate our understanding from the sociolinguistic practices that shaped it (Burkitt, 1998, pp. 124-125; Burr, 1995, pp. 6-7).

Burr (1995, p. 7) crystallizes constructionism in the argument that its central assumption is that all our categories and concepts are historically and culturally specific. It follows that also our understanding is historically and culturally relative. Hence, we have to be aware that all categories and concepts are products of cultural and historical periods, and they are dependent on social and economic arrangements (see also Mackenzie, 1998, p. 201). Language, knowledge, and text have to be understood as parts of extensive social processes, since everyone who

signifies is playing a game with language, and this game is embedded in the models of human action. Since human interaction increases the expressive capacity of language, so it was appropriate to examine this interaction critically. Furthermore, in addition to texts, I also focused on the communal nature of human beings, which also has an effect on their language.

Gergen (1998, p. 46; 1994) highlights the relational nature of constructionism. Also most other constructionists are oriented towards political interchange and thus emphasize the commonly shared basis of meanings, the sharing of responsibility, and the possibility of cooperation in lieu of individualized practices. It is challenging to study relationships between such practices, which could offer a chance for increased tolerance. Instead of searching for an absolute basis of truth for our social lives, we should accept living together with multiple, even conflicting voices. Gergen (1999, p. 145) suggests that we should disassociate meaning from the minds of individuals while studying issues using the constructionist approach, and discover that, above all, meaning is found in human interaction and cooperation. In summary: man is a relational being and meaning is a property that emerges in interaction.

5 THE STRUGGLE OVER UNCERTAINTY

Anti-nuclear protest is part of the overall social struggle over nuclear risks. These risks are scientifically and socially constructed definitions of potential dangers associated with different applications of nuclear technology. The idea of *potential dangers* is the core of the matter, because it goes beyond current material conditions. is quite difficult to describe this, because the word 'risk' is a label for probability, uncertainty, opportunity, and alternative trends of development, which are dependent on multiple choices. Irrespective of the fact that risk is not perceptible to our senses, it can produce collective activities and organized social movements.[46]

Risk is both real and unreal at the same time. It is hidden out of our sight, but we are able to create a gripping sensation and awareness of a risk by describing it. In other words, this 'invisible menace' may be brought to life through language or scientific calculations, and in the end we base our thoughts and actions on this knowledge. Now that we are aware that there is someone or something lurking in the bushes, we cannot ignore the information.[47]

When the hidden danger is rendered into a scientific probability assessment, we have harnessed the danger, but we have also created a monster capable of causing social unrest. Although we have moved from complete uncertainty towards a more precise description of the magnitude of uncertainty, it should not be overlooked that improved risk identification is always accompanied by increased awareness of the fact that we are living in a world of uncertainty and instability (Crook, 1999, p. 182). Hence, the social consequences of technical risk research are quite the opposite of the declared social ethos of risk research. is a strange irony of our time that constantly increasing efforts to make our life healthier and safer make us increasingly concerned about risk.

One part of my thesis focused on the processes of meaning construction in time, place, and different cultural contexts. The social constructionist aspect of my study may evoke criticism from the proponents of realism, in the vein of "Can't you see that reality truly exists. This pencil exists physically independent of its social definitions." The problem with risk is that it is an abstract concept that refers to the future. is not entirely here at the present moment; instead, it depends on a multiplicity of choices [48], which are made at the present moment. is never entirely

concrete and it always leaves room for different interpretations and debate. Parties involved in these debates, such as scientists, experts, journalists, lay people, power companies, or social movements, avail themselves to different resources in an attempt to establish their views over the views of others, but looking from a sociological perspective they all take part in the social construction of risk, which is an ongoing process full of inconsistencies and contradictions.

Social struggle over risk takes place at several different spatial levels. Anti-nuclear movements are important players in these games, and the interplay between movements and their opponents shapes the protest as both sides struggle to achieve their goals with various strategies in varying circumstances. Protest is not only face to face interaction, but the parties also try to influence the issues through media. Media is a highly important scene, since it is in the media that debate over the issue mainly takes place and the most important acts are performed (cf. Gamson & Modigliani, 1989). Media is also vital to the dissemination of protest, since protest actions often happen in far away places and are accessible to the general public only through the media.

My analysis indicated that local support continues to be an important element in protest movements because concrete actions (e.g. demonstrations) always take place in a local community. The Finnish nuclear waste conflicts that I studied showed that local political and cultural circumstances have significance in the construction of conflicts, since the actors tended to take into consideration factors, which they believed to have a positive effect on the success of the movement. For instance, the social definitions of nuclear waste used by the planners of the project (mainly scientific-technical definitions) did not satisfy local residents. Local people started questioning the social definitions presented to them by the power companies immediately after the first informative meeting (Article 2). It turned out that local people did not perceive nuclear waste management solely as a scientific-technical project, instead they viewed it to a great extent as a local political issue involving difficult social, economic, psychological, and ethical problems. The societal evaluation[49] of a project begins when scientific-technical plans meet 'the real world', i.e. the people who have to face the consequences of the project. Scientific-technical expertise and other types of information available are used as sources in social assessment, but it draws its strength from local culture, local history, and the everyday life of local residents (Articles 3 and 4).

The societal evaluation of a project is crystallized in the social definitions of nuclear waste created by participants in the conflict. Additionally, the social definition of a nuclear waste conflict is a sort of a crossroads where local, national, international, supranational, and global levels meet. All the definitions used in a local conflict are products of a complex transformation process due to the global exchange of influences (Article 1; Litmanen1999b). Hybrid definitions[50] are products of this global flow of information, ideas, and beliefs, where the origins of a specific idea is often difficult to ascertain. Furthermore, the cultural perception of a scientific-technical project is another feature of societal evaluation. As I demonstrated above, also the cultural perception of risk has many levels (Article 3). Risks involved in a project are reflected carefully at the personal level, but the social background, social networks, social dependencies, lifestyle choices, occupational position, organizational commitment, etc. of each individual do have

a great effect on these reflections. Therefore, it is important to pay due attention to collectively shared risk perceptions.

In my analysis, I stress the importance of local community and local culture. This view is supported by the results of my analysis of the time-series displaying people's attitudes toward nuclear power and nuclear waste in several different countries, and comparative analysis of nuclear waste conflicts in Finland and Sweden, which support the observation that significance of local culture is not limited to one country. Attitudes in different countries are almost identical, and shifts in public attitudes often occur at the same time and in the same direction in different countries. Despite of the differences in local nuclear waste conflicts in the countries I studied, they usually followed the same overall pattern: residents react against the plans for siting a facility, form an opposition movement, study the plans more closely, use different strategies to achieve their goals, and attempt to influence decisions. Cases where opposition against nuclear industry is weak or nonexistent (e.g. Eurajoki in Finland), proved that local circumstances may also have an opposite effect. Communities where nuclear industry finds most sympathy are called nuclear oases (Blowers et al., 1991). Hence, it was no surprise that the Finnish nuclear waste company, Posiva Ltd., made the decision to concentrate all their investigations in Eurajoki where the attitude of the local population was most favorable (Posiva, 1999, pp. 5-6).

The realization that national and international factors have an important role in local conflicts (see Article 2) drew my attention to these factors. Comparative analysis of nuclear waste conflicts in Finland and Sweden (Article 4) indicated that national plans for siting high-level nuclear waste were received in a similar way at the local level in both countries, and that the interplay between local and external actors (nuclear power companies, scientific experts, governmental bodies, and national environmental organizations) in fact involved a symbolic struggle over the definition of risks. Furthermore, the analysis of international anti-nuclear movements (Article 1) and the analysis of a number of time-series of the attitudes toward nuclear power and nuclear waste (Article 5) convinced me that the perception of risks involved in the nuclear issue are quite similar regardless of country or locality.

However, this does not imply that the risks of nuclear technology are perceived in exactly the same way in varying cultural and political contexts. For instance, on the basis of my analysis of the anti-nuclear power and anti-nuclear weapons movements in Finland, France, and USA (Article 1) I may argue that both national and supranational political opportunity structures have a great influence on risk perception and reactions towards nuclear technology, but not in the rectilinear sense. On the one hand, political opportunity structures shape the protest, whilst activists may, on the other hand, actively redirect their actions to counterbalance the negative effects of specific opportunity structures, if they are aware of these opportunity structures. The problem the activists face is that in addition to one layer there are others, whose effects may be adverse. Hence, it would be an unreasonable simplification to claim that the relationship between opportunity structures and actors is dialectic. The picture is more complex: as I said above, opportunity structures are multi-layered. The same applies to the other side of the relationship, i.e. anti-nuclear protest is multi-layered consisting of spatial

layers similar to those found in opportunity structures. The relationship between these structures and actors might be characterized as consisting of multiple choices and effects, which makes it difficult to isolate the original chain of cause and effect. Both multi-layered opportunity structures and multi-layered networks of actors form a web-like network of relationships through which the anti-nuclear protest is constructed. The task of a scholar studying anti-nuclear protest is to deconstruct this interaction process, distinguish the most important elements, and reconstruct a faithful reproduction.

The results of my constructionist analysis support the argument that anti-nuclear protest is characteristically international. That is to say, several different countries are involved in the protest and that some features of the protest have been carried from one country to another. By now, anti-nuclear protest has existed for several decades and it is no longer characterized by the cultural influence of any single country or any group of influential countries–it has reached the level of supranational protest. It has become unfastened from nations-states thanks to movements, such as Greenpeace, Friends of the Earth, and some international peace movement organizations, which have protested against nuclear technology with little attention to national borders. Thus, anti-nuclear protest may be characterized as an ongoing process where the activities and interests of people separated by vast distances are pooled together. Concrete local, regional, national, international, and supranational activities are just as important in creating anti-nuclear protest as formal and informal networks, which are today maintained through the media and by modern communications technologies.

In the final analysis, it is difficult to determine whether anti-nuclear protest can be regarded as a truly global phenomenon or not. If the actions of a global protest by definition embrace the whole world, we must consider the scope of the protest. The scope of anti-nuclear protest is not restricted to the technologically advanced countries that use nuclear technology, since its sphere of influence also covers other nations, which do not use nuclear technology. Possibly in the 1980s, when there were massive anti-nuclear demonstrations (particularly against nuclear arms) nearly all over the world, anti-nuclear protest may have been on the brink of becoming a global phenomenon. After that, there have been only a handful of events, such as the case of French nuclear tests in Muroroa, which have sparked short-lived international anti-nuclear protests. Nevertheless, I would not call any of them a global protest even if they endeavor to educate the world about the global threats of nuclear technology and the protests have sympathizers all across the world.

In summary, anti-nuclear protest may be regarded global phenomenon only if we view the protest from a cultural perspective instead of the perspective of actors. In that sense, all the movements and individual actors have over the past fifty years of anti-nuclear protest created a global anti-nuclear culture. Global risk awareness means that the adoption or the use of nuclear technology is always monitored by local people, who are ready to voice their disapproval of the official policy.

NOTES

1 In organizing the articles in chronological publication order, I noticed that my analysis of anti-nuclear protest has always focused on spatial questions, starting from the local level and progressing through the national level to international and global issues. The first article (Article 2; in Finnish Litmanen 1996b) is based on my licentiate thesis where my main objective was to examine local conflicts related to nuclear waste siting in great detail. I studied local circumstances, interpretations, discourses, definitions, and emphases in an attempt to find an answer to the question why people disagree over the issue of nuclear waste. In my licentiate thesis I discovered that local disputes were intertwined with more far-reaching questions that concerned national nuclear waste policies and national models of nuclear waste management. This finding prompted my Swedish colleague Rolf Lidskog and me to write the second article (Article 4). It deals with nuclear waste conflicts in Sweden and Finland in the context of national nuclear policies. The third article (in publication order) deals with international anti-nuclear movements (Article 1; in Finnish Litmanen 1998b). In a sense it is an exception among the articles, since it does not explicitly deal with the issue of nuclear waste. The main arguments of the article are that the anti-nuclear protest consists of both an anti-nuclear weapons movement and an anti-nuclear power movement, and that these movements have developed in different directions due to dissimilar social, political, and cultural contexts. The last two articles included in this thesis should not be interpreted as demonstrations of my latest research interests, since both of them were originally conceived several years ago. The article on the cultural perception of risk (Article 3), where I concentrate on the residents' attitudes toward the siting of a nuclear waste facility, was originally prepared for an international congress on hazardous and toxic waste, held in Seattle, USA, in 1996. Also the article on the social construction of the nuclear waste problem (Article 5), where I analyze long-term international trends in public attitudes toward nuclear power and nuclear waste, was prepared for an international symposium on environment research in social sciences, held in Tampere, Finland, in 1995, and it was published in Finnish in 1996 (Litmanen, 1996c).

2 A more detailed description of the organizational structure of social movement organizations can be found in Kriesi's article (1996, p. 152). Kriesi divides the organizational structure of social movements in two parts. These movements are maintained by informal and formal organizational structures. Informal structures consist of networks of friendship and family connections, as well as networks of activists and movement communities. The second group, formal organizations, includes (1) social movement organizations; (2) supportive organizations; (3) movement associations; and (4) political parties and interest groups. Social movement organizations differ from other types of formal organizations, because (1) they use their constituency in the mobilization of collective activities. They act this way, because (2) they have political objectives, i.e. their goal is to acquire collective benefits from the decision-makers. Supportive organizations are organizations that offer services (media, churches, restaurants, copy enterprises, or educational institutions), which help to maintain the foundation of the social organization without directly taking part in the mobilization of collective action. Supporting organizations may assist the movement, their staff may be sympathetic towards the movement, but their participation in the activities is indirect and accidental at its best. Meanwhile, movement associations may be self-help organizations, voluntary associations, or clubs, which are founded by the movement itself to assist the members in their daily life. Like social movement organizations, also movement associations contribute to the mobilization of the constituency, but they are more constituencies oriented. In other words, they assist in creating a consensus and in generating commitment, but they do not directly participate in the mobilization of activities or the activation of commitment for political causes. Social movement organizations can also be distinguished from political parties and interest groups. Although political parties and interest groups advance political causes in the same way as social movements, they are not as dependent on the participation of their constituents as social movement organizations. They specialize in political representation and possess abundant resources (institutional admission, authority, and expertise), which means that they need not be concerned about the mobilization of their constituency. When political parties or interest groups mobilize their constituencies, actions are usually conducted by a small élite and the mobilization is often just a routine.

3 For the organizational structure of a social movement, see endnote 2.

4 I prefer the term 'constructionism,' although the term 'constructivism' is also widely used. The latter refers to the perception of an individual, whilst the former embodies a more collective meaning (Burr, 1995, p. 2; Gergen, 1999, p. 237).

5 Finland has not developed or adopted any nuclear weapons technology. The two Finnish nuclear power plants were constructed in the 1970s and their four reactors were switched on between 1977–1982.

6 An analytical distinction should be made between the older anti-nuclear weapons movement and the newer anti-nuclear power movement. However, the authors of several publications have used the general descriptive term 'anti-nuclear movement' without specifying the time frame or the goal of the movement.

7 Texts dealing with national nuclear energy production and nuclear waste management were gathered between 1 January 1993 and 30 May 1996 (N=177). Texts dealing with global nuclear technology issues were gathered between 1 January 1994 and 30 May 1996 (N=193).

8 Press cuttings on national level nuclear power production and nuclear waste management were gathered between 1 January 1994 and 30 May 1996 (N=167). Press cuttings on global nuclear technology issues were gathered between 1 January 1994 and 9 June 1996 (N=318).

9 Eurajoki was not included in our analysis because of space limitations and because we wanted to focus on municipalities without previous familiarity with the effects of nuclear technology.

10 Globalization opens new prospects for a sociologist, because the process of globalization unites local and national social structures to supranational streams. For example, a sociologist might construct local interpretations of global developments (see e.g. Waters, 1995, pp. 163-164). As Beck (1999, p. 68) argues, the sociology of globalization may be portrayed as a loose, internally contradictory collection of approaches, which share one common characteristic: opposition to the 'sociology of the nation-state'.

11 Although the phenomenon of globalization is today subject to widespread debate, the concept itself is over 400 years old. It became more common in the 1960s, but the interest of sociologists in globalization was not aroused until the beginning of the 1980s; the amount of academic texts on the subject has grown consistently after that (Waters, 1995, p. 2). If post-modernism was the central sociological concept of the 1980s, the concept of globalization is the catchword of the 1990s. Without making any thorough conceptual analysis of these two concepts, I venture to say that the term 'globalization' is more dynamic. It refers to a development process, which facilitates the crossing of the geographical limitations of social and cultural arrangements, and where people become gradually more aware of the diminishing significance of borders. With the help of this term we can track how societies are changing today. Scott (1997, p. 3) has aptly noted that the study of globalization is both a diagnosis of the contemporary world and a political theory of the development of societies.

12 There are many reasons for sociological interest in risks. First of all, societies are today increasingly dependent on science and technology. It is characteristic of our modern way of life that science and technology continuously raises our standard of living, but this development is always accompanied by risks. Previous generations of sociologists studied problems (e.g. famine, poverty, economic depression, or criminality) most relevant to their societies. Consequently, modern sociologists should study today's social problems, which also include several scientific-technological risks, such as radiation, chemical waste, genetic engineering, asbestos, lead, quicksilver, etc. (Douglas, 1986, p. 5).

13 For instance, Waters (1995) divides the concept of globalization into three distinct types that influence three important spheres of social life. First, the globalization of the economy is familiar to most people. During the past few decades the production of goods and services as well as their exchange, distribution, and consumption have become increasingly internationalized. Another sphere of life where the progress of globalization is clearly evident is government systems. Today, it is possible to govern larger populations and wider areas than ever before because of the rearrangement of the forms of governance and use of power. Third, globalization in the sphere of culture has resulted in rearrangements in the production, exchange, and expression of symbols. Symbols are indispensable tools in human societies, because they are utilized in representing facts, influencing values, creating meanings, constructing beliefs, working up likings, and fashioning styles.

14 The basic tenet of the World System Theory is that the present international division of labor results in structural inequalities between nation-states. The World System Theory focuses on the activities of supranational enterprises and the flow of capital over national borders. Moreover, the supporters of the theory presume that the economic logic of the accumulation of capital in the capitalistic world economy to a great extent determines social events and political developments in capitalist nations. Some environmental sociologists, such as Gould, Schnaiberg, and Weinberg (1996), have analyzed environmental conflicts from the viewpoint of neo-Marxist theories and globalization.

15 I am fully aware that a more detailed study of economic globalization would have benefited my study of anti-nuclear protest. This is evident, for example, in the first article, which ends with a debate on the importance of, not only political opportunity structures, but also economic ones.

16 Cultural values affect risk assessment in each group of people. For instance, men are willing to take greater risks than women are, because daring and courage are characteristics traditionally associated with masculinity (for details on the differences between men and women in the assessment of risks associated with a nuclear waste facility; see Article 3).

17 However, Douglas' ideas differ somewhat from the ideas of most other post-structuralists, because her idea of the relationship between culture and social organization is much more deterministic than dialectic by nature. Many post-structuralists emphasize individual freedoms, such as the freedom of choice. Douglas emphasizes the deterministic power of social organizational forms over the individual, who is reduced to a passive risk perceiver. She claims that each form of social organization produces a specific type of perception of the world. According to Milton (1996, p. 89), formulations such as the one presented above bear evidence of Durkheim's influence on Douglas' theory. Different social organizations produce different rules of interpreting the world, different cosmologies, and different cultural approaches. Highly homogeneous societies and communities produce uniform approaches and ways of understanding, whereas societies with more complexity and a greater number of different elements produce more heterogeneous approaches. According to Milton (1996), douglasian cultural theory is weighted with a number of problems. Milton finds the way in which the forms of social organization produce or determinate a cultural approach very problematic. In douglasian cultural theory, the underlying idea is that a person's cultural perspective changes constantly as a consequence of changes in social organization (Douglas and Wildawsky, 1983, p. 192). Furthermore, Douglas and Wildawsky claim that social change is primary, while cultural change is consequential (Milton, 1996, pp. 98-103).

18 Traditional risk research has always focused on the individual. To give an example, little, if any, attention was paid to cultural differences during the early stages of psychological risk research in the 1970s. Methodological individualism was regarded as the basis for all future psychological risk research, because it was widely believed that risk assessment is a reaction of the individual. This extreme rationalism in risk research was based on the idealization of rational individuals, who would make rational decisions based on technical and economic facts. Individuals were supposed to be able to set their own goals, and to be able to pick the best option from a selection of alternatives involving different consequences. The roots of this school of thought were in economics, technical risk analysis, and utilitarian philosophy. This individualistic theory dominated the field, but it suffered greatly from an inordinately narrow view of human behavior, because its basic assumptions were (1) that a specific numerical value can be assigned to any risk regardless of its social, economic, or cultural context, and (2) that a rational actor always minimizes his/her exposure to risks in the same manner as a rational economic actor maximizes his/her personal benefit (Douglas, 1986, pp. 19-28, pp. 41-52; Douglas, 1992, pp. 56-59).

19 Similar tendencies towards methodological individualism are also observable in cognitive risk research. The first cognitive risk studies focused on the human perception system, particularly its dysfunctional aspects, because earlier psychological risk research had suggested that most individuals have a strong, but unfounded sense of inviolability, i.e. we tend to underestimate the probability of harmful events in familiar situations. Psychologically this is quite understandable, since continuous alertness to potentially dangerous, but highly improbable, events would lower our level of concentration and produce even more serious risks. A sense of personal inviolability also facilitates faster adaptation to new situations by enabling a person to maintain his/her peace-of-mind. These early psychological studies resulted in the conclusion or recommendation that the public should be informed and educated about the true nature of risks. The problems with this type of well-intentioned risk education are obvious, because ordinary people seldom assess risks

in such a formal manner. According to Douglas, the true reason for this is not that the public is unable to think in terms of probability. As early as in pre-historic times hunters, fishers, and farmers based their actions in the idea of probability. However, the problem is that people are incapable of mastering complicated, statistical probability analyses. Douglas acknowledges that we are able assess probabilities, but only within our own limited area of competence. Evaluating risks outside our normal sphere of competence is hard, and assessing risks that involve complex social dissonance and value judgements is particularly difficult (Douglas, 1986, p. 32).

20 By considering groups instead of individuals we will notice that also lifestyles are linked to attitudes toward risk. You could even claim that the choice of a lifestyle and risks are made hand in hand, i.e. the form of social life an individual prefers over others is closely associated with the choice of risk. In Summary, each form of social life comes with its own, typical risk folder (Douglas and Wildawsky, 1983, p. 9; Douglas, 1986; 1992).

21 Moral order (what is considered right and wrong, proper and improper) protects the social order of each community. That is to say, it protects the existing social organization. For Douglas, moral order is sanctioned through dangers, fears, and threats, i.e. people acting against the prevailing moral code expect retribution through some sort of a natural punishment (disease, war, witchcraft, punishment from God, crime, natural catastrophe, etc.). Societies and groups do not consider all anxieties equal, but some things are considered more fearful than others are. According to Douglas, also societies and groups choose risks that reflect their social order. Hence, her theory offered me the possibility of explaining fears and anxieties by referring to forms of social organizations. For instance, the fear of pollution, the fear of the depletion of natural resources, or the fear of decreasing biodiversity have become mechanisms through which the society protects its own institutions. In this sense, the anxiety about environmental pollution in an industrial society is functionally equivalent to the fear of ritual pollution in primitive societies. Their function is the same: they protect moral order, which is vital for the preservation of a community's social order (Douglas, 1986, p. 60; 1992, pp. 5-11; Milton, 1996, p. 90; Lupton, 1999a, pp. 43-44).

22 For Douglas, culture is a historical collective creation, which is synthesized from the interests of all individual members of the community. For individuals who are dependent on each other a culture is simultaneously both supportive and restrictive. The culture an individual embraces represents a fixed orientation basis for Douglas, and this basis guides an individual in his/her activities, i.e. a person does not have to solve every new problem he/she encounters by himself/herself, but he/she may apply an existing interpretation framework. These frameworks are found in 'cultural storage'. Moreover, an internalized culture gives an individual a sense of having a channel, through which things run spontaneously, because the culture offers rigid guidelines for decoding dangerous phenomena and existing categories for identifying hazards. When an individual considers taking risks he/she can always rely on these cultural standards. When an individual considers what types of risks he/she would be willing to take, he/she thinks in the lines of culturally established and accepted norms of caution (Douglas, 1986, pp. 67-68). Deviation from these culturally established practices subjects a person to collective criticism, but in general social pressure ensures that deviation is rare (Douglas 1986, p. 80).

23 The cultural risk theory of Mary Douglas has its roots in durkheimian theory where the most important questions are: How the existence of a society is possible and what holds it together? The answer to both of these questions is 'emotional forces': trust, social bindings, moral obligations, and moral solidarity. These forces, which constitute the cultural and institutional continuity of a society, maintain its structure. Furthermore, it is believed that the structure exists *sui generis*, regardless of individual thought or action. The implicit methodological rules of durkheimian theory specify in order to understand a society we must look at the macro-level, not observe the behavior of individual actors. This macro-sociological approach involves a high degree of determinism; according to it, most of the actions of an individual can be derived from macro-level forces above him/her (Milton, 1996, pp. 89-105).

24 Cultural risk theory emphasizes traditional modes of culture, whilst theorists such as Beck (1992; 1995) and Giddens (1990; 1991) highlight the special features of our time. These so-called 'modernization theorists' stress the importance of science in the process of risk definition. Although some formulations of Mary Douglas' cultural risk theory are quite old-fashioned in the sense that they are based on a relatively traditional view of society, she has paid close attention to a number of changes in society. For example, she has analyzed the effects of cultural change to the issue of risk. Furthermore, she has demonstrated that sin is

no longer a serious issue in modern society, and that instead of sin we perceive life in terms of risk. Douglas (1992, pp. 32-33) claims that increasing individualization is behind this phenomenon. In the old days, the idea of sin had a protective functioned in the community, today, in the age of individualization, it has been replaced by the construction of risk, which protects individuals and cultures in a similar manner.

25 The power of scientific risk analysis lies in the fact that it packs knowledge. By analyzing different factors and complex mutual relationships, we can arrive at a conclusion that reveals the probability of harmful or unpleasant events. In this sense, risk discourses involve an emancipating power. With the help of knowledge about risks we do not end up making rushed judgements like children in a blindman's buff. Instead, science and probability analyses enable us to draw maps of the dangers in human life. Thanks to risk analysis, these dangers are no longer undefined threats, but we possess information about the magnitude of uncertainty in case of important decisions.

26 The first documented risk calculations were made by gamblers. In the 18th century, the use of the concept of 'probability' spread to ship insurance. In the 19th century, the term was adopted to monetary use due to the rapid expansion of economic systems. Particularly lending money involved investment risks. In this type of context, risks were understood both in a negative and a positive sense, hence the motto 'no risk, no profit'. At the end of the 19th century, the term had become an integral part of western societies, and together with statistical bookkeeping probability calculus became the primary means for planning and administration in Europe. The rise of statistical thinking, which was based on probability assessment, was a relatively rapid historical change. Detailed accounts of the occurrence of illnesses were kept in some European countries as early as in the first part of the 19th century. However, such objective statistics were given different interpretations in different cultures. In some cultures they were considered historical accounts, whilst elsewhere they may have been treated as indicators of general laws in terms of natural science. Social sciences, decision analysis, risk analysis, and cost and benefit analysis are heirs to this new statistical perspective. Finally, in the 20th century, probability analysis became a fundamental part of scientific methodology and also a useful tool in people's everyday life (Douglas, 1992, p. 23; Luhmann, 1993, pp. 8-14; Lupton, 1999a, pp. 5-13).

27 Even the etymological roots of the word 'risk' illustrate evolution of risk discourse. In the past, the expression was used to describe dangers, which threatened a successful voyage by sea. In Italian, it used to mean 'something or someone that cuts', often with reference to a rock or a reef. In Greek, the word '*rhiza*' referred to a rock or a cliff that might have caused trouble to those who sail close to the shore. By the end of the Middle Ages, the term was generally associated with external dangers, such as the elements or other acts of God. From that time onwards, people have struggled to tame dangers and changes (see e.g. Luhmann, 1993, pp. 8-14; also Adams, 1995; Lahti, 1996; Kamppinen et al., 1995; Ojanperä, 1990).

28 Douglas (1986) provides several examples of cultural bias in organizations. One of the examples is the theory of diffusion of responsibility, which involves the basic assumption that groups take greater risks than individuals because there will be more people to share the responsibility when something unexpected happens. Furthermore, all organizations have loyalty structures, which may be exposed, for instance, when a professional group or organization sorts out the causes and effects of a scandal. Professional organizations are usually concerned about their reputation; hence they seldom criticize their members and tend to protect them. Also occupational loyalty plays a big part in all organizations, i.e. there is a strong reciprocal loyalty inside all occupational groups. Moreover, the perception of moral issues by each individual employee directs the perception of risk in organizations. The more institutions are dependent on personal commitment, the more the risks are viewed from the perspective of fairness (How fair are the decisions?). For instance, risk was less tolerated at a workplace when the workers felt that they were exploited. There are many cultural and social variations in fairness discourse. For instance, ordinary workers perceived fairness in terms of treating each employee equally, while foremen and managers saw fairness in terms of acknowledging the skills of each individual (Douglas, 1986, pp. 66-67).

29 Gergen (1998, p. 34) has divided constructionism in three categories on the basis of political orientation: (1) The representatives of ideological constructionism criticized the ideological use of institutional sciences as a means of legitimizing decisions and procedures as early as in the 1960s. Furthermore, moral outrage against the Vietnam War in the 1960s led to the reevaluation of many societal institutions, including science. The central tenet of this type of constructionism has been the deconstruction of apparently value-free objectivism and the exposure of ideological commitments. The goal of ideological constructionists has been to

demystify political motivations and criticize them from the viewpoint of lower social classes. In contrast, the second movement in the field of social constructionism has been much more restricted in scope than the ideologically critical approach, which has attempted to change societal structures; (2) In literature and rhetoric's criticism was focused on the hegemony of structuralism. For instance, Marxist structuralism is based on the modernistic requirement of a rational and objective basis for a knowledge structure. This offers an opportunity for reflective criticism, because structuralist analysis in general has been subjugated to linguistic determinism (Gergen, 1998, p. 38). This weakness was found out by post-structuralists and de-constructionists, when they called in question the truth bearing ability of the language. It opened a possibility to analyze academic studies critically as rhetorical products where the readers are persuaded to accept the subject matter presented as truth. Both literature and rhetoric's have tried to move the attention away from the represented objects to the means of the representation, which are language, the use of language, and symbols; (3) The third school of thought includes social criticism and liberalism, and it is partly based on the works of Max Weber, Max Scheler, Karl Mannheim, and others who were intrigued by the social origins of scientific thought. Here, the main emphasis is on the examination of the development of ideas in their cultural contexts and on exploring how these ideas shape scientific and cultural practices (Gergen, 1998, p. 40). The political nature of this type of constructionism is evident in its goals: it removes the mantle of scientific authority from scholars, and fosters democratic participation by claiming that scientific facts do not emerge from the minds of individual scientists, but are created as a result of an interactive process (Gergen, 1999, pp. 52-59).

30 Minority groups, such as gays and lesbians, have used social constructionism as a useful tool in fighting biological determinism (Shakespierre, 1998). But even though constructionism includes emancipatory elements, it does not in itself provide a solid basis for the development of more positive alternatives or valuing issues. For instance, constructionist research offers a handicapped person an opportunity to doubt the legitimacy of social models affecting him or her, but it does not provide a basis for the construction of a new identity or political program (Shakespierre, 1998, p. 177). Accusations of voluntarism directed at constructionism are based on the fact that according to constructionists, there are no binding objective structures or consequences restricting the activities of individuals (Burkitt, 1998, p. 129). What is missing in social constructionism is the non-constructed basis of social reality–social reality remains free-floating and indeterminate (Collin, 1997, 63). If we assume that social contracts create facts, it leaves no room for determining facts, because they have to be created over and over again. In response to criticism, I would like to comment that accusations of voluntarism are aimed at the wrong target, because constructionism continues the emancipating work of natural sciences in revealing new information about natural phenomena. I find it difficult to accuse nuclear physics or chemistry of voluntarism, because these fields have demonstrated that our material being only consists of the interplay of atoms. Instead of juxtapositions we should welcome new knowledge, familiarize ourselves with the facts, and perhaps reconsider our views. In my opinion, constructionism does not "leave us in a state of free floating and indeterminacy", because one of its presumptions is that we are all situated within a culture, which is a product of historical events, processes, and traditions (see also endnotes 32, 37 and 45). Constructionist analysis does not eliminate ourselves from culture, instead, at its best it offers us a chance for increasing our self-awareness, appreciating the limitations of our commitments, and evaluating potential of alternatives (Gergen, 1999, p. 235).

31 There is no unified and canonized constructionist position, instead, constructionism is a rather heterogeneous group of overlapping discourses and research practices, which draw ideas from different sources and emphasize different points. Constructionism in general has been utilized in three separate disciplines in social sciences. Berger and Luckmann's book '*Social Construction of Reality*' (1967) is a seminal work and it brought social constructionism to the forefront in sociology. It is widely accepted as a landmark, but Lynch (1998, p. 24) pointed out that also some more radical approaches were developed in the 1960s. Berger and Luckmann were the first who managed to integrate philosophical phenomenology in mainstream sociology. Today, the term 'constructionism' is understood to cover several theoretical approaches, such as phenomenological sociology, ethnomethodology, and symbolic interactionism. Another field where constructionism is widely used is social psychology (Gergen and Davis, 1985). Finally, a third field where this approach is frequently used is the study of science and technology (Latour and Woolgar, 1986).

32 The issue of relativism in constructionism has raised many intellectual disputes. Most members of the constructionist school of thought base their ideas on some degree of relativism both in the ontological and moral sense. After this basic decision a researcher

cannot accept any ultimate foundation for truth, or present any moral principles or requirements of truth. It is more important to understand that knowledge is dependent on actors, institutions, techniques, practices, and writings. In extreme cases, this may lead to implicit nihilism and the denial of material and societal facts. Such conclusions have produced much criticism targeted at the relativist aspect of constructionism (e.g. Roth, 1998 and Turner, 1998). Quite often these anxious critics have ignored the fact that constructionism also has a realistic undercurrent. Structuralist realism highlights the reality where actors live, carry out tasks, and form networks. It is not surprising that also this perspective in life together and the practices of everyday life has been criticized. For instance, Lynch (1998) argues that realistic emphasis in constructionism may lead to the simple replacement of ideas with practices, and to the adoption of a perspective where the researcher is most interested in a semblance of reality. However, this is not the really case in constructionism, because constructionist studies focus on the idea of that we all are actors in the creation of cultural life (Gergen, 1999, p. 167).

33 Relativism in constructionism is linked to the contextual nature of all things. For instance, we may propose that the standards of rationality not only vary from one society to another, but that they also vary temporally in each society in its different stages of development. The social and political organization of a society are some of these changeable characteristics. For example, the prevalent rules of rationality in an agricultural society are different from the ones in an industrial society (Collin, 1997).

34 Roth (1998) emphasizes the naturalist aspect of constructionism. According to him, naturalism is clearly evident in numerous constructionist research problems, since constructionist studies typically attempt to explain how science is made in laboratories, offices, seminar rooms, etc. without any predestined basis, such as principles of scientific logic. The explanatory theoretical framework has to be developed hand in hand with empirical research (Roth, 1998, p. 71). The sociological history of naturalistic observation dates back to Erving Goffman and Georg Simmel (Manning, 1998, p. 164). Also the ethnographic method is widely utilized in constructionist research (e.g. Latour and Woolgar, 1986).

35 The production of very detailed descriptions of research objects is one of the methods used in constructionism. This type of atomistic particularism has been criticized because it does not leave room for generalizations–which makes it non-scientific–and it produces results, which are difficult to verify (e.g. Roth, 1998, p. 76).

36 Manning (1998, p. 161) suggests that there are two kinds of constructionism. The first one concentrates on processes, while the other one is more interested in reflexivity. Representatives of the procedural orientation stress that the ways we form an interpretation of our actions are a very important part of those actions. Hence, the task of the researcher is to explicate the signs, meanings, and procedures through which we form an understanding of our social surroundings. In this case, the focus of analysis is on the complex interaction of everyday life and its more refined dimensions. Meanwhile, representatives of the reflexive approach apply the constructionist method to their own scientific practices and believe that the limitations and validity of knowledge should also be under scrutiny. Some scholars, such as Woolgar (1988), suggest a more self-aware literal style. According to him, also sociologists should use the narrative tools of novelists in their writing process. The epistemological foundation of this type of sociology is based on meticulous self-reflection.

37 Constructionists sometimes use a method called 'molecular analysis'. In it, a researcher observes varying interaction relationships where complex networks of meaning are activated. Hence, the unit of analysis is the multiplicity of socially constructed interaction. The research goal in molecular analysis is to deconstruct these successive molecular periods. As a result, this kind of procedural constructionism produces detailed descriptions of everyday interaction; the purpose of these descriptions is to produce a sociological analysis of the endogenous order of everyday interaction. With the help of these findings we may recognize the way people make the world understandable to themselves, i.e. they help us to understand how the social world becomes routinized and inter-subjectively unproblematic (Manning, 1998, p. 161).

38 The use of constructionism is justified because it is, in my opinion, a superior tool for the study of change and development processes. Nevertheless, the researcher should observe the limitations of the theory: Constructionism may easily be employed in attacks against change, moreover, it may encourage arrogant self-satisfaction and fragment and isolate the social world (Gergen, 1998, p 46).

39 The other side of the coin is that descriptions of the construction of a social problem or conflict may contain too much exoticism, if power struggles and differences in practices are too heavily emphasized. Both Roth (1998) and Turner (1998) agree that constructionist stories may be translated into the more simple language of storytelling or historical accounts without causing any major damage. For them, the most important problem with constructionism is the inflation of concepts. On the one hand, the inflation of concepts may hold true, but on the other hand, exotic 'thick descriptions' may form a basis of new conceptualizations, since earlier researchers may have used biased concepts. For example, NIMBY (Not-In-My-Backyard) theories viewed environmental conflicts from the perspective of authorities and industry representatives, and ignored 'local voices' (Article 2; Litmanen, 1999c). Constructionist styles of writing have been developed partly as a reaction against the long-standing dominance of empiricist tradition (where the researcher's voice dominates and all alternative interpretations are either suppressed or proven wrong) in human sciences. Another important motivation for using alternative styles in research reports is the constructionist emphasis on emancipation and empathy. As Gergen (1999, p. 97) pointed out, "narrative research with a more empathic orientation often attempts to give voice to the unheard and marginalised in society, to generate understanding through sharing first-hand experience."

40 Lupton (1999a, 35) has outlined a continuum of epistemological approaches to risk in social sciences. In the realistic end of the continuum, risk is considered an objective hazard, threat, or danger that exists and can be measured independent of social and cultural processes, but it may be distorted or biased through social and cultural frameworks of interpretation. In the other end of the continuum, we have a strong constructionist approach according to which nothing in itself constitutes a risk, because the issues we perceive as 'risks' are products of historically, socially, and politically contingent 'ways of seeing'. Between these two extremities we find a third approach, which Lupton terms 'weak constructionism', but which in my opinion might just as well be called 'weak realism'. Weak constructionism emphasizes the idea that risk is an objective hazard, threat, or danger that is mediated exclusively through social and cultural processes, and can never be known in isolation from these processes.

41 It is also true that perceiving the world in terms of risks may cause negative effects in people's lives. One effect is that a person may become oppressed with anxiety if he/she is constantly expected to update his/her knowledge of risks and change his/her behavior on the basis this information. For example, the case of grocery shopping described earlier would become a nightmare, if the customer paid an inordinate amount of attention to the risks everyday groceries constitute to human life and the environment.

42 Sociologists took an interest in risks also because risk disputes clearly showed that risks are linked to such issues as power and justice. The distribution of risks appears to reflect the overall distribution of power and status in society. Today, in the case of technological projects, scientific risk calculations include fundamental political or ethical suppositions about the just societal distribution of the pros and cons: should some people make sacrifices on behalf of others, should the government or the enterprises pay compensation, what is the value of life, etc. These types of questions turn apparently objective risk assessments into political, economic, and moral pressures, which in turn have an effect on which activities are considered acceptable in society (Douglas, 1986, p. 10).

43 Lynch (1998) discusses the term 'construction' and shows that it often has a nominalist emphasis. He refers to the theory of deviation and other orientations based on semiotic and symbolic interactionism that deal with the constitutive power of names, descriptions, signifiers, and representations, because they establish social identities and demarcate moral communities (Lynch, 1998, p. 23).

44 Lynch (1998) warns that constructionism does not offer any guarantee of authenticity, accuracy, or deep metaphysical understanding. For him, constructionism offers a means to represent and legitimize an academic work, but this method may have unpredictable results when it is used to effectuate radical epistemological reform (Lynch, 1998, p. 29). Also Manning warns that constructionism may produce significant, even destructive reflexive consequences to sociology itself (Manning, 1998, pp. 160-161). This is due to the fact that social constructionism suggests that there is no external reality and that social reality can be understood only from the inside; the logical consequence of this reasoning is that there are no external standards to which one might appeal in order not to stray to relativistic nihilism. Moreover, constructionism has been blamed for anti-essentialism, which implies that it does not regard anything as a given fact or admit that anything determinates the world or human

nature (Burr, 1995, pp. 5-6). In short, anti-essentialism implies that objects or humans do not have any essential nature.

45 The constructionist solution to the problem of the existence of material reality is often misunderstood. Constructionists do not deny pollution, poverty, radiation, or cancer. Nor do they make an attempt to judge what is or is not fundamentally real. In my opinion, Gergen (1999, p. 222) phrased the idea nicely when he wrote that "the moment we begin to articulate what there is–what is truly or objectively the case–we enter a world of discourse–and thus a tradition, a way of life, and a set of value preferences." That is to say, any statements about reality have to be interpreted in the context of a specific culture and history. Alas, every time we speak we often forget that we are functioning within a particular tradition.

46 It would be interesting to study risks from the viewpoint of ideology since both risks and ideologies are social constructs, and, *vice versa*, they construct alternative social awarenesses of reality, i.e. offer alternative ways of perceiving reality. Successful dissemination of a specific perception of risk or ideology might lead to the rise of a collective consciousness and collective action.

47 It would not be correct to argue that without this piece of information we would have been blissfully ignorant of the risk, because awareness of one's own ignorance also contributes to anxiety.

48 Perrow's (1984) weberian analysis of risk describe this phenomena: "If interactive complexity and tight coupling – system characteristics – inevitably will produce an accident, I believe we are justified in calling it a *normal accident*, or a *system accident*. The odd term *normal accident* is meant to signal that, given the system characteristics, multiple and unexpected interactions of failures are inevitable. This is an expression of an integral characteristic of the system, not a statement of frequency." (Perrow, 1984, 5)

49 The law on Environmental Impact Assessment includes a number of compulsory measures for the evaluation of the social impact of large-scale projects. Public authorities carry out environmental impact assessments. They were designed to take the hopes and anxieties of the local population into consideration, but in practice they largely reduce local people to the position of passive receivers, who have to be heard, but who have no real influence over the plans. Societal evaluation where local residents and communities would be treated as equal partners in the debate on the project or technology would in my opinion be superior to the present procedure.

50 According to Lupton (1999a, p. 132), the concept of 'hybrid' denotes something that "combines two types thought of as distinct from each other in such a way as to merge their characteristics into a new type." Lupton also mentions another definition of 'hybrid': "the separation of a single entity into two or more parts, rendering each different from the other," but in this thesis I have deliberately emphasized the primary definition. I agree with Lupton when she states "that the globalizing processes of late modernity are producing new and transitional forms of hybrid identities. These identities confound, confuse and challenge established ideas about the distinctions between different types of cultural identity. Hybrid identities are constantly in flux, remaking boundaries rather than bolstering then."

REFERENCES

Adams, John (1995), *Risk*, UCL Press, London.

Albrow, Martin (1997), 'Travelling beyond local cultures. Socioscapes in a global city', in John Eade (ed) *Living the Global City. Globalization as a Local Process*, Routledge, London, pp. 37-55.

Albrow, Martin, Eade, John, Dürrschmidt, Jörg and Washbourne, Neil (1997), 'The impact of globalization on sociological concepts: community, culture and milieu', in John Eade (ed) *Living the Global City. Globalization as a Local Process*, Routledge, London, pp. 20-36.

Armour, Audrey (ed) (1984), *The Not-In-My-Backyard Syndrome. A Two Day Symposium on Public Involvement in Siting Waste Management Facilities, 13-14 May 1983. Symposium Proceedings.* Faculty of Environmental Studies, York University, Toronto.

Bash, Harry H. (1995), *Social Problems & Social Movements. An Exploration into the Sociological Construction of Alternative Realities*, Humanities Press, New Jersey.

Bauer, Martin (1997), 'Towards a functional analysis of resistance', in Martin Bauer (ed) *Resistance to New Technology. Nuclear Power, Information Technology and Biotechnology*, Cambridge University Press, Cambridge, pp. 400-410.

Beck, Ulrich (1992), *Risk Society. Towards a New Modernity*, Sage Publications, London.

Beck, Ulrich (1995), *Ecological Politics in an Age of Risk*, Polity Press, Cambridge.

Beck, Ulrich (1999), *Mitä globalisaatio on? Virhekäsityksiä ja poliittisia vastauksia* [What is Globalization?], Vastapaino, Tampere.

Berger, Peter L. and Luckmann, Thomas (1967), *The Social Construction of Reality. A Treatise in the Sociology of Knowledge*, Doubleday, Garden City.

Blowers, Andrew, Lowry, David and Solomon, Barry, D. (1991), *The International Politics of Nuclear Waste*, Macmillan, London.

Burkitt, Ian (1998), 'Relations, communication and power', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism*, Sage Publications, London, pp. 121-131.

Burr, Vivien (1995), *An Introduction to Social Constructionism*, Routledge, London.

Bruhèze, Adri de la (1992) *Political construction of technology. Nuclear Waste Disposal in The United States (WMW-publikatie 10. Faculteit wijsbegeerte en maatschappijwetenschappen)*, Universiteit Twente, Enschede.

Clarke, Lee (1991), *Acceptable Risk? Making Decisions in a Toxic Environment*, University of California Press, Berkeley.

Collin, Finn (1997), *Social Reality*, Routledge, London.

Crook, Stephen (1999), 'Ordering risks', in Deborah Lupton (ed) *Risk and Sociocultural Theory. New Directions and Perspectives*, Cambridge University Press, Cambridge, pp. 160-185.

Dean, Mitchell (1998), 'Question of method', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism*, Sage Publications, London, pp. 182-199.

Douglas, Mary (1986), *Risk. Acceptability According to the Social Sciences*, Routledge and Kegan Paul, London.

Douglas, Mary (1992), *Risk and Blame. Essays in Cultural Theory*, Routledge, London.

Douglas, Mary and Wildavsky, Aaron (1983), *Risk and Culture. An Essay on the Selection of Technical and Environmental Dangers*, University of California Press, Berkeley.

Dunlap, Riley, E. (1994), 'Sociology, Environmental', in Ruth A. Eblen and William R. Eblen (eds) *The Encyclopaedia of the Environment*, Houghton Mifflin, Boston, pp. 655-657.

Dunlap, Riley, E. and Catton, William, R., Jr. (1979), 'Environmental sociology', *Annual Review of Sociology*, vol. 5, pp. 243-273.

Dunlap, Riley, E., Kraft, Michael, E. and Rosa, Eugene, A. (eds) (1993) *Public Reactions to Nuclear Waste. Citizen's Views of Repository Siting*, Duke University Press, Durham.

Eade, John (1997), 'Introduction', in John Eade (ed) *Living the Global City. Globalization as a Local Process*, Routledge, London, pp. 1-19.

Easterling, Doug and Kunreuther (1995) *The Dilemma of Siting a High-Level Nuclear Waste Repository (Studies in Risk and Uncertainty)*, Kluwer Academic Publishers, Boston.

Eder, Klaus (1996), *The Social Construction of Nature. A Sociology of Ecological Enlightenment*, Sage Publications, London.

Eiser, Richard, J. and van der Pligt, Joop (1993), *Attitudes and Decisions*, Routledge, London.

Eiser, Richard, J., van der Pligt, Joop and Spears, Russell (1995), *Nuclear Neighbourhoods. Community Responses to Reactor Siting*, University of Exeter Press, Exeter.

Eyerman, Ron and Jamison, Andrew (1991), *Social Movements. A Cognitive Approach*, Polity Press, Cambridge.

Featherstone, Mike (ed) (1990), Global Culture. Nationalism, Globalization and Modernity (*A Theory, Culture and Society Special Issue, vol. 7, issue 2/3*), Sage Publications, London.

Featherstone, Mike, Lash, Scott and Robertson, Roland (eds) (1995), *Global modernities*, Sage Publications, London.

Flam, Helena (ed) (1994) *States and Anti-Nuclear Movements*, Edinburgh University Press, Edinburgh.

Gamson, William, A. and Modigliani, Andre (1989), 'Media discourse and public opinion on nuclear power. A constructionist approach', *American Journal of Sociology*, vol. 95, no. 1, pp. 1-37.

Gergen, Kenneth, J. (1994), *Realities and Relationships. Soundings in Social Construction*, Harvard University Press, Cambridge.

Gergen, Kenneth, J. (1998), 'Constructionist dialogues and the vicissitudes of the political', in Irving Velody and Robin Williams (eds), *The Politics of Constructionism*, Sage Publications, London, pp. 33-48.

Gergen, Kenneth, J. (1999), *An Invitation to Social Construction*, Sage Publication, London.

Gergen, Kenneth, J. and Davis, Keith, E. (1985), *The Social Construction of the Person*, Springer, New York.

Giddens, Anthony (1990), *The Consequences of Modernity*, Polity Press, Cambridge.

Giddens, Anthony (1991), *Modernity and Self-identity. Self and Society in the Late Modern Age*, Polity Press, Cambridge.

Gould, Kenneth, A., Schnaiberg, Allan and Weinberg, Adam, S. (1996), *Local Environmental Struggles. Citizen Activism in the Treadmill of Production*, Cambridge University Press, Cambridge

Hannigan, John, A. (1995), *Environmental Sociology. A Social Constructionist Perspective*, Routledge, London.

Herzik, Eric, B. and Mushkatel, Alvin, H. (eds) (1993) *Problems and Prospects for Nuclear Waste Disposal Policy (Contributions in Political Science, no. 283)*, Greenwood Press, Westport, Connecticut.

Jacob, Gerald (1990) *Site Unseen. The Politics of Siting a Nuclear Waste Repository*, University of Pittsburgh Press, Pittsburgh.

Jaeger, Carlo, Renn, Ortwin, Rosa, Eugene A. and Webler, Thomas (2001), *Risk, Uncertainty, and Rational Action*, Earthscan Publications, London (in press).

Jamison, Andrew (1996), 'The shaping of the global environmental agenda. The role of non-governmental organizations', in Scott Lash, Bronislaw Szerszynski and Brian Wynne (eds) *Risk, Environment & Modernity. Towards a New Ecology*, Sage Publications, London, pp. 224-245.

Kamppinen, Matti, Raivola, Petri, Jokinen, Pekka and Karlsson, Hasse (1995), *Riskit yhteiskunnassa. Maallikot ja asiantuntijat päätösten tekijöinä* [Risks in Society. Laymen and Experts as Decision-makers], Gaudeamus, Helsinki.

Kilminster, Richard (1997), 'Globalization as an emergent concept', in Alan Scott (ed) *Limits of Globalization. Cases and Arguments*, Routledge, London, pp. 257-283.

Klandermans, Bert (1997), *The Social Psychology of Protest*, Blackwell Publishers, Oxford.

Kriesi, Hanspeter (1996), 'The organizational structure of new social movements in a political context', in Doug McAdam, John D. McCarthy and Mayer N. Zald (eds) *Comparative Perspectives on Social Movements. Political Opportunities, Mobilizing Structures, and Cultural Framings*, Cambridge University Press, Cambridge, pp. 152-184.

Kriesi, Hanspeter, Koopmans, Ruud, Dyvendak, Jan Willem and Giugni, Marco, G. (1995), *New Social Movements in Western Europe. A Comparative Analysis (Social Movements, Protest, and Contention; vol. 5)*, UCL Press, London.

Lahti, Vesa-Matti (1996), *Riskiyhteiskunta tuli kylään. Sosiologinen tutkimus vesijohtoveden saastumisen seurauksista ihmisten elämässä. Helsingin yliopiston sosiologian laitoksen tutkimuksia No. 229*, [Risk Society Pays a Visit. A Sociological Study on the Effects of Drinking Water Contamination on People's Lives. Publications of the Department of Sociology at the University of Helsinki No. 229], University of Helsinki, Helsinki.

Lash, Scott, Szerszynski, Bronislaw and Wynne, Brian (eds) (1996), *Risk, Environment & Modernity. Towards a New Ecology*, Sage Publications, London.

Latour, Bruno and Woolgar, Steve (1986), *Laboratory Life. The Construction of Scientific Facts*, Princeton University Press, Princeton.

Lidskog, Rolf (1994), *Radioactive and Hazardous Waste Management In Sweden. Movements, Politics and Science*, Acta Universitatis Upsaliensis, Studia Sociologica Upsaliensia 38, Uppsala.

Lidskog, Rolf and Litmanen, Tapio (1997), 'The social shaping of radwaste management. The cases of Sweden and Finland', *Current Sociology*, vol. 45, no. 3 (July 1997), pp. 59-79.

Litmanen, Tapio (1994), *Kallion uumenissa, satojen metrien syvyydessä. Paikalliset ydinjätekonfliktit Suomessa* [In the Bowels of the Bedrock, Hundreds of Metres Deep. Local Nuclear Waste Conflicts in Finland], licentiate thesis, University of Jyväskylä, Jyväskylä.

Litmanen, Tapio (1996a), 'Environmental conflict as a social construction. Nuclear waste conflicts in Finland', *Society and Natural Resources*, vol. 9, no. 5, pp. 523-535.

Litmanen, Tapio (1996b), 'Ympäristökamppailun sosiaalinen rakentuminen. Ydinjätekamppailut Eurajoella, Kuhmossa ja Äänekoskella [The social construction of environmental conflict. Nuclear waste conflicts in Eurajoki, Kuhmo, and Äänekoski]', *Sosiologia*, vol. 33, no. 4, pp. 299-311.

Litmanen, Tapio (1996c), 'Kuinka ydinvoimasta tuli globaali ongelma? [How did nuclear power become a global problem?]', *Alue ja Ympäristö*, vol. 25, no. 1, pp. 18-36.

Litmanen, Tapio (1996d), 'Ydinjätteet - Kiitos, ei tänne! Paikkakuntalaisten suhtautuminen ydinjätteisiin Äänekoskella, Eurajoella ja Kuhmossa [Nuclear waste - No thanks! Local attitudes towards nuclear waste in Äänekoski, Eurajoki, and Kuhmo]', in Esa Konttinen and Tapio Litmanen (eds) *Ekokuntia ja Ökykuntia. Tutkimuksia ympäristönhallinnan paikallisesta eriaikaisuudesta* [Ecological and Wasteful Municipalities. An Anthology on the Non-coincident Development of Local Environmental Administration], SoPhi, Jyväskylä, pp. 148-190.

Litmanen, Tapio (1998a), 'International anti-nuclear movements in Finland, France and the United States', *The Canadian Journal of Peace Studies*, vol. 30, no. 4, pp. 1-19.

Litmanen, Tapio (1998b), 'Kansainvälinen ydinvoiman vastainen liike ja sen suhde ydinaseiden vastaiseen liikkeeseen [International anti-nuclear power movement and its relation to the anti-nuclear weapons movement]', in Kaj Ilmonen and Martti Siisiäinen (eds), *Uudet ja vanhat liikkeet* [Old and New Movements], Vastapaino, Tampere, pp. 281-306.

Litmanen, Tapio (1999a), 'Cultural approach to the perception of risk. Analyzing concern about siting of a high-level nuclear waste facility in Finland', *Waste Management & Research*, vol. 17, no. 3, pp. 212-219.

Litmanen, Tapio (1999b), 'From the golden age to the valley of despair. How did the nuclear waste became a problem?', in Esa Konttinen, Tapio Litmanen, Matti Nieminen and Marja Ylönen (eds) *All Shades of Green. The Environmentalization of Finnish Society*, SoPhi, Jyväskylä, pp. 111-128.

Litmanen, Tapio, Hokkanen, Pekka and Kojo, Matti (eds) (1999), *Ydinjäte käsissämme. Suomen ydinjätehuolto ja suomalainen yhteiskunta* [Nuclear Waste in our Hands. The Finnish Society and Nuclear Waste Management in Finland], SoPhi, Jyväskylä.

Lofland, John (1996), *Social Movement Organizations. Guide to Research on Insurgent Realities*, Aldine de Gruyter, New York.

Luhmann, Niklas (1993), *Risk. A Sociological Theory*, Aldine de Gruyter, New York.

Lupton, Deborah (1999a), *Risk*, Routledge, London.

Lupton, Deborah (ed) (1999b), *Risk and Sociocultural Theory. New Directions and Perspectives*, Cambridge University Press, Cambridge.

Lynch, Michael (1998), 'Towards a constructivist genealogy of social constructivism', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism*, Sage Publications, London, pp. 13-32.

Mackenzie, Craig (1998), 'Social constructionist political theory', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism*, Sage Publications, London, pp. 200-220.

Manning, Philip (1998), 'Procedure, reflexivity and social constructionism', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism*, Sage Publications, London, pp. 159-167.

Merton, Robert, K. and Nisbet, Robert (eds) (1976), *Contemporary Social Problems (Fourth Edition)*, Harcourt Brace Jovanovich, New York.

Meyer, David, S. (1993), 'Institutionalizing dissident. The United States structure of political opportunity and the end of the Nuclear Freeze Movement', *Sociological Forum*, vol. 8, no. 2, pp. 157-177.

Meyer, David, S. and Kleidman, Rob (1991), 'The Nuclear Freeze Movement in the United States', in Bert Klandermans (ed) *Peace Movements in Western Europe and the United States. International Social Movement Research. A Research Annual. Vol. 3.* JAI Press, Greenwich.

Milton, Kay (1996), *Environmentalism and Cultural Theory. Exploring the Role of Anthropology in Environmental Discourse*, Routledge, London.

Ojanperä, Matti (ed) (1990). *Sireenien ulvonnasta seireenien lauluun. Antologia modernin yhteiskunnan riskeistä* [From Hooting Sirens to Singing Sirens. An Anthology on the Risks of Modern Society], Imatran Voima Oy, tutkimus- ja kehitysyksikkö, Vantaa.

Perrow, Charles (1984), *Normal Accidents. Living with High-risk Technologies*, Basic Books, New York.

Posiva (1999), *Käytetyn ydinpolttoaineen loppusijoituslaitoksen periaatepäätöshakemus* [Application for a Decision in Principle on the Siting of a Nuclear Fuel Final Disposal Facility], Posiva Oy, Helsinki.

Rabe, Barry, G. (1994), *Beyond NIMBY. Hazardous Waste Siting in Canada and the United States*. The Brookings Institution, Washington, D.C.

Raivola, Petri (1995), *Ympäristöuhan sosiaalinen representaatio. Rikka rokassa vai viimeinen pisara? Psykologian tutkimuksia No. 98* [The Social Representation of an Environmental Threat. An Insignificant Mote or a Drop too Much? Publications of the Department of Psychology at the University of Turku No. 98], University of Turku, Turku.

Richardson, Philip, J. (1999), *Raportti Suomen ydinjätesijoitukseen liittyvistä ongelmista. Suomen luonnonsuojeluliiton monisteita 4/98* [A Report on the Problems Related to Nuclear Waste Siting in Finland. Publications of the Finnish Association for Nature Conservation 4/98], Suomen luonnonsuojeluliitto, Helsinki.

Robertson, Roland (1992), *Globalization: Social Theory and Global Culture*, Sage Publications, London.

Rosa, Eugene, A and Clark, Ronald L , Jr (1999) 'Historical Routes to Technological Gridlock: Nuclear Technology as Prototypical Vehicle', *Research in Social Problems and Public Policy* vol. 7, pp. 21-57.

Rosa, Eugene, A., Renn, Ortwin, Jaeger, Carlo and Webler, Thomas (1995), *Risk as a challenge to cross-cultural dialogue,* paper presented at 'Dialogue Between Cultures and Changes in Europe and the World', the XXXII Congress of the International Institute of Sociology, Trieste, Italy 3-7 July 1995.

Roseneil, Sasha (1997), 'The global common. The global, local and personal dynamics of women's peace movement in the 1980s', in Alan Scott (ed) *Limits of Globalization. Cases and arguments,* Routledge, London, pp. 55-71.

Roth, Paul (1998), 'What does the sociology of scientific knowledge explain?', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism,* Sage Publications, London, pp. 69-82.

Rucht, Dieter (1996), 'The impact of national contexts on social movement structures. A cross-movement and cross-national comparison', in Doug McAdam, John D. McCarthy and Mayer N. Zald (eds) *Comparative Perspectives on Social Movements. Political Opportunities, Mobilizing Structures, and Cultural Framings,* Cambridge University Press, Cambridge, pp. 185-204.

Rüdig, Wolfgang (1990) *Anti-Nuclear Movements. A World Survey of Opposition to Nuclear Energy,* Longman Current Affairs, Essex.

Scott, Alan (1997), 'Introduction - Globalization. Social process or political rhetoric?', in Alan Scott (ed) *Limits of Globalization. Cases and arguments,* Routledge, London, pp. 1-12.

Shakespierre, Tom (1998), 'Social constructionism as a political strategy', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism,* Sage Publications, London, pp. 168-181.

Simes, Iida (1999), 'Ydinjätehuollon harhapolut. Suomen luonnonsuojeluliiton näkemyksiä ydinjätepolitiikasta [Tracks of errors in nuclear waste management. The views of the Finnish Association for Nature Conservation on the Finnish nuclear waste policy] ', in Tapio Litmanen, Pekka Hokkanen and Matti Kojo (eds) *Ydinjäte käsissämme. Suomen ydinjätehuolto ja suomalainen yhteiskunta* [Nuclear Waste in our Hands. The Finnish Society and Nuclear Waste Management in Finland], SoPhi, Jyväskylä, pp. 258-265.

Spybey, Tony (1996), *Globalization and World Society,* Polity Press, Cambridge.

Touraine, Alain, Dubet, François and Wieviorka, Michel (1983) *Anti-Nuclear Protest. The Opposition to Nuclear Energy in France,* Cambridge University Press, Cambridge.

Turner, Stephen (1994), *The Social Theory of Practices,* Polity Press, Cambridge.

Turner, Stephen (1998), 'The limits of social constructionism', in Irving Velody and Robin Williams (eds) *The Politics of Constructionism,* Sage Publications, London, pp. 109-119.

van den Bergh, Benthem, G. (1992), *The Nuclear Revolution and the End of the Cold War. Forced Restraint,* Macmillan, London.

van der Pligt, Joop (1992), *Nuclear Energy and the Public,* Blackwell, Oxford.

Vari, Anna, Reagan-Cirincione, Patricia and Mumpower, Jeryl, L. (1994) *LLRW Disposal Facility Siting. Successes and Failures in Six Countries (Technology, Risk,*

and Society. An International Series in Risk Analysis), Kluwer Academic Publishers, Dordrecht.

Velody, Irving and Williams, Robin (eds) (1998) *The Politics of Constructionism*, Sage Publications, London.

Waters, Malcolm (1995), *Globalization*, Routledge, London.

Woolgar, Steve (ed) (1988), *Knowledge and Reflexivity. New Frontiers in the Sociology of Knowledge*, Sage Publications, London.

YHTEENVETO

Johdanto ja tutkimuksen tarkoitus

Tutkimus *Kamppailu riskistä. Ydinteknologian vastaisen protestin spatiaaliset, temporaaliset ja kulttuuriset ulottuvuudet* paikantuu kahden osittain päällekkäin menevän sosiologisen tutkimusperinteen välimaastoon. Ensinnäkin tutkimus käsittelee yhteiskunnallisia liikkeitä. Kansainvälisen ydinteknologian vastaisen protestin keskeisiä toimijoita ovat vuosikymmenien ajan olleet ydinaseiden ja ydinvoiman vastaiset liikkeet, joiden puitteissa miljoonat ihmiset ympäri maailmaa ovat ilmaisseet näkemyksiään. Toisaalta tutkimus voidaan luokitella myös osaksi uutta sosiologian erityisalaa, ympäristösosiologiaa. Ympäristökysymysten kasvava poliittinen merkitys on suunnannut sosiologien kiinnostuksen ympäristöongelmien sosiaalisiin ulottuvuuksiin ja ihmisyhteisöjen ja niiden fyysisen ympäristön monimutkaisiin vuorovaikutussuhteisiin. Nykyisiä kiinnostuksen kohteita ovat paitsi ympäristöliikkeet myös ihmisen luomat ympäristövaarat, kuten ydinteknologian ympäristö- ja terveysriskit.

Liiketutkimusta ja ympäristösosiologiaa yhdistää tässä tutkimuksessa kaksi teemaa, globalisaatio ja riski. Termi globalisaatio viittaa ydinteknologian vastaisen protestin ilmentymiseen eri tilallisilla tasoilla lähtien paikallistasolta ja päätyen globaaliin. Erityisesti globalisaatiota tarkastellaan sotilaallisena ja kulttuurisena ilmiönä. Yhtäältä globalisaatio nähdään yhteiskunnallisena kehityskulkuna, jota nopeutti kylmän sodan aikainen ydinasevarustelukierre. Sotilaallisen maailmanjärjestyksen ylläpitäminen edellytti suurvaltojen keskinäistä neuvonpitoa ja asioiden koordinointia, mikä lisäsi valtioiden keskinäistä riippuvuutta ja syvensi sosiaalista integraatiota maailman mittakaavassa. Toisaalta tutkimuksessa tarkennutaan globalisaation kulttuuriseen puoleen. Globaalin tietoisuuden kehittyminen ja niin sanotun maapallonäkökulman luominen kulttuurisena ilmiönä kietoutuu yhteen edellä mainitun kansainvälis-poliittisen kehityksen kanssa. Ydinaseiden nopea lisääntyminen lisäsi myös maailmanlaajuisen ydinsodan uhkaa, mikä puolestaan synnytti kansainvälisen protestin ydinaseita vastaan. Ydinteknologian sotilaallisen ja myöhemmin rauhanomaisen käyttöönoton yhteiskunnallinen seuraus on ollut ydinteknologian vastaisen protestin kehittyminen, josta on vähitellen tullut lähes

itse itseään ylläpitävä. Ydinteknologiaa vastustavien liikkeiden toiminnan myötä on muodostunut erityinen ydinkulttuuri ja globaali riskitietoisuus.

Tutkimuksessa eritellään ydinteknologian vastaista protestia, mikä tarkoittaa julkisesti ilmaistua vastustusta tai kriittisyyttä ydinteknologian käyttöä, ydinpolitiikan toimeenpanoa tai ydinjätelaitoksen sijoitussuunnitelmia kohtaan. Ydinteknologian vastainen protesti nähdään kulttuurisena ilmiönä, joka ulottuu paikalliselta tasolta aina kansalliselle, kansainväliselle ja ylikansalliselle tasolle asti. Protesti on käynnistynyt toisen maailmansodan jälkeen ja sen tavoitteena on ollut ydinteknologian ja sen riskien yhteiskunnallinen arviointi. Analyyttisesti ydinteknologian vastainen protesti on jaettu ydinaseiden, ydinvoiman ja ydinjätteiden vastaiseen protestiin.

Tutkimuksessa selvitetään myös ydinteknologian vastaisen protestin sosiaalista alkuperää kulttuurisen riskiteorian avulla. Tällöin kiinnostuksen kohteena ovat 1) paikallisten riskitulkintojen kulttuurinen ja yhteisöllinen tausta, 2) maallikoiden ja asiantuntijoiden riskinäkemysten poikkeavuus, paikoin jopa vastakkaisuus, 3) kollektiivisten riskitulkintojen kulttuurinen muuttuminen. Monimuotoista käsitettä, riski, käytetään tutkimuksessa ydinteknologian vastaisen protestin sosiaalisen alkuperän, kasvavan kollektiivisen tietoisuuden ja toiminnan erittelemiseen sekä ydinkulttuurin jatkuvuuden ymmärtämiseen. Ydinteknologian riskit ovat olleet pitkään yhteiskunnallisen arvioinnin kohteena. Yleisön esittämät näkemykset ja vaatimukset ydinriskeistä ovat vaihdelleet kokonaisvaltaisesta syiden poistamista parempien riskihallintajärjestelmien kehittämiseen.

Tutkimuksen lähtökohta on katsoa ydinteknologian vastaista protestia osana globaalia ydinkulttuuria, joka 1) muotoutuu ydinteknologian kannattajien ja vastustajien välisessä vuorovaikutuksessa, 2) kehittyy eri spatiaalisilla tasoilla, 3) omaa tietyn itsenäisen historiallisen kehityksenkaaren, 4) sisältää tietoa, uskomuksia ja arvoja, jotka ovat tiivistyneet tulkinnallisiksi paketeiksi ydinteknologiaa vastaan ja puolesta, 5) tarjoaa tulkintavälineitä uusien tapahtumien ja muuttuvien olosuhteiden arviointiin, 6) leviää joukkotiedotusvälineiden avulla, 7) on yksilöiden (esim. asiantuntijat, aktivistit, toimittajat ja taiteilijat) ja organisaatioiden (esim. yritykset ja liikkeet) luomaa, 8) resonoi nyky-yhteiskuntien laajempien kulttuuristen virtausten kanssa ja 9) on osittain ulkoisten tekijöiden, kuten muuttuvien taloudellisten ja poliittisten suhdanteiden, määräämää.

Ydinteknologian vastaisen protestin konstruktionistisessa analyysissä on viisi tasoa: 1) Suomen ydinteknologian vastaisen protestin analyysi ja protestin vertailu Yhdysvaltain ja Ranskan vastaaviin liikkeisiin sekä kansainvälisiin tapahtumiin (artikkeli 1), 2) paikallisten määritelmäkamppailujen tarkastelu suunnitelluilla ydinjätteiden loppusijoituspaikoilla Suomessa (artikkeli 2), 3) paikallisten riskitulkintojen yhteisöllisen ja sosiaalisen alkuperän erittely (artikkeli 3), 4) paikallisten ydinjätekiistoista tutkiminen osana kansallista ydinpolitiikkaa sekä suomalaisten kiistojen ja politiikan vertailu Ruotsin vastaaviin (artikkeli 4), 5) ydinvoima- ja ydinjäteasenteiden kansainvälisten kehityskulkujen erittely ja ydinteknologian riskien pitkään jatkuneen sosiaalisen määrittelyn tarkastelu (artikkeli 5). Tutkimuksen viitekehyksenä käytetyn sosiaalisen konstruktionismin etu on siinä, ettei se marginalisoi paikallisten asukkaiden ja ydinteknologian vastustajien näkemyksiä, kuten esimerkiksi ns. NIMBY-teoria (Not-In-My-

Backyard-teoria), vaan se edesauttaa kiistan monimutkaisen dynamiikan ymmärtämistä ja on kulttuurisesti hienovaraisempi lähestymistapa.

Artikkeleiden yhteenveto

Tutkimus koostuu viidestä aikaisemmin julkaistusta artikkelista sekä niitä yhdistävästä yhteenvetoartikkelista. Artikkelissa *International Anti-nuclear Movements in Finland, France and the United States* selvitetään kansainvälisen ydinteknologian vastaisen liikkeen kehitystä sekä ydinaseiden ja ydinvoiman vastaisten liikkeiden välistä vuorovaikutusta Suomessa, Ranskassa ja Yhdysvalloissa. Pääasiallinen tutkimusmenetelmä on olemassa olevan kirjallisuuden sekundäärianalyysi.

Molemmilla liikkeillä on ollut kolme mobilisaatiojaksoa. Ydinaseiden vastaisen liikkeen joukkomobilisaatiot ajoittuvat kylmän sodan välisiin vuosiin 1957-1964, kiistaan risteilyohjusten sijoittamisesta Euroopan maaperälle vuosina 1979-1987 ja Ranskan Mururoalla tekemien ydinkokeiden vuosiin 1995-1996. Ydinvoiman vastaisen liikehdinnän ensi vaihe oli puolestaan paikallisten ryhmien kehittyminen vuosina 1971-1976. Toisessa vaiheessa, 1980-luvunalussa, liike laajeni ja vakiintui. Kansallisen liikkeen kehittymistä seurasi lisääntyvä kansainvälinen yhteistyö. Viimeisin mobilisaatiojakso koettiin vuonna 1986 tapahtuneen Tshernobylin ydinvoimalaonnettomuuden jälkeen.

Artikkelissa eritellään kahden liikkeen välisiä suhteita eri maissa sekä erilaisissa kansallisissa ja ylikansallisissa poliittisissa mahdollisuusrakenteissa. 1970-luvun lopussa ja 1980-luvun alussa molemmat liikkeet elivät vahvaa joukkomobilisaation aikaa. Ydinteknologian rauhanomainen käyttö energiantuotantoon sekä sotilaallinen hyödyntäminen osana puolustuspolitiikkaa saivat osakseen voimakasta arvostelua, vaikka eri perustein. Öljykriisi avasi ovet ydinenergian käytön lisäämiselle, mutta sitä seurasi lisääntyvä epäilys ydinvoimaloiden turvallisuudesta ja taloudellisuudesta. Suurvaltojen uusi kylmän sodan vaihe ja uudelleen käynnistynyt asevarustelu lisäsivät entisestään suuren yleisön kritiikkiä ydinaseita vastaan. Yhden liikkeen tukeminen ei tuolloin haitannut toista liikettä, vaan molemmat liikehdinnät vahvistivat toisiaan. Tuen antaminen liikkeiden rajojen ylitse oli mahdollistasillä molempien tavoitteena oli estää ydinteknologisen osaaminen siirtyminen uusiin maihin, mikä olisi voinut merkitä uusien ydinasemaiden kehittymistä.

Artikkelissa *Environmental Conflict as a Social Construction. Nuclear Waste Conflicts in Finland* kehitetään teoriaa ympäristökonflikteista ja sitä sovelletaan suomalaisiin ydinjätekiistoihin. Teorian kehittämisen lähtökohtana on ympäristökonfliktien selittämisessä käytetyn niin sanotun NIMBY-teorian (Not-In-My-BackYard) kriittinen arviointi. Keskeinen ajatus on tarkastella ydinjätekiistoja tavalla, joka antaa enemmän arvoa paikallisten toimijoiden tulkinnoille ja merkityksille sen sijaan, että kiistaa tarkastellaan vain kansallisten viranomaisten tai voimayhtiöiden näkökulmasta. Ydinjätekiistojen analyysille paremmat lähtökohdat tarjoaa keskittyminen sosiaaliseen vuorovaikutukseen sekä toimijoiden tuottamiin tulkintoihin ja merkityksiin. Tällainen sosiaalisen konstruktionis-

min mukainen tutkimusasetelma kohtelee konfliktin eri osapuoli tasavertaisemmin. Pääpaino artikkelissa on paikallisten asukkaiden toiminnan ja ydinjätteiden loppusijoitusta vastustavien liikkeiden tarkastelussa.

Suomalaisen energiayhtiö, Teollisuuden Voima Oy:n, kallioperätutkimukset ja niihin liittyvät korkea-aktiivisen ydinjätteen loppusijoitussuunnitelmat Eurajoen, Kuhmon tai Äänekosken kallioperään herättivät paikallisissa asukkaista närkästystä. Tämä asetelma tuotti pitkäaikaisia ydinjätekiistoja, joita artikkelissa tutkitaan konstruktionistisella tutkimusotteella. Analyyttisen jaottelun mukaisesti tarkastellaan sekä ydinjätteen että ydinjätekiistan sosiaalisia määritelmiä. Kamppailu määritelmistä on kiistan keskiössä, koska ydinjäte materiaalisena objektina ei ole tuttu ihmisille ja ydinvoimateollisuuden tai asiantuntijoiden hallitsevat määritelmät jättävät huomiotta asiaan kietoutuvat vaikeat sosiaaliset, psykologiset ja eettiset kysymykset. Avainkäsite, joka auttaa ylittämään yksinkertaisen realistisen tutkimusasetelman ongelmat, on materiaalisen objektin tulkinnallinen joustavuus. Tällainen konstruktionistinen ajatus tarkoittaa, että tavaraan tai tuotteeseen liitetyt merkitykset ja tulkinnat ovat aina sosiaalisen vuorovaikutuksen tulosta, koska eri osapuolet tarkastelevat objektia eri näkökulmista.

Konfliktin osapuolet käyttävät eri määritelmiä, jotka ovat yhteydessä heidän elämäntapaansa, asuinympäristöönsä sekä yleisesti ottaen heidän sosiaaliseen taustaansa. Aineiston analyysi osoittaa, että erilaisten määritelmien laaja kirjo on palautettavissa tieteellis-teknisiin, taloudellisiin ja poliittisiin määritelmiin. Kiistan alussa asiantuntijoiden ja viranomaisten tieteellis-tekniset ja taloudelliset määritelmät ovat hallitsevia, mutta paikalliset asukkaat horjuttavat näiden määritelmien perustoja muokkaamalla niitäomiin tarkoituksiinsa. Asukkaat myös pyrkivät politisoimaan asian väittämällä, että ydinjätettä materiaalisena objektina ei voi ymmärtää ainoastaan luonnontieteiden näkökulmasta, vaan että sosiaaliset, psykologiset ja eettiset ulottuvuudet on myös huomioitava.

Eurajoen, Kuhmon ja Äänekosken ydinjätekiistojen tutkimus sisältää paikallislehtien ydinjätekeskustelun (N=416) sekä paikallisten aktivistien ja viranomaisten haastattelujen (N=16) analyysit. Näiden lisäksi aineistona on kaikki sellaiset kunnalliset asiakirjat, jotka käsittelevät ydinjätettä ja Eurajoen tapauksessa myös ydinvoimakysymystä.

Artikkeli *Cultural Approach to the Perception of Risk. Analyzing Concern About the Siting of a High-level Nuclear Waste Facility in Finland* käsittelee riskien kulttuurista hahmottamista Eurajoella, Kuhmossa tai Äänekoskella. Näillä paikkakunnilla ydinvoimateollisuus toteuttialustaviaydinjätteiden loppusijoitukseen tähtääviä kallioperätutkimuksia vuosina 1993-1996. Tutkimusmenetelmä oli vuonna 1994 kerätyn kyselyaineiston tilastollinen analyysi. Aineisto perustui 1500 asukkaan satunnaisotokseen ko. kunnista sekä 200 muun suomalaisen vertailuotokseen. Kyselyn vastausprosentti oli 52.

Artikkelissa keskitytään hankkeen kannattajien ja vastustajien sosiaalisen taustan erittelyyn sekä näiden osapuolten kulttuurisen logiikan ymmärtämiseen. Analyysin lähtökohta on yksilöllisen riskien hahmottamisen korvaaminen kollektiivisella painotuksella. Vaikka itsekkäiden etujen rationaalinen laskelmointi ja yksilölliset tiedot ovat osa riskien hahmottamista, tärkeämpää on kuitenkin

huomata, että riskien hahmottaminen perustuu aina myös kollektiivisesti jaettuihin sosiaalisiin arvoihin, uskomuksiin ja normeihin.

Asenteet loppusijoitussuunnitelmia kohtaan ovat melko samanlaiset Kuhmossa ja Äänekoskella. Näissä kunnissa lähes 50 prosenttia asukkaista on melko tai erittäin huolestunut hankkeen turvallisuus-, terveys-, talous- sekä yhteiskunnallisista ja ympäristövaikutuksista. Eurajoella prosenttiluvut samoista asioista vaihtelevat 25:stä 35:een prosenttiin. Enemmistö asukkaista ei ole lainkaan tai vain vähäisessä määrin huolestunut mainituista seikoista. Johtopäätös empiirisestä analyysista on, että ydinjätteen kulttuurinen hahmottaminen Kuhmossa ja Äänekoskella eroaa Eurajoen vastaavasta. Kulttuuriseen riskiteorian mukainen selitys ilmiölle onkin se, että ydinteknologia on tuttua Eurajoen asukkaille, mutta Kuhmossa ja Äänekoskella tällainen teknologia ei ole osa paikallista kulttuuria ja asukkaiden arkipäivää.

Aineiston analyysi osoittaa, että sosiaalinen tausta on yhteydessä asenteisiin loppusijoitusta kohtaan. Yleisesti ottaen kannattajat ovat paremmin toimeen tulevia ihmisiä, kun taas vastustajia löytyy todennäköisemmin vähäosaisten joukosta. Yllättävää tuloksissa on, että tutkittaessa asukkaiden asenteita ydinjätehuoltoa kohtaan korostuu yleisen yhteiskunnallinen eriarvoisuuden, yhteiskuntaluokkien ja valtahierarkioiden merkitys. Tutkimustulokset osoittavat, että riskien hahmottamisen kulttuurinen logiikka on aina yhteydessä myös yksilön asemaan laajemmissa yhteiskunnallisissa rakenteissa. Yksilön sosiaalinen asema näyttää omaavan ennustearvoa hänen asenteisiinsa ydinjäteasioita kohtaan. Ydinjätekysymystä arvioidaan olettavasti useiden aikaisempien ja samanaikaisten ihmisten hyvinvointiin vaikuttavien yhteiskunnallisten projektien pohjalta.

Artikkeli *The Social Shaping of Radwaste Management. The Cases of Sweden and Finland* on kirjoitettu yhdessä ruotsalaisen Rolf Lidskogin kanssa. Artikkelissa vertaillaan Suomen ja Ruotsin ydinjätepolitiikkaa ja ydinjätekiistoja. Teoreettisena viitekehyksenä käytetään konstruktionistista otetta. Tutkimuksen kohteena on molempien maiden ydinjätehuollon sosiaalinen muotoutuminen ja se, miten ydinjätepolitiikka on hahmotettu paikkakunnilla, joita pidetään soveltuvina ydinjätteen loppusijoituspaikoiksi. Tapausanalyysejä yhdistävä ajatus on, että paikallisia konflikteja on tutkittava osana kansallisen politiikan muotoutumista ja toimeenpanoa. Paikallinen konfliktisisältää näinollen dynaamista vuorovaikutusta paikallisen ja kansallisen tason välillä.

Suomea käsittelevä konstruktionistinen politiikka-analyysi perustuu Helsingin Sanomista ja Keskisuomalaisesta kerättyyn aineistoon (N=855). Analyysi osoittaa, kuinka Suomen ydinjätepolitiikka muuttui dramaattisesti vuosien 1993-1997 aikana. Ulkomaiset ympäristöryhmät ja poliitikot painostivat hallitusta kieltämään korkea-aktiivisen ydinjätteen viennin Venäjälle vedoten vakaviin ympäristöongelmiin jätteiden käsittelyalueella. Kokonaiskuvan muodostamiseksi Suomen ydinvoima- ja ydinjätepolitiikan kehityksestä 1950-luvulta 1990-luvulle tutkimuksessa analysoidaan myös virallisia asiakirjoja ja hyödynnetään aikaisempia tutkimuksia.

Paikallistason analyysissa keskitytään kolmeen ydinjätekiistaan. Ruotsin tapaus on Storuman ja Suomen tapaukset ovat Kuhmo ja Äänekoski. Vertailun pohjalta havaitaan, että paikalliset ydinjätekiistat ovat ymmärrettävissä laajempien historiallisten ja rakenteellisten olosuhteiden pohjalta. Paikalliset kiistat ovat osa

ydinpolitiikan historiallista kehitystä. Molemmissa maissa kansallinen ydinpolitiikka on edistynyt samaan vaiheeseen. Ydinvoimaloiden omistajat ovat selvittäneet tiettyjen paikkojen soveltuvuutta ja ominaisuuksia ydinjätteiden loppusijoittamiseksi kallioperään. Molemmissa maissa aiheesta on keskusteltu vilkkaasti ennen lopullista päätöksentekoa. Erityisesti paikalliset asukkaat ovat joutuneet paneutumaan suunnitelmiin hyvin vakavasti. Merkittävä havainto artikkelissa on tieteellis-teknisten, taloudellisten ja poliittisten määritelmien samanaikainen esiintyminen. Johtopäätös on, että sosiaalisten määritelmien lisäksi käytössä on strategista argumentointia vaihtelevissa sosiaalisissa ja kulttuurissa olosuhteissa.

Artikkelissa *From the Golden Age to the Valley of Despair. How Did Nuclear Waste Become a Problem* selvitetään, kuinka ydinjätteestä on tullut globaali ongelma kaikissa ydinvoimaa käyttävissä maissa. Artikkelissa kuvataan ydinteknologisen keskustelun kehityskaari ja tarkastellaan ydinteknologisten asenteiden muuttumista. Tarkastelun pohjana ovat yhteiskuntatieteelliset tutkimukset ydinteknologiasta, erityisesti asennetutkimukset. Aikaisemmassa tutkimuskirjallisuudessa esiteltyjen selitysmallien pohjalta hahmotellaan kulttuuriteoreettinen kehikko ydinteknologiaa koskevien kiistojen yhteiskunnallisen dynamiikan ymmärtämiseen.

Toisen maailmansodan jälkeinen ydinteknologinen keskustelu on jaettu kolmeen vaiheeseen: (1) dualismin aika, (2) ydinteknologian vastaisen diskurssin nousu ja (3) 'elämä imitoi taidetta' -jakso. Dualismin aika alkoi Yhdysvaltojen pudotettua atomipommit Hiroshimaan ja Nagasakiin. Tuolloin tuli osoitettua, millainen tuhovoima ydinaseella on. Traagisten tapahtumien muistot muuttuivat vahvaksi innostukseksi ydinteknologian siviilikäyttöä kohtaan. Samanaikaisesti ydinvoiman rauhanomaisen kehittämisen kanssa voimistui kansainvälinen protesti ydinaseiden ilmakehässä tapahtuvaa testausta vastaan. Toisessa vaiheessa protesti ydinvoimaa kohtaa voimistui. Sitä edelsivät mm. 1970-luvun alun öljykriisi, joka vauhditti avointa keskustelua energiapolitiikasta, ydinteknologiaa hyödyntävien valtioiden pyrkimykset estää ydinteknologisen osaamisen leviäminen uusiin maihin, ydinvoimaloiden turvallisuusvaatimuksista käyty kriittinen keskustelu ja aktivistien puheet biosfääriin joutuneen radioaktiivisen materiaalin vaaroista siitä riippumatta oliko se peräisin ydinreaktorista vai ydinaseista. Kolmas vaihe keskustelussa alkoi 1970-luvun lopussa, kun amerikkalainen Kiina-ilmiö -elokuva tuli elokuvateattereihin vain vuosi ennen Harrisburgin ydinonnettomuutta vuonna 1979.

Seuraus kasvaneesta kritiikistä oli asennetutkimusten määrän lisääntyminen. Yhdysvalloissa tutkijat havaitsivat asenteiden kehittyneen siten, että 1970-luvun alun yleisestä innostuksesta siirryttiin 1970-luvun lopulla suhtautumiseen, jota leimasi ambivalenttisuus. Kaksiarvoisuus muuttui kriittisyydeksi vastustuksen lisääntyessä 1980-luvulla. Euroopassa ydinvoima-asenteiden seuranta ei ole ollut niin järjestelmällistä kuin Yhdysvalloissa, mutta ensimmäiset standardisoidut mielipidetiedustelut 1970-luvun lopussa ja 1980-luvun alussa vahvistavat edellä mainitut tulokset. Ainoa poikkeus on kuitenkin Ranska, missä enemmistö kansalaisista oli myötämielisiä ydinvoimateollisuuden laajentumista kohtaan. Tshernobyl-ilmiön vaikutukset ihmisten asenteisiin on hyvin dokumentoitu useissa tutkimuksissa. Johtopäätös niistä on, että heti kyseisen ydinvoimaonnettomuuden jälkeen yleisön tuki alaa kohtaan romahti, mutta ajan mittaan asenteissa on ollut nähtävissä jonkinlaista palautumista onnettomuutta edeltävälle tasolle. Tämän

lisäksi maantieteellinen etäisyys onnettomuuspaikkaan on vaikuttanut asenteisiin. Suomessa toteutetut kyselytutkimukset osoittavat, että vuodesta 1983 vuoteen 1985 ydinvoiman vastustus väheni, mutta vahva kielteisten asenteiden nousu koettiin vuosina 1986 ja 1987. Kolmasasennetutkimuksista erottuva jakso oli vuodesta 1988 vuoteen 1991, jolloin vastakkaisten asenteiden suhteet pysyivät ennallaan.

Asenteet ydinjätettä kohtaan heijastelevat yhtäältä kasvavia epäilyjä ydinteknologiaa kohtaan ja toisaalta ydinjätehuollon vähittäisen kehittymisen myötä lisääntynyttä hyväksyntää. 1970-luvun lopulla ihmiseteivät olleet juurikaan huolestuneita ydinjätekysymyksestä, mutta 1980-luvun alussa asenteet alkoivat muuttua. Kyseisellä vuosikymmenellä alkoi vakavampi tutkimus-, kehitys- ja suunnittelutyö ydinjäteongelman ratkaisemiseksi. Hallitukset ja ydinteollisuus etsivät soveliaita paikkoja ydinjätelaitosten sijoittamiseksi, mutta yritykset kilpistyivät erityisesti vahvaan paikalliseen vastustukseen, jota tukivat myös kansalliset liikkeet. Tutkimusten mukaan enemmistö läntisen Euroopan kansalaisista vastusti tuolloin kyseisten laitosten sijoittamista kotiseudulleen.
Johtopäätökset asennetutkimuksista 1990-luvun alussa olivat, että ainoat mahdolliset paikat loppusijoituslaitokselle olivat yhteisöt, joissa ydinvoimateollisuus oli vakiinnuttanut asemansa ja tuottanut hyvinvointia asukkaille.

Artikkelissa esitellään neljä yleisimmin käytettyä sosiologista selitysmallia kielteisille ydinteknologia-asenteille: (1) ydinpelon historialliset juuret, (2) ydinvoimateollisuuden laiminlyönnit ydinjätehuollon kehittämisessä, (3) ns. ylivuotoilmiö ydinaseasenteiden puolelta ja (4) yhteiskunnan muodonmuutos teollisesta yhteiskunnasta riskiyhteiskunnaksi. Kulttuurisen teorian pohjalta kehitelty lähestymistapa ydinteknologiaa koskevien kiistojen ymmärtämiseen päättää artikkelin. Ydinkulttuurin käsite viittaa osittain itsenäiseen kulttuuriseen kenttään, jolla on omat viittauskohteensa, symbolinsa, metaforansa, merkitykselliset tapahtumansa, diskurssinsa ja vakiintuneet ajattelu- ja toimintamallinsa. Sitä voi ajatella varastona, josta toimijat löytävät kiteytyneet tavat tulkita tapahtumia ja asioita. Pitkäaikainen vuorovaikutus toimijoiden kesken on luonut yhteisvaraston sekä myönteisille että kielteisille tulkintapaketeille, joita käytetään uusien tapahtumien selittämiseen ja joita päivitetään kun olosuhteet kentällä tai sen ulkopuolella muuttuvat. Myös kentän ulkopuolisten tekijöiden huomioiminen on tärkeää, sillä myönteiset ja kielteiset tulkintapaketit kulkevat rinnakkain yleisempien yhteiskunnallisten kamppailujen kanssa.

Yleiset johtopäätökset

Ydinteknologian vastainen protesti on osa kamppailua ydinteknologian riskeistä. Riskit ovat tieteellisesti ja sosiaalisesti konstruoituja määritelmiä ydinteknologian käytön mahdollisista vaaroista. Erityisesti ajatus mahdollisista vaaroista on kamppailun keskiössä, sillä se viittaa todellisuudessa olemassa olevien materiaalisten olosuhteiden ulkopuolelle. Tällaisen ilmiön hahmottaminen on vaikeaa, koska termi riski on nimike todennäköisyydelle, epävarmuudelle, mahdollisuudelle ja vaihtoehtoisille kehityskuluille, jotka ovat puolestaan riippuvaisia moninkertaisista

valinnoista. Siitä huolimatta, että riski ei ole aistein havaittavissa, se voi tuottaa kollektiivista toimintaa ja jopa organisoituja yhteiskunnallisia liikkeitä.

Tutkimuksessa on keskitytty merkityksen sosiaaliseen konstruointiin ajassa, paikassa ja eri kulttuurisissa yhteyksissä. Sosiaalisen konstrutionismin näkökulmasta tehty tutkimus riskeistä on altis kritiikille, etenkin niin sanotusta realistisesta näkökulmasta. Kritiikissä tähdennetään sitä, että materiaalinen todellisuus on olemassa riippumatta siitä esitetyistä sosiaalisista määritelmistä. Riskin kohdalla ongelma on kuitenkin siinä, että se on abstrakti käsite, joka viittaa tulevaisuuteen. Se ei ole kokonaisuudessaan osa nykyisyyttä, vaan se on riippuvainen moninkertaisista valinnoista, joita tässä hetkessä tehdään. Se ei ole koskaan niin konkreettinen, etteikö se mahdollistaisi erilaisia tulkintoja ja keskusteluja. Keskustelun eri osapuolet, kuten tiedemiehet, asiantuntijat, toimittajat, maallikot, voimayhtiöt tai yhteiskunnalliset liikkeet, omaavat erilaisia resursseja vakiinnuttaa näkemyksensä todellisempina kuin toisten. Sosiologisesta näkökulmasta katsottuna ne kaikki kuitenkin osallistuvat riskin sosiaaliseen konstruointiin, joka on alati jatkuva prosessi täynnä epäjohdonmukaisuuksia ja ristiriitoja.

Sosiaalinen kamppailu riskistä käydään eri ajallis-paikallisilla tasoilla. Ydinteknologian vastaiset liikkeet ovat merkittäviä toimijoita tässä kamppailussa. Näiden toimijoiden ja niiden vastustajien välinen vuorovaikutus muovaa protestia sen myötä kun osapuolet yrittävät saavuttaa tavoitteitaan käyttämällä erilaisia strategioita vaihtelevissa olosuhteissa. Protesti ei ole kuitenkaan vain kasvotusten tapahtuvaa vuorovaikutusta, vaan osapuolet yrittävät vaikuttaa asioihin joukkotiedotusvälineiden kautta. Tärkeä tapahtumapaikka on media, missä julkinen keskustelu asiasta käydään ja missä raportoidaan tärkeimmistä toimista. Tiedotusvälineitä tarvitaan myös protestin leviämiseen, sillä vaikutteet voivat tulla hyvin kaukaa ja uutiset tapahtumista tietyissä paikoissa leviävät laajemman yleisön keskuuteen.

Globalisaation aikakaudellakin paikallisuus on edelleen tärkeä osa protestiliikettä, koska monet toiminnot sijoittuvat paikallisyhteisöihin. Analyysi Suomen ydinjätekonflikteista osoittaa, että paikallisilla poliittisilla ja kulttuurisilla tekijöillä on merkitystä kiistan kehittymisessä. Esimerkiksi ydinjätteiden loppusijoitusta suunnittelevien toimijoiden tieteellis-tekniset määritelmät ongelmanlaadusta eivät asukkaiden mielestä yksistään riitä. Tarjotut määritelmät asetetaan helposti kyseenalaisiksi, kun projekti esitellään paikallisille asukkaille. Heille hanke ei ole vain tieteellis-tekninen projekti, vaan hyvinkin merkittävä paikallis-poliittinen asia, joka sisältää vaikeita sosiaalisia, taloudellisia, psykologisia ja eettisiä ongelmia. Projektin yhteiskunnallinen arviointi alkaa, kun tieteellis-teknisten suunnitelmat kohtaavat sen 'todellisen maailman', jossa projektin toteutuksen vaikutuspiiriin kuuluvat henkilöt elävät. Tässä yhteiskunnallisessa arviointiprosessissa käytetään muitakin tiedonlähteitä kuin tieteellis-teknistä asiantuntemusta, sillä asukkaat perustavat käsityksensä myös arkipäiväiseen toimintaansa sekä paikalliseen kulttuuriin ja historiaan.

Hankkeen yhteiskunnallinen arviointi on kiteytynyt kiistassa käytettyihin ydinjätteen sosiaalisiin määritelmiin. Ydinjätteen sosiaalinen määritelmä on risteytymä paikallisista, kansallisista, kansainvälisistä, ylikansallisista ja globaaleista vaikutteista. Paikallisessa konfliktissa käytetyt määritelmät ovat muotoutuneet monimutkaisissa globaaleissa vuorovaikutusketjuissa. Tosiasioiden, ideoiden ja

uskomusten globaali virta tuottaa hybridejä määritelmiä, joiden alkuperää on vaikea osoittaa. Toinen näkökohta tieteellis-teknisen projektin yhteiskunnallisessa arvioinnissa on sen kulttuurinen vastaanotto. Riskin kulttuurinen arviointi on monitasoinen prosessi, sillä vaikka projektia harkitaan henkilökohtaisesti myös sosiaalinen tausta, sosiaaliset verkostot, sosiaaliset riippuvuudet, elämäntapaan liittyvät valinnat, ammatillinen asema, organisatorinen kiinnittyneisyys jne. vaikuttavat näihin pohdintoihin. Toisin sanoen, myös kollektiivisesti jaettu riskitulkinta on huomioitava.

Ydinteknologian vastainen protesti on vuosien varrella levinnyt maasta toiseen, ylittänyt maantieteellisiä rajoja ja kehittynyt ylikansalliseksi protestiksi, kun liikkeet, kuten Greenpeace, Maan Ystävät tai rauhanliikkeen eri organisaatiot, ovat edistäneet protestia piittaamatta kansallisista tai valtiollisista rajoista. Ydinteknologian vastaista protestia voikin luonnehtia alati jatkuvaksi tapahtumasarjaksi, jossa etäällä toisistaan olevien ihmisten aktiviteetit ja kiinnostuksen kohteetyhtyvät. Protesti sisältää sekä paikallisia, alueellisia, kansallisia, kansainvälisiä ja ylikansallisia toimintoja että muodollisia ja epämuodollisia verkostoja, joita ylläpidetään joukkotiedostusvälineiden ja nykyaikaisen viestintäteknologian välityksellä.

Kuitenkin on vaikea sanoa, onko ydinteknologian vastainen protesti aidosti globaali ilmiö. Jos globaali protesti määritellään painottaen aktiviteetteja, pitää toimien ulottua eri puolille maailmaa. Ydinteknologian vastainen protesti ei rajoitu ainoastaan kyseistä teknologiaa hyödyntäviin maihin, sillä maantieteelliset rajat ylittävät riskit liittävät vaikutuspiiriinsä myös ne maat, joissa ydinteknologiaa ei käytetä. Kaikkein lähimpänä globaalia ydinteknologian vastaista protesti oltiin 1980-luvulla, kun ydinaseiden vastaisia mielenosoituksia järjestettiin eri puolilla maailmaa. Sen jälkeen 1990-luvun puolivälissä on koettu hetkellinen kansainvälinen protestiaalto Ranskan Mururoalla suorittamia ydinkokeita vastaan. Tämänkaltaisia tapahtumia ei kuitenkaan voi pitää globaaleina protesteina, vaikka niissä pyritään kertomaan ihmiskunnalle ydinteknologian globaaleista vaaroista ja protestin kannattajia löytyy kaikkialta maailmasta. Sen sijaan eri asia on, kun ydinteknologian protestia tarkastellaankulttuurisesta näkökulmasta. Ydinteknologian vastaisen protestin vuosikymmenet ovat luoneet globaalin ydinteknologian vastaisen kulttuurin, joka ulottaa vaikutuksensa eri puolille maailmaa. Kyseisen kulttuurin keskiössä on kasvanut tietoisuus ydinteknologian riskeistä. Niinpä globaalin riskitietoisuuden ansiosta ydinteknologian käyttöönottoa tai hyödyntämistä on alati seuraamassa paikallisia asukkaita, jotka voivat hyvinkin aktiivisesti osallistua hankkeen yhteiskunnalliseen arviointiin.