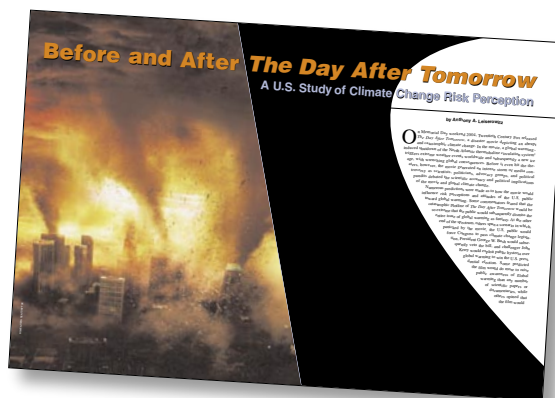


The International Impact of *The Day After Tomorrow*



With its November issue, *Environment* has provided a platform for an interesting study on a rather new type of climate impact: After climate change reached Hollywood, Hollywood struck back and gave the world Roland Emmerich's *The Day After Tomorrow*, the top-ranking film in the recently created film genre "Global Warming Films."¹ Anthony Leiserowitz's article, "Before and After *The Day After Tomorrow*: A U.S. Study of Climate Change Risk Perception,"² is an important contribution to a special field that assesses this new type of impact: that of climate change communication via the media on the general public. The author has quoted some important literature on this issue, and his study might help contribute a novel facet to it. The article is also one of several recent demonstrations that climate change science, largely dominated by the natural sciences, is an interdisciplinary endeavor that needs social science support.

Along with colleagues at the Potsdam Institute for Climate Impact Research (PIK), I have completed a parallel study on the public impact of *The Day After Tomorrow* in Germany.³ We surveyed about 1,300 people immediately before and after viewing the film and about 150 people 4 weeks later in subsequent telephone interviews to control for persistency effects. The questionnaire comprised about 20 questions, covering issues of climate system and change, climate policy, film attributes, and sociodemographic and lifestyle information.

In addition to the U.S. and German studies, three other impact studies on the film have

been conducted: a Japanese study and two British studies.⁴ PIK and the European Climate Forum (ECF) hosted a workshop in late October with the main authors from all five studies. This meeting informs my comments.

Before turning to study results, I would first like to comment on the methodology Leiserowitz and his colleagues used. As far as one can tell from the article, the distinction between "watchers" and "nonwatchers" was based upon the answer to a question like "Have you seen *The Day After Tomorrow*?" in the second of the two nationwide surveys the author performed. Most of the conclusions about the film's impact on the U.S. public is based upon this distinction. Of course, we learn a lot if we compare both groups. But do we really learn about the impact of the film on the public? Do watchers display their often significant, distinctive answering patterns due to the fact that they have seen the film (in which case their own answering behavior before having seen the film would have been significantly different), or do their answers reflect that they had more pro-climate or pro-environment attitudes before entering the cinema? Only a comparison of cinema visitors before and after having seen the film (a panel study) would be able to uncover the true effect of the film. Leiserowitz's study compares watchers to nonwatchers, but this comparison does not necessarily tell us what the film's impact was on its audience.

The German panel study demonstrates a rather strong self-recruitment of better-educated and more engaged visitors of the

In addition to the U.S. and German studies, three other impact studies on the film have been conducted: a Japanese study and two British studies.

Comparing the Japanese, German, and U.S. studies with regard to conceptual models of the climate system, three peculiarities arise.

film: Thirty-six percent of respondents said that before watching *The Day After Tomorrow*, climate change was an issue they were interested in, one that had drawn them to the cinema to see the film. This significant self-selection effect should prevent the scientist and the reader from drawing too strong a conclusion from comparisons between watchers and nonwatchers.

Despite this general caveat, the study is very useful and informative, especially in its demonstration of the clear links to climate and general policy issues and in its comparison of the media impact of *The Day After Tomorrow* and other films or events. This makes the U.S. study rather unique, as none of the other four studies has taken such a deep look “outside” the climate change issue and into the field of policy.

From a non-U.S. point of view, one result of Leiserowitz’s study is particularly interesting. He uses the four “myths of nature” from cultural theory—an influential theory developed by anthropologist Mary Douglas that attempts to explain risk perception—to concretize the conceptual model of the interviewed. The Japanese and the German studies have followed this approach as well. Cultural theory assumes four basic “myths”: nature is stable within certain limits, beyond which critical developments lead to ecological crisis (model A); nature is random, its reactions to human interventions cannot be predicted (model B); nature is ultra-stable, no human intervention can destabilize it (model C); and nature shows a delicate balance that can easily be disturbed by human action (model D). Leiserowitz has added a fifth conceptual model—“Climate is slow to change. Global warming will gradually lead to dangerous impacts”—which is not part of the original cultural theory framework and may make comparison difficult. Nevertheless, a limited form of comparison is possible—and quite revealing.

Comparing the Japanese, German, and U.S. studies with regard to conceptual models of the climate system, three peculiarities arise. First, the number of U.S. respondents who chose model B (“Climate is random”) is very high (34 percent nonwatchers, 29 percent watchers). In Germany this model has lower acceptance, and it even dropped after watching the film from 26.2 to 19.9 percent. This difference might be a consequence of the public debate and especially the dominant discourse of the U.S. government, suggest-

ing that climate change is unpredictable and that scientists have not agreed that it exists. In Europe and, to a lesser extent, Japan, the public discourse is much more influenced by the assumption that climate change is predictable or that it already happens.

Model A (“Climate is stable within limits”) is the dominant choice in all three countries (except for the nonwatchers in the United States, who prefer model B). However, the second peculiarity is the change given the “impact” of the film. If we assume that Leiserowitz’s article indeed measures the film’s impact, in the United States, model A seems to be supported by viewing the film, as the share rises from 27 percent to 39 percent. Although model A is the dominant model in Japan and in Germany—before and after viewers have seen the film—this model loses credibility due to the film: In the German case it falls from 44 percent to 42.2 percent, and in Japan from 47.3 percent to only 35 percent. Cultural theory interprets this model as part of the worldview of the “hierarchical,” that is, people who like to know about mechanisms so they can control them (such as scientists and bureaucrats). So while U.S. viewers seem to have been led to frame climate change in a “hierarchical” way, this model has lost some credibility for German and Japanese viewers. Leiserowitz indicates that model A was the model conveyed by the film itself. If we take a look at cross-cultural studies, this is a contestable statement.

For Germans, model D (“Climate shows a delicate balance”) is the film’s clear “winner”: It went up from 29.1 percent to 37.5 percent. This still places model D only second to A, but the trend is remarkable. German viewers of *The Day After Tomorrow* take home the message of a very vulnerable and complex climate system we should possibly not disturb—a model attributed to the worldview of the “egalitarian” according to cultural theory. *The Day After Tomorrow* has especially brought forward the role of the oceans in the world’s climate system and the existence of nonlinear changes, aspects that many viewers did not know of before. This “sensitizing” effect was much weaker in the Japanese case, where model D gained ground only moderately (from 32.6 to 34.5 percent). (Japanese viewers were much more convinced of model B (“climate is random”), which went up from 18.7 to 28.6 percent, than they were before watching the film.) But while model D

rates second in Japan and Germany after viewers have watched the film, it performed poorly in the United States and—even stranger from a non-U.S. view—is not affected by the film: About 7 percent of watchers and nonwatchers chose it.

There is much more to comment and compare about the studies mentioned, and the participants of the Potsdam workshop agreed to unite forces to create such a comparison. For now it is worth noting that the impact studies of *The Day After Tomorrow* have entered a new, reflexive area of climate change research: the area of the impacts of impacts. Twentieth Century Fox Germany has established an initiative to facilitate emissions trading rights and reducing CO₂ emissions of services, events, and traffic (see <http://www.climatepartner.de>). One might take it as image work, but it is also an indication that *The Day After Tomorrow* might not be the last of the global warming movies. Thus, it will be helpful for climate scientists to continue researching media and film representations of climate change and the public's response to them. It is doubtful that the creators of the United Nations Framework Convention on Climate Change had Hollywood on their minds when they drafted Article 6, which asks for improved communication and education on the issue of climate change. But the entertainment industry seems to have done quite a lot for the public awareness of climate change, and Anthony Leiserowitz gave us a very useful look at this new domain of climate impact research.

Fritz Reusswig
Potsdam Institute
for Climate Impact Research
Germany

1. See <http://www.boxofficemojo.com/movies/?page=main&id=dayaftertomorrow.htm>.

2. A. Leiserowitz, "Before and After *The Day After Tomorrow*: A U.S. Study of Climate Risk Perception," *Environment*, November 2004, 22–37.

3. F. Reusswig, J. Schwarzkopf, and P. Pohlentz, *Double Impact. The Climate Blockbuster The Day After Tomorrow and its Impact on the German Cinema Public*, Potsdam Institute for Climate Impact Research (PIK) Report No. 93 (Potsdam, Germany: PIK, 2004), http://www.pik-potsdam.de/publications/pik_reports.

4. M. Aoyagi-Usui, "The Day After Tomorrow: A Study on the Impact of A Global Warming Movie on the Japanese Public," National Institute for Environmental Studies (NIES) Working Paper (unpublished), October 2004; T. Lowe et al., "Does Tomorrow Ever Come? Disaster Narrative and Public Perceptions of Climate Change," Draft Tyndall Working Paper (unpublished), October 2004; and A. Balmford et al., "Hollywood, Climate Change, and the Public," *Science*, 17 September 2004, 1713.

As the article "Before and After *The Day After Tomorrow*" was going to press, I was very pleased to learn that somewhat similar studies had been conducted in the United Kingdom, Germany, and Japan. Thanks to the generous hospitality of Fritz Reusswig and the Potsdam Institute for Climate Impact Research, the primary investigators of all these studies gathered for a workshop in October 2004 to share our respective findings. This meeting was quite stimulating and led to the formation of an international research team to conduct cross-cultural experimental research.

I thank Reusswig for his comments on the paper and would like to take this opportunity to address his primary concern. We conducted three national surveys of the American public—before, during, and several months after the movie played in theaters. The article reported results from the first two waves, in particular the second, which compared a randomly selected group of movie watchers and nonwatchers from a national sample in June 2004—several weeks after the movie debuted. The first two surveys were not based on a within-subject (panel) design, so this study was unable to directly measure whether watching the film changed an individual's attitudes toward climate change. Thus Reusswig raises a legitimate question: Are the significant differences observed in the U.S. study between movie watchers and nonwatchers really due to the impact of the film, or did movie watchers already have "more pro-climate or pro-environment attitudes before entering the cinema"? In other words, perhaps moviegoers went to the film because they were already more concerned about global warming.

Three streams of convergent evidence suggest this hypothesis is incorrect. First, our own and other previous national surveys have found that climate change is not a highly salient concern of the American public, yet by the time of our second survey, 21 million American adults had seen the movie in the theater. Our respondents were randomly selected to represent this group. On its face it seems unlikely that 21 million Americans went to the film because they were already highly concerned about global warming. It is more likely that most people went to see the film because it was a summertime, blockbuster disaster movie.

Nonetheless, we explicitly tested this hypothesis in our third and final survey, completed in

Are the significant differences observed in the U.S. study between movie watchers and nonwatchers really due to the impact of the film, or did movie watchers already have "more pro-climate or pro-environment attitudes before entering the cinema"?

We have only scratched the surface in the effort to understand the role of popular representations of risk.

November 2004. In this survey (not reported in our article because it had not been conducted yet) we re-interviewed the same respondents as in wave two, including movie watchers. We asked them, “Why did you watch this movie?” Of all movie watchers, only 17 percent said they went because they were “interested in global warming.” By contrast, 83 percent of moviegoers went because they “liked the trailer” (29 percent), “like disaster movies” (21 percent), “like to see all big films” (21 percent), or “another reason” (12 percent). In contrast, Reusswig’s team found that among German moviegoers, 36 percent said a prior interest in climate change led them to watch the film. As he writes, “The German panel study demonstrates a rather strong self-recruitment of . . . more engaged visitors of the film.” Again, by contrast, only 17 percent of American moviegoers said they went because of a prior interest in global warming. Thus, the results on which he bases his conclusion that “there is a significant self-selection effect” are probably more indicative of very interesting cross-cultural differences between German and American climate change risk perceptions.

Second, as reported in the article, we determined that movie watchers were demographically different from the general public—they tended to be slightly younger, male, Hispanic, and politically liberal. We therefore used multiple regression to control for sociodemographic and political variables, including sex, age, education, income, race, political party, and political liberalism. In almost all cases and as

reported in the article, we found that even after controlling for these variables, there remained significant differences between the attitudes of watchers and nonwatchers.

Third, as reported in the *Environment* article, we directly asked movie watchers whether the movie made them more worried about global warming. Forty-nine percent of moviegoers said the film made them somewhat (36 percent) or much more worried (13 percent), 42 percent said it did not change their level of worry, and finally, only 1 percent said it made them less worried. These three streams of convergent evidence all suggest that indeed, the reported differences in perceived risk between watchers and nonwatchers were due to the impact of the film.

During the meeting in Potsdam, the principle investigators of all five studies identified a number of other intriguing cross-cultural differences in American, British, German, and Japanese responses to the movie, which we intend to investigate further with a multinational experimental study, using exactly the same research design and instruments in these and other cultural contexts. We have only scratched the surface, however, in the effort to understand the role of popular representations of risk (such as movies, books, television, fiction, and nonfiction) or of cross-national differences in public risk perception and behavior.

Anthony A. Leiserowitz
Decision Research
Eugene, Oregon