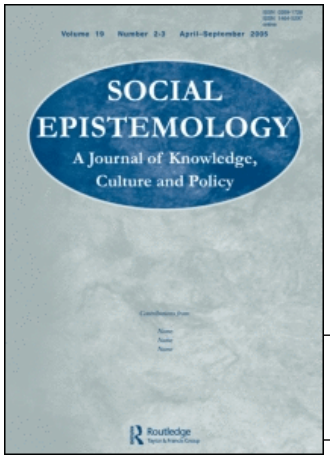

Social Epistemology
A Journal of Knowledge, Culture and Policy
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713765921

Is it Safe to Eat That? Raw Oysters, Risk Assessment and the Rhetoric of Science

Robert Danisch; Jessica Mudry

Online Publication Date: 01 April 2008

To cite this Article: Danisch, Robert and Mudry, Jessica (2008) 'Is it Safe to Eat That? Raw Oysters, Risk Assessment and the Rhetoric of Science', Social Epistemology, 22:2, 129 — 143

To link to this article: DOI: 10.1080/02691720802156268
URL: http://dx.doi.org/10.1080/02691720802156268

Social Epistemology
Vol. 22, No. 2, April–June 2008, pp. 129–143

Is it Safe to Eat That? Raw Oysters, Risk Assessment and the Rhetoric of Science

Robert Danisch and Jessica Mudry

Recently, oysters have been identified by the US Food and Drug Administration (USFDA) as a risky food to eat because they may or may not contain the pathogenic bacteria Vibrio parahaemolyticus. *The USFDA's attempts to manage the risk manifest themselves in a "Quantitative Risk Assessment", a report that attempts to quantify and predict the number of oyster eaters that will fall ill from* Vibrio. *In seeking to produce knowledge and eliminate uncertainty, the USFDA, through the use of a discourse of quantification, does the opposite. Instead, we argue, documents such as risk assessments are best understood as kinds of rhetorical practice. According to this perspective, these documents are epistemologically and ontologically reductive, produce uncertainty, politicize the act of eating, and serve an ironic function.*

Keywords: Rhetoric of Science; Risk Communication; Discourses of Quantification; Epistemology; Diet and Health; Public Decision-Making

The threat of natural disasters, nuclear accidents, and illnesses like Severe Acute Respiratory Syndrome (SARS) and avian flu increasingly occupy a place in the political, social, ethical, and scientific conversations of the moment. These threats, whether real (Hurricane Katrina), imagined (nuclear terrorism), or something in between (virulent strains of common diseases), motivate and influence decision-making processes at all levels of government, in science laboratories, and in multi-billion dollar industries of many kinds. To calculate the probability of a natural disaster, to speculate on the possibility of a terrorist attack, and to estimate the chance that a mutation in a virus will lead

Robert Danisch is an assistant professor in the General Studies Unit of the Faculty of Engineering and Computer Science at Concordia University, Canada. His most recent book is entitled *Pragmatism, Democracy and the Necessity of Rhetoric*.
Jessica Mudry is an assistant professor in the General Studies Unit of the Faculty of Engineering and Computer Science at Concordia University, Canada. Her forthcoming book is entitled *Measured Meals: Nutrition in America.* Correspondence to: Robert Danisch or Jessica Mudry, General Studies Unit, Faculty of Engineering and Computer Science, Concordia University, 1455 de Maisonneuve Blvd W., Montreal, QC, Canada H3G 1M8. Email: rdanisch@alcor.concordia.ca; jmudry@gsu.concordia.ca

ISSN 0269–1728 (print)/ISSN 1464–5297 (online)
DOI: 10.1080/02691720802156268

to an epidemic is to engage in risk assessment. Both risk assessment and risk communication bring together public relations specialists, statisticians, and scientists in order to rationalize and manage the uncertainty that attends these dangers and threats. This alignment of science with statistics and public relations is a danger of its own kind, but, more importantly, it reveals the extent to which we live in, what Ulrich Beck (1999) calls, a "world risk society".

Risk assessments rely explicitly on a discourse of quantification for epistemological authority. The presumption is that, through numeric evaluations and statistical analyses, the uncertainty that attends a specific danger can be reduced or perhaps eliminated. In addition, a risk assessment attempts to predict the likelihood of some event happening, given certain circumstances. Relying on a discourse of quantification to establish epistemological certainty is not an unusual tactic—it remains one of the central features of modernist scientific practice (Porter 1995; Wise 1995). The relationship between discourses of quantification, mathematical probability, and epistemology continues to pose serious questions in the philosophy of science (Salmon 2005). The common assumption is that quantification can reduce the complexity and plurality of the world to manageable formulae such that crafting good public policy and predicting the likelihood of certain events, by knowing more, becomes easier. From a rhetorical perspective, this is not what happens in the process of risk assessment.

In 2005, the US Food and Drug Administration (USFDA) published a "Quantitative risk assessment on the public health impact of pathogenic *Vibrio parahaemolyticus* in raw oysters"—this is just one representative example of risk assessments performed by the USFDA. The purpose of the study was to predict the likelihood of illness following the consumption of raw oysters (given specific circumstances). This document, we argue, does not reduce the uncertainty that attends eating an oyster. More important, it cannot produce sound public policy that would reduce the likelihood of illness following the consumption of raw oysters. Its clear reliance on a discourse of quantification that, instead, manufactures uncertainty. This, of course, is exactly the opposite claim of the epistemological assumptions made by the modernist program of scientific practice, broadly—and risk assessment, narrowly. In seeking to produce knowledge and eliminate uncertainty, the USFDA has accomplished just the opposite.

In this paper, we will show how a discourse of quantification facilitates the production of uncertainty around foods such as raw oysters, how the USFDA's risk assessment procedures politicize the act of eating, and what the implications of such moves are for the relationship between science and public decision-making. Such an argument rests on three key claims. First, not only are numbers capable of "making up people," as Ian Hacking (1990) claims, they are also capable of remaking objects. In other words, numerical analysis of foods causes an ontological shift in the object being analyzed. Second, in this particular case, foods such as oysters become an object of politics not an object of taste, pleasure, or culture. The language of numbers deployed in USFDA risk assessments creates the conditions for making public policy, conducting government surveillance, and instituting regulations. Third, the deep irony in this process is that risk assessment can never produce the control and certainty that it seeks, and

instead it re-figures the objects under analysis as unknowable and mysterious hazards. Such a move complicates the process of judgment and holds the potential to dramatically recast the relationship between science and the public.

In pursuing these lines of thought, we will first analyze the USFDA's analysis of raw oysters as an example of the kind of risk assessment being performed in the name of public safety. Such a critical reading of government documents is designed to reveal the effects of the discourse of quantification and the manner in which statistics attempt to organize, limit, and order our understanding of public health. Next, we will read the general features of risk assessment as a form of rhetorical practice in order to show how this particular way of producing knowledge shifts our understanding of the foods we eat. In addition, by working toward a general understanding of the science of risk assessment, our goal is to determine how, and to what extent, risk rhetorically alters or reshapes the role of science in public decision-making. Finally, we shall reflect on the manner in which examples of risk assessment help us rethink the relationship between rhetoric and science. In other words, we will ask the question: what can risk tell us about the rhetoricity of scientific practice and scientific knowledge?

Should I Eat Raw Oysters? The USFDA as Arbiter of Safe Eating

The USFDA conducted a "product pathway" risk assessment of *V. parahaemolyticus* in raw oysters from 1999 to 2001. This kind of risk assessment involves tracing "the key steps from harvest through post-harvest handling and processing to consumption" (USFDA 2005, 1). The goal of such analysis was to calculate the "likelihood of illness" from eating raw oysters. The underlying assumption is that harvest methods, post-harvest handling, geography, and practices of eating each could potentially increase the probability of getting sick from consumption. In light of such assumptions, the objectives of this document were to determine which factors are most likely to contribute to illness, and to evaluate control measures designed to secure public health and safety. As a "product pathway" analysis, it is broken into four sections. The first section, called "Hazard Identification", seeks to recognize and name "the pathogenic organism" present in the food. The second section, called "Hazard Characterization/Dose Response", seeks to determine the relationship between exposure to the pathogen and the likelihood of adverse health effects. The third section, called "Exposure Assessment", seeks to determine the frequency and likely level of exposure to the pathogen. And the fourth section, called "Risk Characterization", integrates the second and third sections in order to "predict the probability of adverse outcomes for individuals or populations" (USFDA 2005, 3). Finally, in the concluding section, the document uses models that describe "what-if scenarios" to estimate the likely impact of intervention strategies on the predicted number of illnesses. We will read each section by focusing on the effects of the language used.

The first section, hazard identification, reduces the salient features of an oyster to the presence of a natural bacterium called *V. parahaemolyticus*. This is an example of Kenneth Burke's (1945) conception of metonymy. According to Burke, metonymy and reduction are substitutes for each other. Furthermore, Burke understands metonymy

as a basic strategy of both "poetic realism" and "scientific realism" (1945, 505–507). From the perspective of "scientific realism", "any attempt to deal with human relationships after the analogy of naturalistic correlations becomes necessarily the *reduction* of some higher or more complex realm of being to the terms of a lower or less complex realm of being" (1945, 506). While from the perspective of "poetic realism", the basic strategy of metonymy is "to convey some incorporeal or intangible state in terms of the corporeal or tangible" ("to speak of 'the heart' rather than 'the emotions'") (Burke 1945, 506). To extend this comparison between the poetic and the scientific, Burke contends that both forms of metonymy work by borrowing words that originally refer to material realities and, by analogy, extending the use of those words to the invisible or intangible. For this reason, Burke refers to the realistic function of reduction. But for the poet this reduction is a "*terminological* reduction", while for the scientist it is a "real" reduction. Implied in this distinction is that metonymy, for the scientist, serves an ontological function. By reducing what exists to some hidden or invisible property, the scientist must call that new property into existence and establish its "reality". This new "reality" may be a reduction but it is also a production.

In the case of risk assessments like the one performed on raw oysters, the oyster is reduced to the bacterium that lives in it (an entity we cannot see, taste, or touch immediately) and the bacterium is called into being through the metonymic strategies employed by the language describing the oyster. The strategies deployed in the hazard identification section serve these two functions. For example, the first description of *V. parahaemolyticus* is an account of its genetic make-up, two circular chromosomes and 4832 genes.[1] In order to certify the reality of this bacterium, the authors of the risk assessment must borrow from the central metonymic strategy of the biological sciences—that is, understanding an organism by reducing it to its genetic make-up. Only after such reductions have occurred can science explain the cause of illness; and at the point of explanation, a new kind of "reality" has been called into being through the language of the document and legitimated by the very explanation being offered.

The hazard identification section proceeds to analyze the illnesses caused by *V. parahaemolyticus*. Again, metonymy is employed to make sense of the abstract concept of "illness". In this case, illness is understood in terms of the following symptoms: diarrhea, abdominal cramps, nausea, vomiting, headache, fever, and chills. As Burke suggests, a seemingly abstract concept is made "real" through reference to material symptoms. What is unique about risk assessments, however, is that these symptoms are then understood in terms of the probability of each symptom manifesting itself. Thus, diarrhea, abdominal cramps, and so forth, are made abstract by a discourse of quantification. According to Burke, this is a special kind of metonymy that shares a general application with synecdoche: "the substitution of quantity for quality … would be a metonymy" (1945, 509). Synecdoche (understood as representation) "stresses *relationship* or *connectedness* between two sides of an equation, a connectedness that, like a road, extends in either direction, from quantity to quality or from quality to quantity" (Burke 1945, 509). But in this case, "reduction follows along this road in only *one* direction, from quality to quantity"—scientific realism, according to Burke (1945, 509), confines itself to this metonymic, or uni-directional, sense. The quantity that is

deployed to understand the quality of vomiting, for example, is a percentage. This percentage represents the likelihood of some symptom manifesting itself; in other words, it represents chance. Through these discursive moves, an oyster comes to represent the chance of, for example, vomiting after eating.

The rest of the hazard identification section deals with the "CDC's [US Centers for Disease Control] Active Surveillance Systems". Organizations such as "FoodNet" and the "Gulf Coast *Vibrio* Surveillance System (GCVSS)" are designed to "complete standardized *Vibrio* illness investigation forms" on all patients that report symptoms linked to the consumption of raw oysters (USFDA 2005, 11). The case reports are then broken down by geography and season. These reports provide the data for use in the quantitative assessments performed later in the document; they represent the materials out of which formulae come to substitute for food. Thus they further reduce the abstract nature of illness to a discourse of quantification in order to certify the ontological status of *Vibrio* as the essence of the oyster. Producing data about the presence of *Vibrio*, as these surveillance programs are designed to do, further legitimates the metonymic reduction being carried out by this risk assessment and further legitimates the "reality" of the microbial world that comes to define eating raw oysters.

The next section of the risk assessment deals with "hazard characterization and dose–response". This section quantifies the relationship between the levels of *Vibrio* ingested and the frequency and severity of illness. The surveillance data collected in the hazard identification section are combined with "human clinical feeding trial studies" in order to determine "the probability of illnesses" and "the incidence of severe disease" (USFDA 2005, 16). The purpose of this section is to use models capable of determining the level of *Vibrio* that correlates to a 100% chance of illness on the one hand, and a 0% chance of illness on the other. Between these two extremes, a graph maps a line that represents the regions of probability of illness given exposure to a specific dose (a mathematical equation is used to determine the curve of the line). Once this line is mapped, if one knows the dose that was ingested one could predict the likelihood of illness. In fact, the graph should conceivably predict the total number of illnesses that occur in a given year, once the average ingested dose combined with the number of servings consumed each year are known. By using "Beta-Poisson", "Probit", and "Gompertz" equations to map these probabilities, the risk assessment combines the earlier metonymic reductions of illness and oyster to produce a new figure that makes knowledge possible. The "realities" certified in the first section lead to an enumerated epistemology in the second.

This enumerated epistemology is further developed in the "exposure assessment" section. The purpose of the "exposure assessment" section is to evaluate the likelihood of "ingesting a pathogenic microorganism via food and the likely level of exposure" (USFDA 2005, 31). At this point, the enumerated epistemology laid out in the previous section becomes far more complex and intricate. In order to determine these probabilities, the following factors must be analyzed (factors that stretch from harvest to consumption): water temperature at harvest, relationship between the level of *Vibrio* and water temperature, total level of *Vibrio* present per gram of oyster at harvest, ratio of pathogenic to total *Vibrio* per gram of oyster, quantity of pathogenic *Vibrio* per gram

at harvest, duration of harvest time, time to refrigeration, air temperature post-harvest, growth rate of *Vibrio* in given air temperature, pathogenic *Vibrio* per gram at time of initial refrigeration, cold storage time (die-off rate during this time), pathogenic *Vibrio* per gram at retail, grams per oyster, number of oysters per serving, and pathogenic *Vibrio* per gram at consumption. The risk assessment proceeds through 49 pages of analysis in an attempt to manage all of these variables, graph the changes in the variables, model the data available within specific mathematical formulae, and finally to predict the possibility of exposure and the severity of exposure. Knowledge in this section, and the previous section, is a matter of determining how much of the pathogen is present at harvest, post-harvest, and consumption. Once one can determine the level of exposure, one can be certain of the potential for sickness and predict the total number of cases. These results are then tabulated in the "risk characterization" section.

The risk of getting ill from eating an oyster in the Northeast Atlantic region of the United States during the month of November is 4.0×10^{-7}, while the risk is 1.8×10^{-5} in that same region in the month of August. The predicted number of cases for that region in November is 0.1, while in August it is 14. These changes are due to the differences in water temperature at harvest and in air temperature post-harvest. Finally, all of the above variables are tested for the significance of their affects on these probabilities. The danger of the raw oyster has been reduced to a table of quantities (like 4.0×10^{-7}). At this point metonymy is operating at several important levels. As we demonstrated in the "risk characterization" section, the oyster has been reduced to the bacterium within it. At this point, a subtle linguistic substitution takes place—consistently throughout the risk assessment, "danger" or "hazard" and "*Vibrio*" are used interchangeably. This substitution is supposed to be the claim that is supported by the document, but on almost every page either "danger" or "hazard" is understood as equivalent to "*Vibrio*".[2] Once that linguistic substitution is in place, "danger" or "hazard" must then be reduced.[3] But in this case they are not reduced to some other ontological being; instead, these concepts are reduced to quantitative statements.

Thus, "hazard", "danger", and even "risk" are subject to the metonymic tactic of reduction to a discourse of quantification. What are the effects of such a linguistic move? And what are the effects of the new enumerated epistemology provided through this kind of reduction? Because of the centrality of a discourse of quantification, Burke's analysis of "scientific realism" and its relationship to metonymy is not sufficient to begin to answer these two questions. But all metonymies are tropes and, in this case, a discourse of quantification does, in fact, serve a tropical function. As such, the numbers in the probability charts turn our attention from certain features of oysters and practices of eating to an abstract calculation of danger. The general assumption in enumerated epistemologies is that numbers are not subject to the same slippery problems of interpretation that trouble words. Thus, numbers are thought to legitimate knowledge claims by removing the possibility of conflicting interpretations and ambiguity. But, in this case, the statistical tables produced by the risk assessment are not able to do that. Instead, these numbers serve an ironic function.

According to Burke the substitute for irony is dialectic. In treating the irony–dialectic pair, Burke traces the interaction of opposing terms. In some cases, this interaction

makes dramatic development possible (Burke 1945, 512). Burke draws from literary examples, a vastly different genre of work than that which is being analyzed here, to make his point. In the light of these literary examples, the question becomes whether or not this development out of dialectic leads to relativism, the simplification of literalness, or an "inevitable" outcome:

> As an over-all ironic formula here, and one that has the quality of "inevitability," we could lay it down that "what goes forth as A returns as non-A." This is the basic pattern that places the essence of drama and dialectic in the irony of the "peripety," the strategic moment of reversal. (Burke 1945, 517)

Despite the immediate application of this passage to drama, Burke has offered an excellent description of what is happening in this risk assessment. In this case, what goes forward as a project of producing knowledge returns and ends as non-knowledge. If one poses the most basic question that arises in the light of a document like this—should I eat this raw oyster?—one must answer "I don't know". That is the irony of risk assessment.

To clarify this point further, the purpose of the risk assessment is to determine why and to what extent eating raw oysters is a dangerous or hazardous activity. The kinds of metonymic reductions that take place in answering this question produce a table of probabilities. These probabilities only certify that what one knows is that one does not know. Once put into a position of uncertainty, the kinds of linguistic substitutions carried out earlier in the document (along with the rhetorical force of a discourse of quantification) ensures that one seek out more quantitative information regarding the presence of *Vibrio* at the time of consumption. Of course, in the absence of elaborate laboratory equipment that would surely destroy the experience of eating the oyster, this number cannot be known. Thus, this document introduces an enumerated epistemology that is, itself, an admission that we cannot know. Unlike Burke's contention concerning development in the light of dialectic, in this case the second pair in the dialectic (ignorance) is suppressed to insure the continued expansion of the discourse of quantification. Although the entire document is an explication of deep and irreversible ignorance, to admit to that ignorance would be to arrest the development of a discourse of quantification and to recast the relationship between government and science being forged by such documents. More important, perhaps, such an admission would disrupt the relationship between risk assessment as a scientific practice and other kinds of modernist scientific practices designed to secure certainty and insure progress. Instead of securing certainty, however, risk assessments certify and legitimate our ignorance—it is for this reason that such documents are ironic.

The final section of the risk assessment elaborates on the deep irony at play here. This section concerns "what-if scenarios". According to the authors of the document, the benefit "of performing a quantitative product pathway risk assessment is that the model can be used to estimate the likely impact of intervention strategies on the predicted number of illness" (USFDA 2005, 99). The first four, and most effective, "mitigation strategies" against *Vibrio* recommended by the USFDA are irradiation, ultra-high pressure, hot water/cold shock, and mild heat. Anyone who has ever eaten a

raw oyster can only laugh at the irony of such suggestions. Even the USFDA seems aware of the absurdity of these suggestions. In the case of irradiation, they warn that "the mortality of the oyster" could be affected (USDA 2005, 100). Surely, one can assume that the oyster would not taste the same after being exposed to gamma rays (irradiation may, in fact, produce other risks).[4] The other recommendations raise the internal temperature of the oyster above 50°C or 122°F. In other words, you must cook your oysters before eating them in order to be safe. Because we cannot know whether eating a raw oyster is dangerous, the best recommendation is to not eat them raw. This play of irony extends even further. The second set of recommendations suggests freezing or immediate refrigeration. This amounts to telling a seafood retailer or a fisherman to put ice on their oyster stock. Again, anyone with any knowledge of how oysters are harvested must find this deeply ironic. The USFDA, after approximately 100 pages of mathematical analysis, can only recommend the most basic and common-sensical approach to harvesting that is already employed. In other words, we now know what we already knew, which is that we do not know how safe raw oysters are.

Risk Assessment as Rhetorical Practice

In assessing the risk of eating a raw oyster, the USFDA uses metonymy and irony to secure knowledge of what we do not know. In attempting to rationalize and control the uncertainty that attends acts of eating, the result is clarity about probabilities not certainties. But this is another way of certifying the danger of eating that derives from all that we do not know about the foods we consume (including the microbes that live inside of our foods without our seeing them). This is an ironic epistemology; it requires the production of non-knowledge. In recent years, the practice of risk assessment has been extended and applied to numerous objects. Generalizing from the example of raw oysters, two questions emerge: what can we say about the manner in which risk assessment figures food safety? And, more broadly, what are the unique characteristics of this kind of scientific practice that lends it to rhetorical analysis? In this section, we shall try to answer the first question by generalizing from oysters to other foods. In the next section, we will try to answer the second question in light of advances in the rhetoric of science.

To answer the first question is to understand risk assessment as a kind of rhetorical practice. By rhetorical practice, we mean methods of using language to respond to uncertainty, to seek agreement on interpretations of objects or events, to influence human choices, and to coordinate social action in response to public exigencies. Risk assessment is used by a number of governmental agencies, including the US Center for Disease Control, The Food Safety and Inspection Service (a part of the US Department of Agriculture), and the Center for Food Safety and Applied Nutrition (to name just three). Each of these agencies follows the same general procedures in performing risk assessments and refers to the same general justifications.[5] For each of these agencies, risk assessment almost always proceeds by the following steps: hazard identification, hazard characterization, exposure assessment, and risk characterization. The metonymic strategy of reduction remains the same in nearly every case. For example,

on 13 October 2003 the USFDA released a "Risk assessment for food terrorism and other food safety concerns". In this document, the USFDA speculates on the possibility of terrorists using biological and/or chemical agents on the American food supply. Thus, the hazard characterization section attempts to identify such agents. But when the document proceeds to the exposure assessment section, the uncertainty that marks the possibility of food terrorism is inescapable: "Although the CDC has identified certain pathogens as critical agents for food terrorism, it is difficult for FDA to predict with any certainty the likelihood that an act of food terrorism will occur" (USFDA 2003, 3). Such an admission could serve for the entire project of risk assessment, and that is the irony of this kind of science.

Of course, the risk assessment for food terrorism explicitly links its claims to the 11 September 2001 attacks, but it does so by rationalizing and scientizing the likely impact of an attack on the food supply.[6] This move is supposed to demonstrate control over the possibilities of this kind of attack. But even the Codex Alimentarius Commission (an organization created in 1963 by the Food and Agriculture Organization of the United Nations and the World Health Organization to develop food standards) admits that: "Many sources of uncertainty exist in the process of risk assessment … of food related hazards to human health. The degree of uncertainty and variability in the available scientific information should be explicitly considered in the risk analysis" (Codex Alimentarius Commission 1999). The implication is that because risk assessment is a science it can account for, in a mathematical or numeric fashion, uncertainty. But is this the case? In almost every risk assessment, except notably the risk assessment for food terrorism, the risk characterization section offers probabilities as a source of certainty. This illustrates the kind of ironic epistemology made clear in the case of raw oysters.

Given this kind of ironic epistemology, the same organizations that produce risk assessments have been faced with the issue of how to communicate this knowledge to a "hazard-weary" consumer. In 1998, Susan Conley (Director of the Food Safety Education and Communications Staff at the US Department of Agriculture) claimed that, in response to the problem of the "hazard-weary" consumer, the US Department of Agriculture should "motivate consumers to change unsafe food handling behaviors … without scaring them [the consumers] to death—or worse, to inaction. At the same time, we know that many consumers must be 'scared' into taking action" (Conley 1998, 1). Here the play of irony extends to risk communication practices. Conley claims that "we" (supposedly the authoritative figures who possess knowledge of what is best) must both scare and not-scare American consumers.

Many of the other strategies used to "communicate" risk assessments to the public rely on the following set of assumptions: more information is always better, information must be clear and practical, and, most importantly, messages should be "science-based". Nevertheless, the fears of the "hazard-weary" consumer are never assuaged and uncertainty is never eliminated. The question remains: what do we know once we know that which is provided by a risk assessment? And the ironic answer is that we know that we do not know. If the circulation of a discourse of quantification does not fix the problem of the "hazard-weary" consumer and does not solve the problems of food

terrorism or *V. parahaemolyticus*, what does such a discourse do? By calling risk assessment a rhetorical practice, we are most interested in just this question. Most obviously, and Susan Conley admits to just this, as a rhetorical strategy, the purpose of risk assessment is to produce a kind of rational fear in the public mind. Of course, the notion of a "rational fear" may itself be a kind of irony. In producing such rationalized fear, a rhetorical analysis of risk assessment entails the following seven conclusions:

(1) *Foods are re-figured (or, eating is dangerous not pleasurable)*. The word "oyster" can, and often does, signify much more than a rough stony mollusc with a mucous-like interior. For some, "oyster" can signify France's Atlantic coast, or tradition, pleasure, taste, salt air, the summer off of Vancouver Island, or the morning on the Great South Bay in Blue Point. The purpose of the risk assessment is to create a new signification for "oyster"—in this case, "oyster" signifies danger and *V. parahaemolyticus*. When the science of risk assessment proceeds to describe the dangers of "consumption" (it is almost never called "eating"), the foods being consumed must be re-figured, re-imagined, or re-made. In other words, some otherwise hidden aspect of the food must be made "real" by the language used in these documents. This is not to deny the reality of *Vibrio*, but it is to argue that such "realities" are certified by linguistic choices. Through that ontological process, other "realities" are ignored, substituted, hidden, overlooked, or eliminated. In this case, the pleasure of eating an oyster is countermanded by the danger being made "real" by this new discourse of quantification. To re-figure food in this way is to make eating more a matter of managing fear and less a matter of experiencing pleasure.

(2) *Numbers are tropes.* Numbers are the linguistic means by which foods are re-figured in risk assessments. On their surface, these numbers signify an abstract quantity, the interpretation of which is not a matter of open debate or disagreement. But to trope is to employ words in such a way that one's attention is turned from one thing to another. From a rhetorical perspective, numbers act just like other words. In this case, numbers, probabilities and statistics trope oysters by turning one's attention to a potential danger and away from the possibilities of pleasure. These numbers also turn one's attention from the language games provided by one's cultural experiences of eating to a discourse of quantification. Therefore, numbers, as tropes, legitimate knowledge claims made within that discourse of quantification. But numbers also become a way of de-legitimating other possible knowledge claims, or, at the least, making other kinds of knowledge unimportant (e.g. one's personal knowledge of the chef serving the oysters or the waters out of which the oysters were harvested). To trope oysters in this manner is to secure a particular rationality as opposed to some other possible rationalities.

(3) *Quantification manufactures uncertainty*. In order to secure the production of rational fear, the discourse of quantification that produces the knowledge found within a risk assessment manufactures further uncertainty. As the set of potential factors affecting the uncertainty of eating multiply, so too does our lack of knowledge. Although each risk assessment employs the general scientific strategy of reduction, the next step is always the amplification of factors and numbers that could potentially

lead to adverse consequences. In the case of raw oysters, this amplification is carried out in the complex mathematical formulae produced after the metonymic reduction of oyster to bacteria. Because uncertainty can never be eliminated, the amplification of potential risk factors and the numbers reported to rationalize those factors is also an amplification of uncertainty. This is the central feature of an ironic epistemology—the more we know about the foods we consume, the more uncertain the act of eating becomes. This is a kind of epistemology that produces ignorance.

(4) *Probabilities are political.* In the rhetorical tradition, deliberation is the genre of rhetoric that concerns the political. The central characteristic of deliberative rhetoric is that it is aimed at the future. Risk assessments are deliberative documents in that they attempt to predict the future and recommend strategies for effectively coping with future dangers. In this sense, each risk assessment is a kind of political rhetoric. This is made possible by the use of probabilities. There are at least three main probability theories in the philosophy of science: the logical theory, the personalistic theory, and the frequency theory (Salmon 2005, 78). Each probability theory takes as its main aim the discovery of the plausibility of some event happening. To characterize the probable is to determine that which happens often. But in the case of risk assessment, the purpose of the probabilities may be the same, but such calculations discover the implausibility or infrequency of some event happening. In other words, in a great deal of philosophy of science, questions often surround the convergence of probabilities to a degree of one. But that is not even a consideration in risk assessments—instead, it is a matter of determining the degree to which something is extremely unlikely. The recommendations that come at the end of the risk assessment are designed to make illness less likely. This is what makes these probabilities political and not just scientific. Because these probabilities never converge on a degree of one, continued uncertainty, debate, disagreement, and fear over the future are inevitably present. Once the fear of the future is firmly in place (a fear that will never be erased because the probability of illness will never be zero), political action is inevitable.

(5) *Eating is a political act.* By making recommendations that attempt to minimize probabilities, risk assessments also attempt to make eating a political act. The emergence of risk assessments has coincided with the emergence of government surveillance programs designed to collect data about illness and food safety (on "risk" as a "governmental tactic", see Burchall, Gordon, and Miller 1991). These surveillance programs subject the act of eating to government inspection and regulation. Once the potential danger of eating is established and made real, political and governmental regulation naturally follows as the only available mechanism for managing, rationalizing and reducing those dangers. This includes the production of standardized food handling procedures, warning labels on menus in restaurants that serve oysters, and even recommendations for methods of consumption. All of these tactics politicize the act of eating. More importantly, because the risk of eating a raw oyster can never be eliminated and because the discourse of quantification amplifies and manufactures uncertainty around an increasing number of potential risk factors, political regulations on eating will be permanent and will extend and

amplify as well. If eating is a political act, then two questions become important: What are the political implications of manufacturing a fear of oysters? What political agenda might such a project serve?

(6) *Judgment is rhetorical not mathematical or experiential.* All of the mathematical calculations present in a risk assessment lead, inevitably, to more rhetorical practice. Scientific demonstrations cannot, in these cases, provide certain knowledge, and instead produce uncertainty. Because of this, judgment is not a matter of knowing the mathematics or trusting your experience. Instead one can be persuaded to eat, or not eat, raw oysters by any one of a number of competing claims. Science is just one strategy for persuasion among a set of other possible strategies. Most importantly, science has no special claim to authority (other than the authority it borrows from the general ethos of scientific practice). To decide whether or not to eat that raw oyster in front of you is to engage in a complicated rhetorical task of weighing evidence (sometimes competing evidence) in the face of uncertainty. Scientific demonstrations teach us that we cannot rely solely on our experience to make the best decision, but risk assessments also demonstrate that mathematics can't give us the right answer either. We are on our own, navigating the contingent world of potential dangers with no certain guide and only the swirl of competing rhetorics attempting to persuade us one way or the other.

(7) *The relationship between science and public decision-making is re-cast*. Science no longer provides an objective guide to public decision-making (maybe it never did). Instead, it is engaged in the task of producing an uncertain world. In this manner, risk assessments serve two ontological functions: first, they certify the "reality" of some otherwise hidden aspect of the foods we eat; and, second, they discursively produce a world in which food is dangerous and numbers are important. In other words, science now produces the central controversies that require public decision-making. As a world-making enterprise, the science of risk assessment has begun to make controversy and danger. It cannot, then, provide an objective guide to those controversies and dangers. If the science of risk assessment manufactures the uncertainties that require public action, then what mechanisms are available for guiding public decision-making? In such cases we deploy a variety of rhetorics in decision-making, and science becomes just another rhetoric among others and no longer has the same special, authoritative relationship to public decision-making that it once had. Of course, this has not yet happened. Risk assessments still possess the prestige of other kinds of scientific knowledge. According to Ulrich Beck (1992), however, we are witnessing a social transformation in the relationship between science and society—figures like the "hazard-weary" consumer are a sign of just this transformation.

By understanding risk assessment as a rhetorical practice, these seven conclusions point to the capacity of language to constitute social being in a scientized world. In the light of the ever-growing uncertainties of a "risk society", we are faced with two possibilities: we can be arrested by our lack of knowledge and prevented from acting, or we can choose to act without guarantees. Perhaps science has deluded us into thinking that

acting with certainty was a possibility, when we have all been happily choosing the second option. In any case, we will go on eating the raw oysters in front of us, not knowing whether we will vomit afterwards.

The Irony of a Science of Uncertainty

According to "Science behind the regulation of food safety: risk assessment and the precautionary principle", a report for Congress from 1999, "the use of science [in risk assessment] is not as clear-cut and simple as it may appear initially" (Parish 1999, 2). There are two specific problems that this report identifies. First, since scientific knowledge is constantly changing, risk assessments can potentially change from year to year. Second, a common feature of risk assessment studies is disagreement among scientists about the conclusions of the studies. Both of these problems identify the uncertainty of the scientific conclusions of risk assessment. This uncertainty mimics the uncertainty of the objects of this kind of science. But, according to another report on "Quantitative risk assessment: an emerging tool for emerging foodborne pathogens", "decisions to address foodborne pathogens cannot wait for scientific certainty" (Lammerding and Paoli 1997, 5). This is the dilemma that faces the science of risk assessment, and it is this dilemma that makes this science a rhetorical practice, a practical method of coping with and responding to exigencies (Hauser 2002).

Although it is beyond the scope of this paper to fully think through the implications of risk assessment for the field of the rhetoric of science, it is possible to raise some general questions in the light of the proceeding analysis. Alan Gross (1996) contends that doing "rhetorical analysis" of scientific texts is a useful and important task. Thus, he understands rhetoric as a kind of hermeneutic enterprise for explaining the role of persuasion in producing knowledge. Dilip Gaonkar (Gross and Keith 1997) offered an important critique of this position through reference to the productive capacity of rhetoric. Instead of using rhetoric to analyze scientific texts, one can take Gaonkar's critique seriously and argue that, instead, science acts as a rhetoric, as a mode of discursive production. This, in part, is what we have shown here. The science of risk assessment works as a mechanism for controlling interpretations, influencing decision-making, and coordinating social action all in the face of uncertainty and on the basis of insufficient knowledge. We are not arguing that science works just as any other kind of rhetorical practice (public address, political campaigns, social movements, etc.). Instead, we argue that science acts according to its own protocols but is, nonetheless, directed toward similar political ends just as many other more obvious forms of rhetorical practice. The rhetoricity of scientific knowledge, in cases like the one being considered here, stems not just from the use of language and persuasion (although this is certainly important) but also from the manner in which this kind of knowledge is a response to uncertainty and an attempt to manage decision-making. The rhetoric of science is not just a hermeneutic enterprise; it is also a way of understanding science as a rhetoric—risk assessments make this clear.

Ulrich Beck makes a similar argument in his description of the "world risk society":

> Tangible, simplifying symbols, in which cultural nerve fibers are touched and alarmed, here acquire a key political significance. These symbols must be produced or concocted, in the open fire of conflict provocation, before the strained-terrified television eyes of the public. The decisive question is: who discovers (or invents), and how, symbols that disclose or demonstrate the structural character of the problems as well as creating the capacity for action? (1999 44)

This discovery or invention of symbols is precisely the task in which risk assessments are engaged. It is a political and rhetorical task. Beck's claims regarding the incompetence of expertise, the emergence of a "sub-politics", the development of "reflexivity", and the presence of endemic uncertainty all point to the rhetoricity of scientific practice. By this we mean the manner in which science is deployed as a symbolic strategy for political action in response to uncertainty. From Beck's perspective, "normal science" no longer exists, and all science is political. The example of raw oysters that we have chosen illustrates Beck's argument.

To return to the question posed in the title of this essay—is it safe to eat that?—the available answers can all be understood as competing rhetorical acts vying to guide an individual's decision. According to a risk assessment, the only answer to this question is a statistical report on the likelihood of illness. This rhetoric assumes that individuals are mathematical machines, calculating, counting, and judging based only on numbers. Furthermore, such a rhetoric instills fear and manufactures a kind of rational uncertainty regarding the foods that we eat. These documents rhetorically produce a world in which what matters most about a food is our ability to make these calculations. There is a kind of irony to this rhetoric. It attempts to find a secure and certain answer but inevitably it highlights our ignorance. But there are other rhetorics, rhetorics of pleasure, tradition, or culture that call on us to make different kinds of judgments and different decisions. How, then, do we evaluate this rhetoric of science in relationship to other competing rhetorics? To answer this question is to "know" whether or not an oyster is safe to eat.

Notes

[1] The genetic structure of *Vibrio* is phylogenetically close to *Cholera*. There are also genetic similarities between *Vibrio* and *Salmonella*, *Escherichia coli*, and *Shigella*.

[2] One might claim that this is a classic example of begging the question. The document assumes that *Vibrio* is a danger or hazard, when, in fact, that is just what the document aims to prove.

[3] If Burke is right, then this would almost always be the strategy employed by a form of "scientific realism".

[4] Ulrich Beck argues that a common feature of the "world risk society" is that many of the scientific solutions to global environmental problems actually hold the potential to produce more risk (1999, 58–61).

[5] A generally accepted framework for risk assessment is endorsed by the Codex Alimentarius Commission and the US National Academy of Sciences. This is the framework followed for raw oysters. See *Working Principles for Risk Analysis for Application in the Framework of Codex Alimentarius* (ALINORM 03/41) (Codex Alimentarius Commission 2003); *Principles and Guidelines for the Conduct of Microbial Risk Assessment* (CAC/GL-30) (Codex Alimentarius Commission 1999); and "Risk Assessment in the Federal Government: Managing the Process" (US National Academy of Sciences 1983).

[6] This document goes so far as to claim that al Qaida's "leading experts on chemical and biological warfare was involved in a plot to poison food intended for British Troops" (USFDA 2003, 6).

References

Beck, Ulrich. 1992. *Risk society: Towards a new modernity.* Thousand Oaks, CA: Sage Publications.

———. 1999. *World risk society.* Cambridge: Polity Press.

Burchell, Graham, Colin Gordon, and Peter Miller, eds. 1991. *The Foucault effect: Studies in governmentality.* Chicago, IL: University of Chicago Press.

Burke, Kenneth. 1945. *A grammar of motives.* Berkeley, CA: University of California Press.

Codex Alimentarius Commission. 2003. *Working principles for risk analysis for application in the framework of Codex Alimentarius.* ALINORM 03/41. Rome: Food and Agricultural Organization of the United Nations.

———. 1999. *Principles and guidelines for the conduct of microbial risk assessment.* CAC/GL-30. Rome: Food and Agricultural Organization of the United Nations.

Conley, Susan. 1998. "Science, not scares: Communicating food safety risks to 'hazard weary' consumers" [cited 5 August 2005]. Available from www.fsis.usda.gov/OA/speeches/1998/sc_iamfes.html; INTERNET.

Gross, Alan. 1996. *The rhetoric of science.* Cambridge, MA: Harvard University Press.

Gross, Alan, and William M. Keith, eds. 1997. *Rhetorical hermeneutics: Invention and interpretation in the age of science.* Albany, NY: State University of New York Press.

Hacking, Ian. 1990. *The taming of chance.* Cambridge: Cambridge University Press.

Hauser, Gerard. 2002. *Introduction to rhetorical theory.* Prospect Heights, IL: Waveland Press.

Lammerding, Anne, and Greg Paoli. 1997. Quantitative risk assessment: An emerging tool for emerging foodborne pathogens. *Emerging Infectious Diseases* 3 (4): 483–7.

Parish, Mickey. 1999. *Science behind the regulation of food safety: Risk assessment and the precautionary principle.* CRS Report for Congress RS20310. Washington, D.C.: National Council for Science and the Environment.

Porter, Theodore. 1995. *Trust in numbers: The pursuit of objectivity in science and public life.* Princeton, NJ: Princeton University Press.

Salmon, Wesley. 2005. *Reality and rationality,* edited by Phil Dowe and Merrilee H. Salmon. New York: Oxford University Press.

US Food and Drug Administration. 2003. "Risk assessment for food terrorism and other food safety concerns" [cited 1 September 2005]. Available from http://www.cfsan.fda.gov/~dms/rabtact-html; INTERNET.

———. 2005. "Quantitative risk assessment on the public health impact of pathogenic *Vibrio parahaemolyticus* in raw oysters" [cited 1 August 2005]. Available from http://www.cfsan.fda.gov/~dms/vpra-toc.html; INTERNET.

US National Academy of Sciences. 1983. *Risk assessment in the Federal Government: Managing the process*. Washington, D.C.: National Academies Press.

Wise, Norton, ed. 1995. *The values of precision.* Princeton, NJ: Princeton University Press.