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Stigma Models: Testing Hypotheses of How Images of Nevada Are Acquired and Values Are Attached to Them

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All errors of fact, inference, and interpretation remaining in this report are my own.

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H.C. Jenkins-Smith

Abstract

This report analyzes data from three telephone surveys on the effects that images associated with nuclear power and waste (i.e., nuclear images) have on people's preference to vacation in Nevada. The focus is on the processes by which individuals acquire images about a place and give value to them. The analysis was stimulated by a model of imagery and stigma developed by Slovic, Flynn, and Layman, which assumes that information about a potentially hazardous facility generates signals that elicit negative images about the place in which it is located. Individuals give these images negative values (i.e., valences) that lessen their desire to vacation, relocate, or retire in that place. Sufficiently awful images that are widely shared can lead to stigmatization of a place. The model has been used to argue that the proposed Yucca Mountain high-level nuclear waste repository could elicit images of nuclear waste that would stigmatize Nevada and thus impose substantial economic losses there. This report proposes a revised model that assumes that the acquisition and valuation of images depend on individuals' ideological and cultural predispositions and that the ways in which new images will affect their preferences and behavior partly depend on these predispositions. The report tests these hypotheses: (1) individuals with distinct cultural and ideological predispositions have different propensities for acquiring nuclear images, (2) these people attach different valences to these images, (3) the variations in these valences are important, and (4) the valences of the different categories of images within an individual's image sets for a place correlate very well. The analysis largely confirms these hypotheses, indicating that the stigma model should be revised to (1) consider the relevant ideological and cultural predispositions of the people who will potentially acquire and attach value to the image, (2) specify the kinds of images that previously attracted people to the host state, and (3) consider interactions between the old and potential new images of the place. Evaluating who is likely to obtain stigmatizing images of a place and how the new images are likely to be related to previously held sets of images can lead to more plausible assessments of the effects of nuclear images on that place.

1 Introduction

This report presents the results of an analysis that builds on recent research regarding the potentially stigmatizing effects of a proposed high-level nuclear waste repository at Yucca Mountain, Nevada. Prior research (Slovic et al. 1991a,b, and 1992; Kunreuther and Easterling 1992) examined the extent to which existing nuclear images affected perceptions of Nevada as a place to vacation, relocate, or retire. By using an innovative approach for measuring images and the valences (negative or positive valuations) attached to those images, this research demonstrated that (1) nuclear images tended to be quite negative and (2) those persons having nuclear images of Nevada tended to express less preference for vacationing there. Complementary research (Kasperson et al. 1988; Burns et al. 1990) argued that because of the (1) special nature of public perceptions of nuclear risks (Slovic 1987), (2) likelihood of extensive media coverage of accidents involving nuclear waste or power, and (3) role played by activist groups with agendas tied to nuclear issues, signals about even modest accidents involving the proposed nuclear facility will probably be amplified as they are transmitted to the public. Thus, the proposed nuclear waste repository could generate a large volume of signals that attach negative nuclear images to Nevada. As the stock of nuclear images grows, Nevada could become stigmatized, resulting in changes in behavior as people vacation, relocate, and retire in less stigmatized places: In summary, the prior research hypothesized a pattern of signal generation, image formation, stigmatization, preference change, and resultant behavioral change that could result in significant losses for the stigmatized community.

This complex argument includes a sequence of important hypotheses about how images are signaled, acquired by individuals, given value, and used to generate preferences and, ultimately, behavior. Furthermore, the argument is of substantial importance with regard to a wide array of decisions made in modern societies confronted with the necessity of managing potentially stigmatizing materials.[1] Nuclear power plants, nuclear waste repositories, chemical manufacturing plants, petroleum refineries, hospitals, and other facilities that are part of modern industrial societies have bundles of attributes that could generate stigma. It is very important, therefore, that researchers and policymakers understand as much as possible about how potential stigmatization works, not just for the proposed repository at Yucca Mountain but also for attempts to site nuclear waste repositories and other potentially stigmatizing facilities elsewhere.

This report provides the results of an analysis of a subset of the hypotheses drawn from the stigmatization argument. The focus is on the processes by which individuals acquire different images, give value to them, and rely on them in developing preferences. Data from a set of regional and national telephone surveys are used to test hypotheses about who gets the different images, how different types of people value those images, and how images are translated into preferences. Underlying the specific hypotheses is a more general argument. It states that (1) images of places are best understood as sets or bundles of images that are systematically related and (2) different types of individuals are quite likely to acquire and have distinct bundles of images. People are not passive receptors of whatever signals they confront but actively impute

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[1] Implications of the stigma argument for broader public policy decisions are discussed in Flynn et al. (1992) and Slovic et al. (1991a).

meanings and values to signals in systematic ways. In other words, images of places and things are neither uniformly nor randomly distributed and valued across the members of the general population. In part, this argument means that different types of individuals, given the prior distribution of images about a place, have probably acquired distinct subsets of images and value them in ways that make that place more or less attractive. New images are probably acquired more readily by some people than others, and once acquired, the images are likely to be valued differently by different types of individuals. If this argument is correct, whether a new image will stigmatize a place depends, in part, on how readily that image is acquired, how it is valued, and how it is related to the preferences for the place already held by individuals who otherwise would have been attracted to the place. Thus, one needs to know something about the types of people who were already attracted to a place to evaluate what kind of change is likely to result from the introduction of the new image.

The remainder of this section provides more specific information about the hypotheses developed in prior research and presents a revised model of stigma to be tested. Several theories useful in studying how cultural and ideological characteristics might affect image acquisition and valuation are briefly discussed. Section 2 tests hypotheses about what kinds of individuals are most likely to acquire negative nuclear images about a place such as Nevada. Section 3 evaluates how images of Nevada are related to preferences for vacationing in Nevada; it essentially retests and confirms propositions made in the prior research on stigma. This section also discusses the potential problems associated with measuring image valences. Section 4 focuses on the distribution of the valences of nuclear images — both those elicited in response to the prompt, "high-level nuclear waste repository," and those associated with the State of Nevada. Are they uniformly negative? How do cultural and political characteristics influence the valences people attach to nuclear images? Section 5 examines the full array of images that are attached to Nevada by Phoenix-area residents; it looks at both their frequency and average valences. In addition, the pattern of associations among the image valences is examined to see how images about a place interact. The Nevada image categories are compared with those for Colorado to illustrate how distinctive the bundles of images and their valences can be for different places. Section 6 reviews the ramifications of the analysis for understanding image acquisition, valuation, and preference formation.

1.1 Stigma Model of Nuclear Imagery

The works of research on stigma as it relates to Yucca Mountain (Slovic et al. 1991b; Slovic 1992) have argued that if a high-level nuclear waste storage facility were to be constructed in southern Nevada, perceptions of Nevada and its cities would be more likely to include images of nuclear waste. Furthermore, the resulting nuclear imagery would be extremely negative, and the association could contaminate general images of Nevada. The resulting stigma could, in turn, have behavioral consequences, as people would find other places to vacation, retire, or relocate firms. In short, Nevada could suffer serious economic consequences because of the "special effects" that could result from constructing a high-level nuclear waste storage facility there.

As did Weart (1988), Slovic et al. (1991a) made a strong case that unalloyed perceptions associated with nuclear power and waste are highly unfavorable. On the basis of their analyses of images elicited in response to the prompt, "underground nuclear waste facility," they found negative imagery that was

> so strong that to label it "dislike" hardly does it justice. What these images reveal are pervasive qualities of dread, revulsion, and anger — the raw materials of stigmatization and political opposition (Slovic et al. 1991a, p. 1605).

The authors were also able to show that people who associate nuclear images with Nevada tend to be less likely to want to vacation there. On the basis of the assumption that the construction of a high-level nuclear waste facility in Nevada would broadly increase the connection of nuclear imagery to Nevada via the social amplification of risk (Kasperson et al. 1988; Burns et al. 1990; Kasperson 1992), the authors concluded that the waste facility might well lead to substantial economic losses for Nevada. The authors argued that this "special effect" must be taken into account in assessing the impact of siting the facility in Nevada.

Underlying this argument is a reasonably well-defined model of the structure of risk perception. Based on earlier work by Slovic (e.g., Slovic 1987, 1992), this model assumes that individuals perceive potential hazards in terms of underlying mental constructs, which can be understood as having two primary dimensions. One is dread risk — things characterized by lack of control, dread, catastrophic potential, fatal consequences, or inequitable distributions of risks and benefits. The other is unknown risk — things unobservable, unknown, new, or with delayed effects. This structure is seen to be quite general, having been identified by using factor analysis and confirmed by taking samples of both experts and lay people about a wide array of potential hazards. For lay people, perceived risk and risk policy preferences are driven primarily by the placement of a hazard on the dread risk dimension — and nuclear power and nuclear waste are at the extreme on this dimension.[2] This model has come to be seen as the dominant paradigm in risk perception work in the United States; for an example, see Otway (1992).

The importance of the model of risk perception for present purposes is that it signifies how the risk perception associated with a nuclear storage facility in Nevada is expected to affect perceptions of Nevada. Since the dread risk mental construct is understood to be quite general among the lay public, exposure to information (via social amplification of risk) about the high-level waste storage facility is likely to increase the link between Nevada and imagery of the nuclear waste facility uniformly and, in turn, reduce the attractiveness of Nevada as a place to vacation, retire, or relocate.[3] The available data, collected for Slovic et al. (1991b), indicate that (1) the underground nuclear waste facility is indeed perceived to be dreadful, (2) a relatively small number of people associate Nevada with anything nuclear, and (3) those who do make this

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[2] Experts, on the other hand, are not so inclined to take positions on the basis of the dread risk dimension. See Slovic (1987, p. 283).

[3] This report does not directly address the argument that nuclear images will be magnified in transmission via a process called the social amplification of risk. See Kasperson (1992) for a discussion of the relevant literature.

association have much less pleasing images of Nevada than those who do not. These empirical findings are taken to support the argument that serious and costly special effects could result from siting the Yucca Mountain facility in Nevada, making acceptance of the facility a poor gamble for the state.

1.2 Revised Stigma Model That Considers Ideology and Culture

Three aspects of the stigma model deserve more thorough analysis. First, it is not immediately apparent that the sets of mental images that people retain about a place are a simple function of exposure to information. To the contrary, individuals may already have fairly complex cognitive filters that effectively screen out some types of data while screening in others.[4] Thus, some types of individuals could be more likely than others to recognize the Nevada-nuclear link and to retain it in their set of mental imagery if they do.

Second, once images are included in the imagery set associated with a place, it seems likely that some images will be accorded higher salience than others. Thus, when asked to associate a limited number of images with a place, respondents are likely to supply those that are most salient to them. Given the massive doses of information to which people are subjected each day, it is probable that — if prompted under congenial circumstances — the resulting list of images attached to a place like Nevada could be quite extensive. Therefore, most individuals probably have quite a few possible images to draw upon and will tend to restrict expression to those most salient in the context in which they are expressed.[5] Moreover, as are the cognitive filters that can shape the content of an image set, the relative salience of particular images within that set are likely to be very different for different types of individuals.

Third, systematic differences across individuals are likely to shape both the content of their image sets and the valences they attach to images of particular places. For example, prior research suggests that ideological attitudes are correlated with concern about nuclear energy (Kuklinski et al. 1982; Rothman and Lichter 1987) and nuclear waste (Nealey and Herbert 1983; Jenkins-Smith et al. 1991). Self-described liberals tend to perceive greater risk from, and are more opposed to, nuclear facilities than are self-described conservatives. Similarly, the images attached to the presence or absence of certain attributes of a particular place (e.g., gambling or legal prostitution in Nevada) might also be significantly associated with ideological positions. If so, ideological positions could be expected to affect both (1) whether nuclear images about Nevada are particularly salient and how they are valued and (2) how other images of Nevada (gambling, prostitution, etc.) are valued. What appears at face value to be a straightforward link between

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[4] See, for example, the discussion of "group think" among decision makers in Janis (1983). The more general literature on cognitive screening is vast. See Eysenck (1990) for an overview.

[5] The argument that the images elicited from a respondent will be those that are most salient to them is supported by the fact that in predicting Nevada vacation preferences, the strongest predictors are the valences of the first images obtained.

nuclear images and preferences for vacationing in Nevada might result from the relationship between ideology and an entire set of images about Nevada.

In addition to ideological characteristics, an individual's cultural attributes might influence the types of images this person acquires and how the images are valued. One variant of cultural theory — as specified in Douglas (1985), Rayner (1992), Wildavsky and Dake (1990), Douglas and Wildavsky (1982), and Dake (1991), and Thompson et al. (1992) — can be taken to suggest that preferences for patterns of social relationships, and the biases that flow from these preferences, will influence both the acquisition and valences of images of a place like Nevada.

A person's placement on two dimensions determines one's cultural type. The group dimension reflects the degree to which the individual defines himself or herself as part of a group; the grid dimension reflects the person's perceptions of the appropriate extent and variety of rules governing relationships among people.

- *Hierarchs* perceive themselves as group members (high group) and accept great differentiation among the rules that apply to different members of the group (high grid). This placement predisposes these individuals to trust experts and those in authority, have faith in (and relatively little fear of) technologies that are sanctioned and managed by experts, and be chiefly concerned about threats to order and security.

- *Egalitarians* are high group but low grid. For these individuals, rule differentiation among group members violates a fundamental principle of equality. Egalitarians are suspicious of specialized experts and those in positions of authority, particularly those in large centralized and secretive organizations. For these individuals, concentrations of power — particularly by those not readily held accountable for their actions — are strongly detested. Potentially hazardous technologies and the environmental risks that flow from organizations seen as having concentrated, unaccountable power (such as nuclear utilities or corporations) are singled out as particular threats.

- *Individualists* are low grid and low group, perceiving themselves to be involved in bidding and bargaining with other individuals to transact their own terms of social relationships. Intrusions upon such individual transactions (such as the regulation of private business or imposition of standards of political correctness within organizations) are perceived as threats to a person's abilities to make his or her own way in life. Such intrusions are seen as one of the chief risks confronting society.

- *Fatalists* are individuals who are low group (they tend to see themselves as outsiders) and high grid (their world view contains many social distinctions). As the name "fatalist" implies, these individuals tend to see the occurrence of events and their outcomes as arbitrary and beyond their control. Although the

> world might produce a cornucopia of wealth, health, and safety, it might just as readily produce disaster. Fatalists see people as having little ability to shape such outcomes.[6]

According to this formulation of cultural theory, an egalitarian might give particular attention to information about nuclear facilities because nuclear technologies are seen to be the outgrowth of large corporations and central governments — both of which tend to be held by egalitarians as exemplars of unresponsive and concentrated power (Rayner and Cantor 1987; Thompson 1982). Once acquired, nuclear images are likely to have high salience and very negative valences. An egalitarian might also take a dim view of gambling, seeing it as an outgrowth of greed and a source of inequality. At the other extreme, hierarchs would probably find nuclear facilities far less salient and fear-inducing because they have faith in the experts that run and regulate them. At the same time, because hierarchs are not particularly concerned about inequality and its trappings, they would probably take less umbrage at activities such as gambling than would egalitarians. In both of these cases, the link between nuclear images of Nevada and evaluating Nevada as a place to vacation may be mediated by a third variable — culture — rather than being a straightforward link between images and vacation preferences, as the research on stigma has suggested.

An alternative specification of culture advanced by Inglehart (1971, 1981, 1990) argues that individuals can usefully be characterized as "materialists" or "postmaterialists." This theory posits that the primary values people hold stem from conditions that characterized their early life experiences. Conditions of material deprivation and insecurity inculcate resilient values that place emphasis on material well-being, safety, and order. Early life conditions of wealth and security, on the other hand, instill values that emphasize nonmaterial, quality-of-life issues, including environmental preservation and equality. Inglehart argued that citizens of Western societies who grew up before the 1950s were disproportionately subjected to material insecurity while they were young and hence are predominantly materialists. Those who grew up after the 1950s in conditions of greater wealth and (perhaps more important) a greater sense of a secure future are more likely to be postmaterialists. Thus, Inglehart sought to describe a mechanism of cultural change, driven by the replacement of one cohort by another with quite different formative experiences and therefore quite different basic values.

On the basis of Inglehart's specification of culture, postmaterialists would be expected to be more concerned about nuclear issues (and hence more likely to have nuclear images) and more likely to put negative valences on such images. At the same time, these individuals would be likely to have less interest in, and place lower value on, money-based recreation such as gambling. Hence, all other things being equal, one would expect postmaterialists to have less preference for vacationing in Nevada. Materialists, on the other hand, would be likely to have less concern about nuclear issues. In addition, they would be expected to enjoy the material glitz and glamour of Nevada's casinos more. Thus, being a materialist might simultaneously make one less likely to have a negative nuclear image and have a greater preference for vacationing in Nevada.

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[6] Because of space constraints, this sketch of cultural theory is necessarily incomplete. See Rayner (1992) and Thompson et al. (1992) for much more complete descriptions.

If these hypotheses derived from ideological or cultural theories are correct, the association that Slovic et al. (1991b) found between nuclear images and negative perceptions of Nevada is at least partly driven by a third variable — culture or political ideology. Having omitted that third variable, previous research has not specifically tested for the effects of these factors. It may well be that cultures or ideologies explain both images of Nevada and perceptions of Nevada as a place to vacation, retire, or relocate. In Figure 1, the model underlying the prior research on stigma (shown with dashed lines) is compared with a revised model that considers cultural values and ideology (solid lines).

If the hypotheses underlying the revised model of stigma are correct, one should find substantively and statistically significant relationships between measures of an individual's cultural attributes or ideology and (1) the contents of their image sets about a place and (2) the valences of the images that they attach to that place. If such associations are evident, the implication would be that the presence and valence of images of a place are not simply a function of available information. They are, instead, mediated by other attributes of the individual. Information transmitted by the media about a high-level waste facility in Nevada may readily enter the mental image sets of certain types of individuals; for others, the information may tend to "bounce off" cognitive screens. In addition, should nuclear images of Nevada be acquired, the valence attached to those images could vary systematically across different types of individuals. If these variations exist, identification of the relevant receptive and unreceptive population subsets may well be critical in assessing the effects of imagery.[7]

In summary, if the revised model is correct, it will show that the development and effects of stigma are more complicated than has been implied by prior work on stigmatization. There is no straightforward function by which signals (whether socially amplified or not) become negative images attached to a place and lead to stigmatization and preference change. Instead, images are differentially acquired by different subsets of people who give them different values. The images are then factored into preexisting image sets. The effect on a person's preference for vacationing in a particular place depends in part on how the preexisting images are associated with the new images. All of these aspects of image acquisition, valuation, and attachment to preferences for a place are critical for understanding how the introduction of a new facility, like the proposed Yucca Mountain high-level nuclear waste repository, could affect preferences for vacationing, relocating, or retiring in Nevada.

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[7] The argument made here is not that ideology or culture, as specified and operationalized here, will fully determine the images and valences associated with a place or technology. The underlying theories are in various stages of development (see, for example, Rayner 1992), and the methods of operationalization available are far from perfect (see Section 2.C of this report). Limitations in theory and measurement are likely to attenuate the observed relationship between the images and the measures of ideology and culture. Nevertheless, it is hypothesized that indicators of ideology and culture are both substantively and statistically significantly related to the kinds of images that people acquire and express about a place and to the values that they attach to those images.

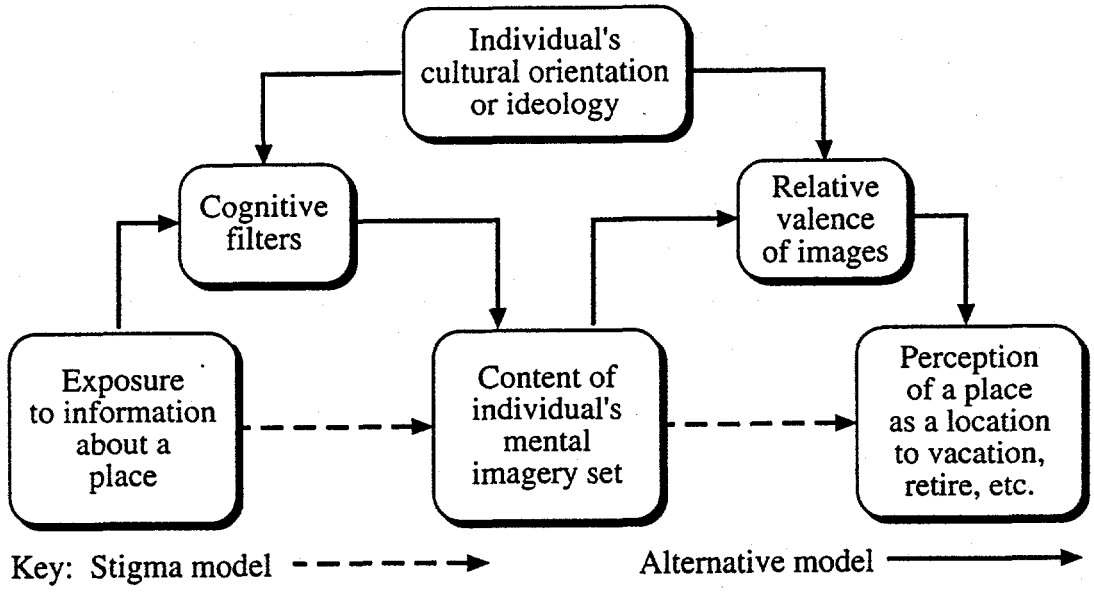

FIGURE 1 Alternative Models of Mental Imagery and Stigma

1.3 Data and Method Used to Test Models

To test elements of both the extant and revised models of stigma, surveys were conducted to collect data on respondents' images of Nevada as well as appropriate data that would tap their ideological and cultural attitudes. To continue the work done by Slovic et al. (1991a,b), the University of New Mexico's Survey Research Center surveyed random samples of household respondents. One sample consisted of residents of Phoenix, Arizona,[8] and another sample represented the entire United States. The data were collected between December 1992 and February 1993. Respondents in the Phoenix-area sample were interviewed in two surveys. The first survey consisted of long telephone interviews (involving about 130 questions) with more than 400 respondents. This survey collected data on images and their valences for Nevada, Colorado, New Mexico, a nuclear power plant, and a high-level nuclear waste repository. The second survey of the Phoenix-area sample, consisting of slightly shorter interviews with more than 600 residents, collected data on images of Nevada, New Mexico, and a high-level nuclear waste repository. The third national survey included more than 800 respondents, from whom images of a high-level nuclear waste repository were collected.[9] For each sample, questions were included not only to elicit images from respondents but also to determine their (1) political ideologies and cultural types,[10] (2) perceptions of the degree of risk associated with an array of types of

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8 This sample is of particular importance because it was from a Phoenix sample that the most substantial connection of Nevada with nuclear imagery was detected by Slovic et al. (1991b).

9 Images of Nevada were omitted from this sample because Slovic et al. discovered almost no association between Nevada and nuclear images by respondents to their national sample.

10 Karl Dake of the University of California at Berkeley collaborated in the development and selection of the items used to make the culture variables operational.

potentially hazardous facilities, (3) support or opposition for local siting of nuclear facilities, and (4) degree of trust in a set of relevant policy actors. Questions were also included to construct a full demographic profile. A survey questionnaire that shows which questions were asked in each of the three surveys is included in Appendix A. Survey procedures and response rates for the Phoenix and national surveys are described in Appendix B.

To measure images attached to states, nuclear power plants, and nuclear waste repositories, the technique used in Slovic et al. (1991a,b) was followed (Szalay and Deese 1978; Slovic 1992). Respondents were read the following instructions:

> The first few questions involve word association. I will give you a topic and ask you to tell me the first word or image that comes to mind. For example, I might say "education," to which you might respond "student," "learning," or "books." Today I am interested in the first four words or images that come to mind when you hear the name of a particular state.
>
> Think about [first state] for a moment — when you think about [first state], what is the first word or image that comes to mind?
>
> What is the next word or image you have when I say [first state]?
>
> [First state] Your next word or image?
>
> [First state] ?

After each prompt, the interviewer recorded each image on a computer.[11] Once the images were collected, a second set of questions followed:

> Next, I want to return to the words you associated with the three states to be sure that I understand them. When I say your word, please tell me how it relates to your overall image of the state.
>
> Let's begin with the words you gave me for [first state]. The [first] word or image you listed was [first image for first state]. Please tell me how this word or image relates to your overall view of [first state]. Would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

---

11 The computer-assisted telephone interviewing system used for the survey stores each image as it is entered by the interviewer, then retrieves and inserts the appropriate images into the questions as they are presented on the computer screen to the interviewer. The questions are then read by the interviewer from the computer screen.

Each image was coded with a value of +2 for "very positive" through –2 for "very negative." Once the images were collected, images for Nevada and Colorado were assigned to categories. Two independent coders and a referee resolved differences among coders. A list of the images obtained for Nevada is presented in Appendix C.

Measuring grid/group cultural type has proven to be a difficult business, requiring many iterations of design, implementation, and evaluation.[12] One approach has focused on directly identifying the grid and group placements of individuals to identify their cultural orientation (Boyle and Coughlin 1994). The approach used here employs an indirect evaluation of culture, involving the measurement of "cultural bias" (Jenkins-Smith and Smith 1994). Conceptually, culture is imbedded in a person's social life, reflecting patterns of social relationships and institutional structure. It is not, strictly speaking, an attribute of individuals. However, the matrix of a person's social relationships is expected to be related to the person's pattern of cultural biases — particularly concerning social prescriptions for authority and assignment of blame (Dake 1991). Thus, a person's cultural orientation should leave strong traces in the types of social biases he or she holds. The measurement of culture used here therefore involves tapping a person's cultural biases.

To develop measures of cultural bias, specific sets of questionnaire items were used to develop indices of each of four grid/group cultural types (Thompson et al. 1990, pp. 5-11; Rayner 1992, pp. 87-91). For the cultural theory based on the grid and group dimensions, a set of items measuring aspects of cultural bias was developed in collaboration with Karl Dake.[13] These items, which had been used and validated in surveys in the United States and the United Kingdom, are designed to tap sets of cultural biases that characterize each of the four grid/group types. For each cultural type, an average score was developed (ranging from 1 to 4). Higher scores indicate greater agreement with the cultural biases of that cultural type. To isolate those individuals who might be most characteristic of a grid/group cultural type, responses across the four sets of cultural bias categories were compared, and individuals were assigned to the cultural type for which the bias was strongest. Those whose scores were tied across two or more categories were placed in an "other/mixed" category. The breakout of grid/group types for the Phoenix sample (including both the long and short versions) is shown in Table 1. Because very few respondents fell into the fatalist category (less than 1%), the fatalists were excluded from many of the analyses in this study.

To measure Inglehart's concept of culture, respondents were presented with a set of four distinct types of general goals that a society might seek and asked to select the two that they believed were most important.[14] The listed goals can be characterized as material (maintaining order, fighting inflation) or postmaterial (protecting free speech, giving greater access to

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12 Some earlier efforts have been reported on in Dake et al. (1992) and Jenkins-Smith and Smith (1994).

13 See items 37-50 in Appendix A.

14 See items 59-60 in Appendix A.

TABLE 1 Distribution of Phoenix Respondents According to Grid/Group Cultural Type

Grid/Group Cultural Type	Respondents No.	Respondents % of Total
Hierarch	213	21.22
Individualist	417	41.53
Egalitarian	75	7.47
Fatalist	6	0.60
Other/mixed	293	29.18
Total	1,004	100.00

TABLE 2 Distribution of Phoenix Respondents According to Materialist/Postmaterialist Cultural Type

Materialist/ Postmaterialist Cultural Type	Respondents No.	Respondents % of Total
Postmaterialist	213	21.82
Mixed	599	61.37
Materialist	164	16.80
Total	976	100.00

government). Individuals who chose the two material goals as their top two priorities were classified as materialists, while those who chose the two postmaterial goals as their top priorities were designated postmaterialists. Those who chose one of each were classified as mixed types. The breakout of respondents into materialist/postmaterialist cultural types is shown in Table 2.

Finally, to measure respondents' political ideologies, a seven-point Likert-type scale was used for self-placement on a liberal/conservative scale.[15] The distribution of responses to the political ideology question is shown in Figure 2.

15 See item 101 in Appendix A.

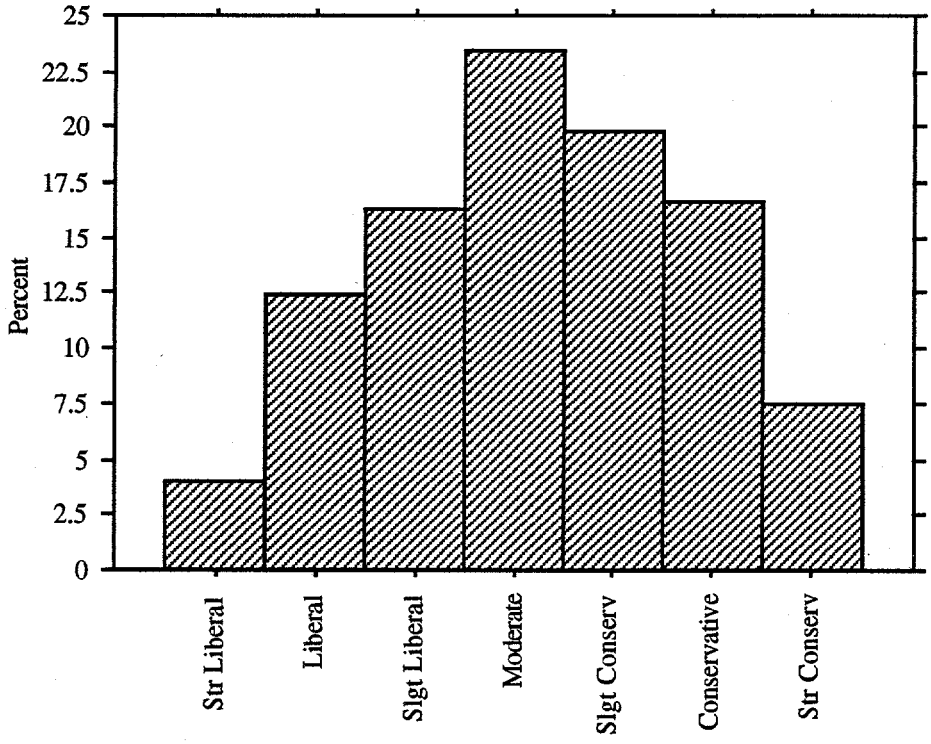

FIGURE 2 Distribution of Phoenix Respondents According to Political Ideology (Str = strongly, Slgt = slightly)

2 Types of People Who Have Nuclear Images of Nevada

Given broad exposure to information about Nevada, are individuals of all types equally likely to acquire a nuclear image of Nevada? If not, what types of individuals are most and least likely to acquire such an image? This section examines the overall frequency with which nuclear images were elicited in response to the word "Nevada," then presents the results of a set of hypothesis tests regarding whether some people are more likely to acquire nuclear images than others.

To use Nevada as a test for the possible effects of negative imagery from a nuclear repository, the number of times nuclear images are attached to the state must be large enough to permit tests of the effects of such images. When they used the word association technique described in Section 1, Slovic et al. (1991a,b) found that almost no respondents from a random national household sample linked Nevada to nuclear images. In separate samples of Phoenix-area residents, however, approximately 10% of the respondents attached a nuclear image to Nevada. For that reason, the Phoenix-area samples are used for these tests. The samples include more than 1,000 individuals from whom images of Nevada were elicited.[16]

2.1 Frequency of Nuclear Images of Nevada

Of the 1,004 respondents to the Phoenix-area survey, 9.3% (or 93 individuals) had an image of Nevada that included a nuclear element. Not surprisingly, most of these images were clearly tied to the Nevada Test Site rather than nuclear waste. Specific responses included "atomic testing," "nuclear bombs," and "nuclear test site," with a few mentions of "nuclear waste" and (in only one case) "Yucca Mountain high-level nuclear waste repository." Appendix C provides a full list of the images. Overall, the results confirm the frequency with which nuclear images were elicited from residents of the Phoenix area that was reported in Slovic et al. (1991a,b). Table 3 shows the frequency with which nuclear images were elicited from the Phoenix-area respondents.

2.2 Relationship between Political Ideology and Nuclear Image Acquisition

What are the characteristics of those people who do — and do not — have nuclear images? As described in Section 1, recent scholarship suggests that ideological and cultural predispositions lead to greater (or lesser) propensities to pay attention to specific kinds of images or to give salience to those images once acquired. To statistically test for these relationships, the appropriate

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16 Since the image elicitation questions were asked first in both of the Phoenix-area surveys and the same wording was used, these items can be merged into a single data set without introducing bias.

model must allow for prediction of a dichotomous variable (presence or absence of a nuclear image among an individual's Nevada image set), and it must allow for a nonlinear relationship[17] between the explanatory variable (ideology or culture) and the presence or absence of the image. Where appropriate, chi-square tests, analysis of variance models, and logit models[18] were used.

TABLE 3 Frequency with Which Nuclear Images of Nevada Were Elicited from Phoenix-Area Respondents

	Respondents	
Response	No.	% of Total
No nuclear image	911	90.74
Nuclear image	93	9.26
Total	1,004	100.00

The first test evaluates the relationship between ideology and the presence of nuclear images of Nevada. The hypothesis is that as an individual moves toward the liberal side of the ideological scale, the probability of the presence of a nuclear image in that individual's image set will increase. A logit model and the seven-point ideological scale described in Section 1 were used to predict the presence of nuclear images. The hypothesized relationship was found to be quite modest, although significant at the 0.05 level (one-tailed test). The direction of the relationship was as predicted. The relationship between ideological self-placement and the probability of having a nuclear image, as predicted by the logit model, is shown in Figure 3. As expected, those who fall on the extremely liberal side of the scale have a greater probability (12%) of having a nuclear image of Nevada than do those on the extremely conservative side of the scale (7%). Overall, the hypothesis that ideology is associated with nuclear image acquisition is supported by the data.

2.3 Relationship between Grid/Group Cultural Type and Nuclear Image Acquisition

A second hypothesis is that a person's cultural type (as based on the grid/group cultural bias measures) is related to nuclear image acquisition. The most straightforward way to test this relationship is to see whether those individuals who scored highest in each of the cultural bias

17 When predicting a dichotomous dependent variable (such as presence or absence of a nuclear image), the shape of the relationship is more likely to be sigmoid than linear. Use of a linear model (such as the ordinary least-square regression technique) for estimation of such a relationship is likely to bias the results and will provide suspicious statistical significance tests.

18 Logit models are particularly useful when predicting a dichotomous dependent variable in which (1) the functional form is expected to be nonlinear and (2) multiple independent variables are required. For a technical discussion of logit models, see Hanushek and Jackson (1977, pp. 190-199).

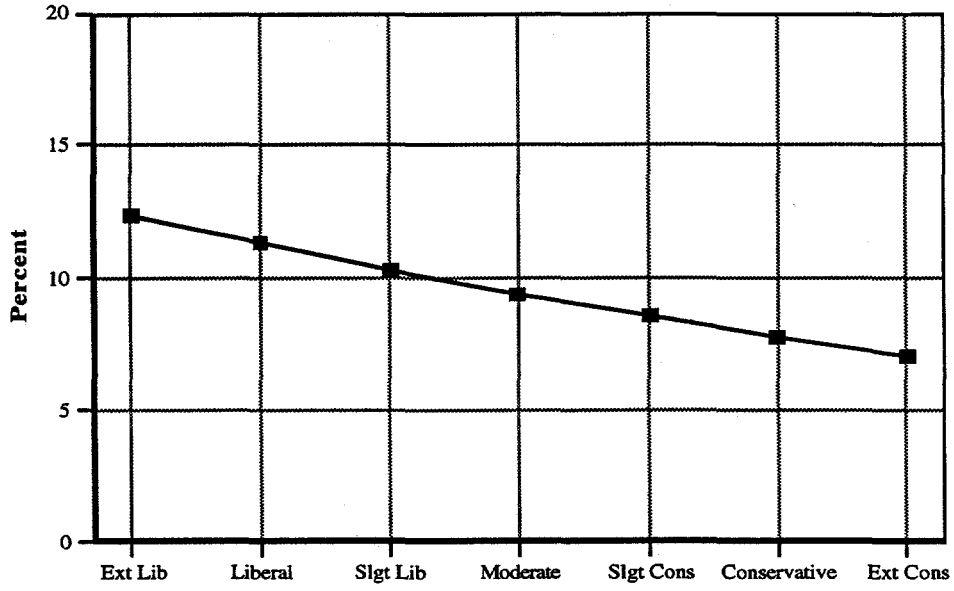


FIGURE 3 Estimated Relationship between Political Ideology and the Presence of a Nuclear Image of Nevada (Ext = extremely; Slgt = slightly)

categories (see Section 1) tend to have nuclear images more or less often than others. The results are shown in Table 4.

As indicated in Table 4, of those respondents who most agreed with the hierarch position, less than 4% had a nuclear image. Although nearly 17% of those in the fatalist group had nuclear images, the small number of respondents in this category makes the result interesting but not statistically useful.[19] Of the respondents who most agreed with the egalitarian cultural bias, 12% had a nuclear image. More than 11% of those who most agreed with the individualist cultural bias had a nuclear image. Interestingly, once again the relationship was strongest among women, of whom only 1.5% of the hierarchs had nuclear images, while 11% of the egalitarians had such an image.

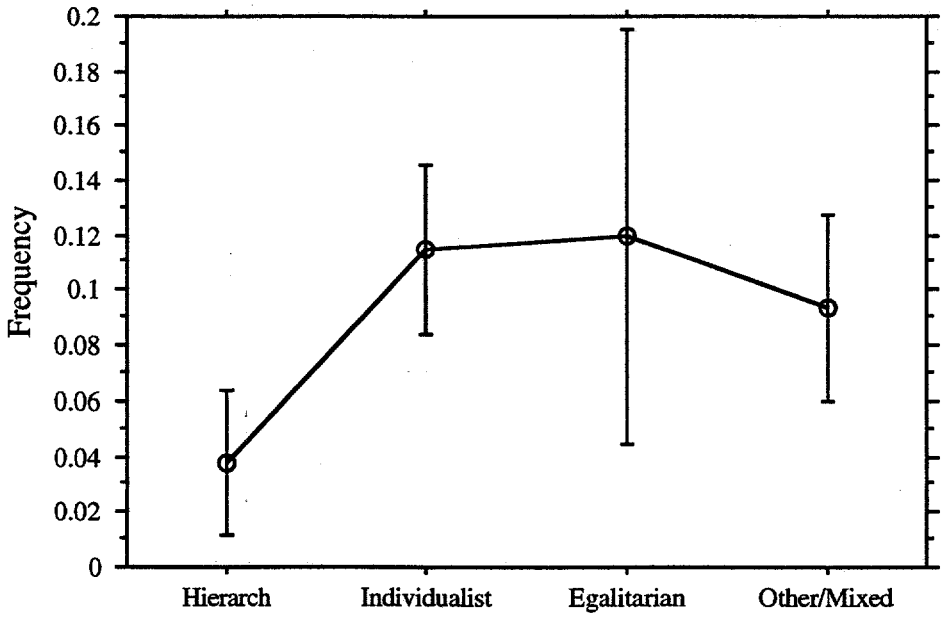
The relationship is revealed in a slightly different way in Figure 4, which shows the frequency of nuclear images within each cultural category, with 95% confidence intervals reflecting the size of each of the cultural subgroups (fatalists were omitted from this analysis because of the small size of this group). This analysis shows that egalitarians have the highest frequency of nuclear images and the hierarchs stand out as having a low frequency of such images.

19 Removal of the six respondents in the fatalist category from the analysis improves the statistical significance of the relationship between cultural type and nuclear images (by reducing the degrees of freedom to 3) to statistical probability $p = 0.0125$.

TABLE 4 Frequency with Which Nuclear Images of Nevada Were Elicited According to Grid/Group Cultural Type

Chi-square: 11.16 with 4 d.f.; p = 0.025

Response	Hierarch	Individualist	Egalitarian	Fatalist	Other/Mixed	Total
No nuclear image						
%	96.24	88.49	88.00	83.33	90.44	90.64
Number	205	369	66	5	265	910
Nuclear image						
%	3.76	11.51	12.00	16.64	9.56	9.36
Number	8	48	9	1	28	94
Total						
%	100.00	100.00	100.00	100.00	100.00	100.00
Number	213	417	75	6	293	1,004



95% confidence intervals; p-value of difference = 0.0124;
fatalists omitted

FIGURE 4 Frequency with Which Nuclear Images of Nevada Were Elicited According to Grid/Group Cultural Type

Overall, the results shown in Table 4 and Figure 4 indicate that significantly fewer hierarchs tend to have nuclear images than other cultural types. Although those in the egalitarian group had the highest frequency of nuclear images, the differences between egalitarians and individualists or those people in the mixed category were small and statistically weak. Thus, among the grid/group cultural types, the hierarchs stand out as having substantively and statistically significant filters that screen out (or give less salience to) nuclear images of Nevada.

2.4 Relationship between Materialist/Postmaterialist Cultural Type and Nuclear Image Acquisition

The second cultural theory addressed in Section 1, concerning materialist and postmaterialist values, suggests that postmaterialists are more likely than materialists to be concerned about nuclear issues and therefore more likely to have nuclear images of Nevada. This hypothesis was tested by using analysis of variance. The estimated relationship was strong and statistically significant; postmaterialists were significantly more likely ($p < 0.0001$) to have a nuclear image than materialists. The frequency of nuclear images by cultural type, with 95% confidence intervals, is illustrated for postmaterialists, those with mixed values, and materialists in Figure 5.

As Figure 5 indicates, postmaterialists were estimated to have a 16% probability of having a nuclear image, while materialists had only a 6.5% probability. These differences are shown in Table 5. As these data make clear, postmaterialists are more than twice as likely as materialists (or those with mixed values) to have responded with a nuclear image of Nevada in the survey.

2.5 Implications

The results of the hypothesis tests regarding the presence (or expression) of a nuclear image in an individual's image set support the proposition that systematic cognitive filters lead some individuals to screen out and screen in certain kinds of images.[20] In particular, among the Phoenix-area survey respondents, people who (1) identified themselves as more conservative, (2) tended to agree with hierarch cultural biases, and (3) gave priority to materialist values appear

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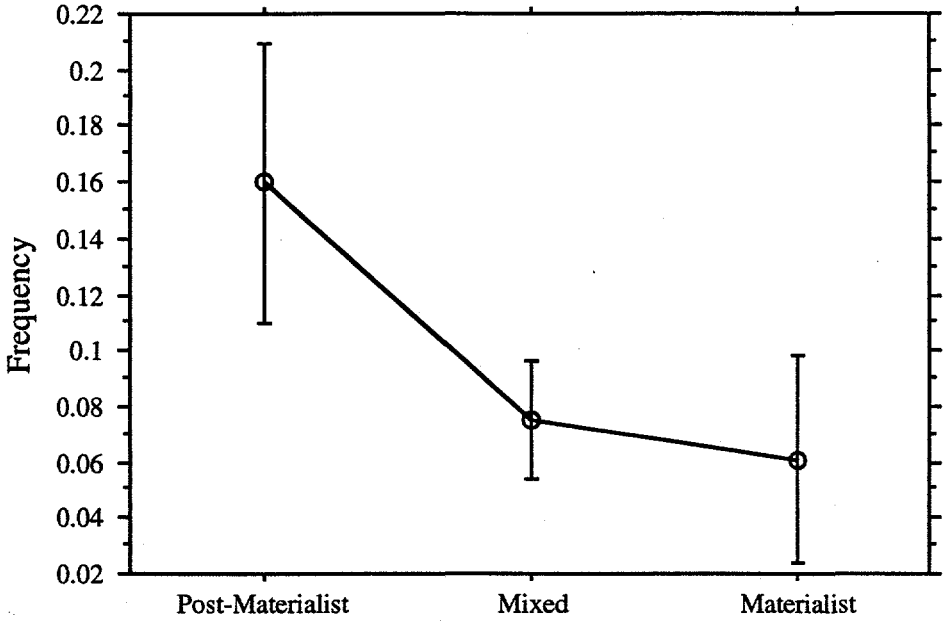
20 It is likely that an individual has actually acquired many more images than can be expressed in a word association process of the kind used here. If so, this analysis has shown systematic variation in the kinds of images that respondents choose to *express*, given a limited number of opportunities to provide an image. Nevertheless, statistical analysis indicates that the first images that respondents provide are the most important indicators of vacation preferences; the valences for the first images obtained for Nevada explained 23% of the variation in Nevada vacation preferences, those for the second explained 11%, those for the third explained 9%, and those for the fourth explained only 8%. Thus, the first image has (on average) nearly three times the weight of the fourth, and the importance of the image declines monotonically with the order of the image obtained. Thus, the images analyzed here are quite likely to be the most significant for shaping vacation preferences. I am indebted to Paul Slovic for raising this issue.



95% confidence intervals; p-value of difference = 0.0004

FIGURE 5 Frequency with Which Nuclear Images of Nevada Were Elicited According to Materialist/Postmaterialist Cultural Type

to have been systematically less likely to acquire or express nuclear images about Nevada. Those who (1) identified themselves as more *liberal*, (2) tended to agree with *egalitarian* cultural biases, and (3) gave emphasis to *postmaterialist* values were more likely to acquire or express nuclear images of Nevada. Furthermore, these differences were substantial: egalitarians were more than three times as likely to have a nuclear image than were hierarchs, and postmaterialists were more than twice as likely to have a nuclear image than were materialists. Thus, it is evident that images of particular types are not uniformly distributed across a population but tend to be systematically filtered into, and out of, specific subgroups of that population. Thus, as cultural theorists have argued, people are not passive receivers of information about risks or associated images but actively apply meaning and importance to the signals they receive (Rayner 1992, pp. 85-86).

TABLE 5 Frequency with Which Nuclear Images of Nevada Were Elicited According to Materialist/ Postmaterialist Cultural Type

Materialist/ Postmaterialist Cultural Type	Number	Mean
Postmaterialist	213	0.16
Mixed	599	0.08
Materialist	164	0.06

Although 40 years of nuclear weapons testing in Nevada has resulted in a modest (9-10%) infusion of nuclear images about Nevada, that infusion has taken place disproportionately among individuals who share particular ideological and cultural predispositions.[21] These results suggest that should a nuclear waste repository be located in Nevada, any increase in the prevalence of nuclear images will be most pronounced for these types of individuals. If having a nuclear image of Nevada leads to a reduced preference for vacationing there (an issue addressed in the next section), it appears that certain types of people will be more likely than others to have nuclear images erode their desire to vacation in Nevada. In other words, some types of individuals are more (and others are less) susceptible to image-induced changes in a vacation preference resulting from the presence of a nuclear repository. Therefore, to understand the potential impact of a nuclear repository on tourism in its host state, it is important to learn who makes up this susceptible population. In the worst case, those who are currently most likely to vacation in that state would be the most susceptible. The presence of a repository would then lead to the greatest reduction in tourism among that state's most likely tourists. On the other hand, it might be that those who are most attracted to vacation in the host state are also those who are relatively immune to the acquisition of nuclear images and therefore will not significantly change their vacation preferences.

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21 Kasperson argues that the "social amplification of risk" is conditioned by cultural patterns that can "heighten or attenuate perceptions of risk" (1992, p. 158). This analysis of the links between cultural predispositions and nuclear image acquisition provides strong support for Kasperson's contention.

3 Image Valences and Preferences

What is the relationship between imagery and preferences? Slovic et al. (1991b) showed that the negative and positive values — or valences — that individuals attached to their images of Nevada significantly affected the attractiveness of Nevada as a place to vacation. This relationship, in combination with the finding that nuclear images tend to have extremely negative valences, provided the empirical basis for the argument that the promulgation of nuclear images would be likely to result in lost tourism for hosts of nuclear waste repositories.

The connection between image valences and preference formation should extend beyond vacation sites. If the measurement technique works properly, the valences that individuals attach to images of a nuclear waste repository should be correlated with their level of fear about, and opposition to, such a facility. More important for this analysis, if there is a strong relationship between the valences attached to nuclear repository images and those attached to nuclear images of Nevada, nuclear repository images can be used as a proxy for nuclear images of Nevada in tests of the relationships between nuclear image valences and culture and ideology. In general, such a relationship would mean that one could make inferences from variations in the valences of nuclear waste images about the valences that would be attached to a nuclear image of Nevada, if a person had one. This conclusion is of no small importance: because more than 90% of the sample had no nuclear images of Nevada, statistical analysis of the relationship between ideology or culture and valences for nuclear images of Nevada is restricted to a very small data set (only 98 observations out of 1,004 completed surveys). Thus, if a strong association between valences for nuclear waste images and nuclear images of Nevada can be established, use of the former as proxies for the latter will permit much more precise statistical tests.

This section reevaluates the link between image valences and vacation preferences, testing for the relationship between two different measures of respondents' preferences for vacationing in Nevada and their image valences for that state. In addition, because of the importance of the measures of nuclear image valence for testing hypotheses about stigma, this section presents some tests of the validity of the nuclear waste repository image valences as measures of the negative and positive values that individuals may attach to nuclear policies. Finally, the overall strength of association between valences of nuclear waste repository images and nuclear images of Nevada is estimated.

3.1 Relationship between Image Valences and Vacation Preferences

On the basis of data collected in 1988, Slovic et al. (1991b) found a strong positive relationship between the valences that respondents attached to their images of Nevada and their expressed preferences for visiting Nevada. The more positive the image valences were, the more likely the individual was to prefer vacationing in Nevada. The analysis here uses 1992-1993 data and extends the earlier studies by calculating the total of each individual's Nevada image valences

(here called "NVSumScore").[22] These scores can range in value from -8 (for someone who had four images, all valued at -2) to +8 (for someone who had four images, all valued at +2). An individual with offsetting images (e.g., two images with valences of -2 and two images of +2) would obtain a summary valence score of zero, as would an individual who rated all images at zero (or neutral).[23] In addition, all respondents were asked to rank their vacation preferences for four states — Nevada, California, Colorado, and New Mexico.[24] Statistical analysis was then used to test for a relationship between the NVSumScore and Nevada's rank among the four states. The results are shown in Table 6. The average NVSumScores by vacation rank, with 95% confidence intervals, are shown in Figure 6.

As shown in Table 6, there is a strong relationship between the NVSumScores and Nevada's rank as a vacation destination. Those who ranked Nevada as their first choice among the four states (6% of respondents) had, on average, image valences that totalled 4.14. Those who ranked Nevada last (46% of respondents) had average NVSumScores of less than 1.0. This relationship is illustrated in Figure 6. These findings confirm the results of Slovic et al. (1991b) regarding the strong positive association between image valences and vacation preferences.

A second test of the association between image valences and vacation preferences was based on an alternative measure of vacation preferences. In this case, respondents were asked the following question:

> We'd like to get your opinions about a short list of states in which many people take vacations. Assuming that there were no significant differences in the cost of the trip, please tell me how attractive each state is to you as a place to vacation. Please use a scale where ten means extremely attractive, zero means not at all attractive, and you can pick any point in between.

The question was asked for Nevada, California, Colorado, and New Mexico.[25] The vacation score for Nevada is here referred to as "VacNV." The association between the vacation rank and VacNV was extremely strong, with a positive linear relationship between vacation rank and the VacNV score.[26]

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22 One assumption implicit in the NVSumScore measure is that the valences of all images have equal weight. That assumption in tested in Section 5 of this report.

23 Note that the extreme scores (-8 and +8) are possible only for individuals who are able to provide at least four images and who give them consistently high (+2) or low (-2) valence scores. Thus, the NVSumScore variable indicates both the valuation and the "depth" of an individual's image set about Nevada.

24 See questionnaire items 69-72 in Appendix A for the exact wording for the state rankings.

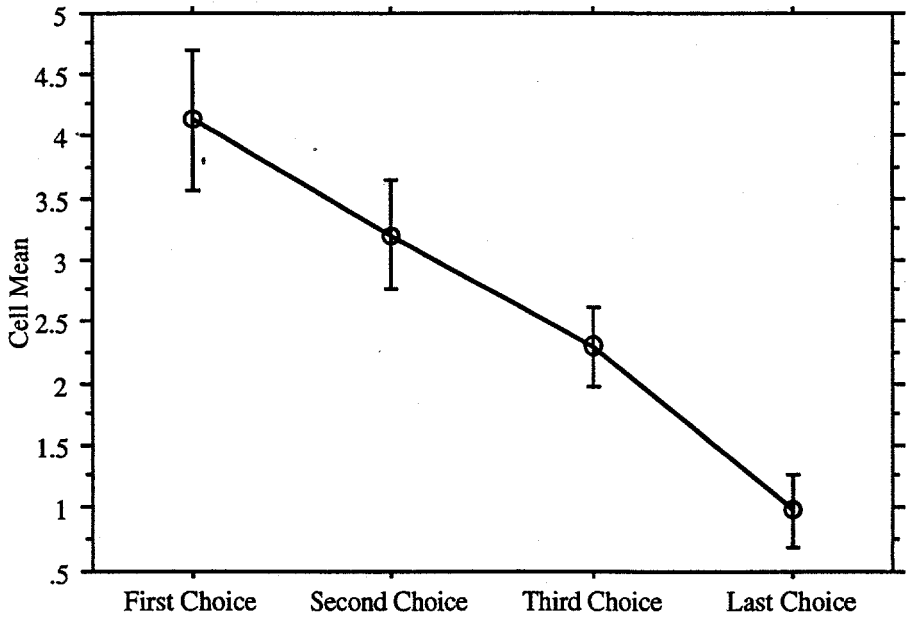
25 The questions for the four states were presented in a random order to ensure that there was no bias due to an ordering effect. See items 26-30 in Appendix A.

26 Analysis of variance of VacNV by vacation rank was extremely statistically significant, with a chi-square of 90.90 with 3 degrees of freedom.

TABLE 6 Relationship between a Person's Average Valence Score for Nevada Images and Nevada's Rank as a Vacation Destination[a]

Rank of Nevada as Vacation Choice	Number	Mean	Standard Deviation	Standard Error
First	65	4.14	2.29	0.28
Second	179	3.20	2.99	0.22
Third	313	2.29	2.84	0.16
Last	426	0.98	3.05	0.15

[a] Means table for NVSumScore effect: NVVacCho.



Interaction line plot for NVSumScore Effect: NVacCho
Error bars: 95% confidence interval

FIGURE 6 Relationship between a Person's Average Valence Score for Nevada Images and Nevada's Rank as a Vacation Destination

How well do the Nevada image valences predict the VacNV scores? When a linear regression analysis was used, the NVSumScores alone predicted 27% of the variation in the respondents' VacNV ratings for Nevada — a very strong relationship for data of these kind. The model is highly statistically significant. These results are shown in Table 7.

As indicated in Table 7, the model estimates that for each one-point increase in the sum of the Nevada image scores, the 0 to 10 VacNV score rises by nearly half a point. Thus, the difference between individuals with +8 and -8 Nevada image scores would be expected to be about 7.7 points on the vacation preference score. The magnitude of this relationship is illustrated in Figure 7, which plots the estimated relationship between NVSumScore and VacNV. Clearly, the valences of the Nevada images are strongly related to vacation preferences.

To summarize, there is a very powerful relationship between Nevada image valence scores and the overall rank of Nevada as a place to vacation. This relationship also holds for the other states for which image scores were collected. These results confirm one of the central findings of Slovic et al. (1991a,b) and emphasize the importance of images in shaping preferences (at least, the stated preferences).

3.2 Relationship between Political Ideology/Cultural Type and Vacation Preferences

Is there a relationship between preferences for vacationing in Nevada and the ideological or cultural attributes of an individual? As discussed in Section 1 of this report, because Nevada is associated with some unique images (e.g., gambling and legal prostitution), ideological and cultural attributes could well have an overall link to preferences for vacationing in Nevada. To test for this relationship, a linear regression model estimated the effects of postmaterialism, ideological self-placement, and the four grid/group cultural bias measures on vacation preferences for Nevada (VacNV). The results are shown in Table 8.

As shown in Table 8, several measures of culture and ideology proved to be statistically significant predictors of preferences for vacationing in Nevada. Those who expressed postmaterialist values were less likely to want vacation in Nevada (0.33 points lower on the VacNV scale). Those who were more conservative (high values on the ideology measure) were more likely to want to vacation in Nevada. Those who scored high on the individualist cultural bias measure were also more likely to want to vacation in Nevada.

Although these measures do not provide a complete picture of why people would choose to vacation in Nevada (only 2% of the variation in VacNV is accounted for), they do indicate that more general cultural and ideological constructs play a part in shaping preferences for vacation destinations. The expectation discussed in Section 1 is that a more complete explanation for the link between one's ideology/culture and vacation preferences will derive from the relationships

TABLE 7 Relationship between Nevada Vacation Score and Summed Nevada Image Scores

Regression Summary
VacNV vs. NVSumScore

Number	900
Number Missing	14
R	0.52
R squared	0.27
Adjusted R squared	0.27
RMS residual	2.17

Parameter	Coefficient	Standard Error	Standard Coefficient	t-Value	p-Value
Intercept	4.56	0.08	4.56	55.53	<0.0001
NVSumScore	0.42	0.02	0.52	18.96	<0.0001

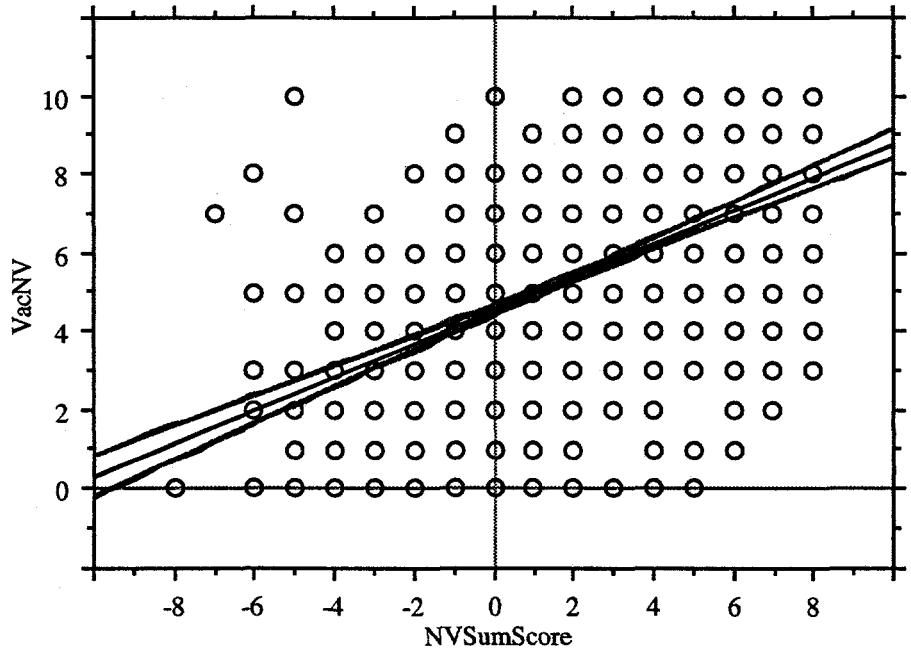


FIGURE 7 Plot of Regression Model Showing the Relationship between Image Scores and Nevada Vacation Preference Scores

TABLE 8 Relationship between Rank of Nevada as a Vacation Choice and a Person's Cultural Type and Ideology

Regression Summary
VacNV vs. 6 Independents

Number	949
Number missing	55
R	0.14
R squared	0.02
Adjusted R squared	0.01
RMS residual	2.52

Parameter	Coefficient	Standard Error	Standard Coefficient	t-Value	p-Value
Intercept	4.38	0.82	4.38	5.33	<0.0001
PostMDummy	-0.33	0.20	-0.05	-1.65	0.1000
Ideology	-0.15	0.06	-0.10	-2.72	0.0066
AvgHier	0.27	0.17	0.05	1.55	0.1223
AvgIndiv	0.39	0.19	0.07	2.13	0.337
AvgFatal	-0.17	0.18	-0.03	-0.98	0.3265
AvgEgal	0.03	0.16	0.01	0.21	0.8324

between an individual's ideological/cultural attributes and the larger sets of images that the person has for particular places. Therefore, to understand how a particular image affects vacation preferences, one must sort out how that image fits into the larger image set of an individual and how the valences for images in that set are related to more general ideological and cultural attributes.

3.3 Assessing the Validity of Nuclear Image Valence Scores

As did studies by Slovic et al. (1990, 1991a, 1991b), this study leans heavily on the valence scores attached to images to test hypotheses drawn from the models of stigmatization. For that reason, it is important to assess how valid the measures of image valences are. If the measures themselves are invalid, they will undermine the results of any hypothesis tests that are performed. Furthermore, because it is critical that researchers evaluate the valences that different types of individuals attach to nuclear images of Nevada (if and when they acquired such an image), it is also important that researchers know how well the nuclear waste image valences will serve as proxies in such tests.

There are a variety of ways to assess the validity of a measure.[27] The most appropriate for purposes of this study is to test for construct validity: how does the measure being evaluated correlate with other variables that, according to theory, should be associated with the measure in particular ways? If tests of associations among variables show that the measure does perform as one would expect on the basis of prior theory, the tests support the validity of the measure. In the case of the Nevada image valences, theory (and intuition) would suggest that the more positive one's image valence, the more likely one would be to want to vacation in Nevada. By that measure, the Nevada image valences perform quite well, as described above in this section. When two different measures of vacation preferences were used, the more positive the Nevada image valences were, the higher Nevada ranked as a place to vacation. Furthermore, past behavior (as reflected in survey questions) also supports the validity of the measure; those who said they had vacationed in Nevada in the past 5 years had significantly higher image valences for Nevada (averaging 2.47) than did those who had not (average 0.97).[28] Thus, along with the results of Slovic et al. (1991a,b), the analysis presented here increases the level of confidence that can be placed in the measures of image valences.

The valences attached to the images obtained in response to the prompt, "high-level nuclear waste repository," have not been as thoroughly tested for construct validity. On the basis of more general theory, several measures should be associated with the nuclear waste image valences if the measure has construct validity. First, the less safe one perceives nuclear energy generation and waste disposal to be, the more negative one's images of a nuclear waste repository should be. Second, the more negative one's images of a nuclear waste repository are, the less willing to support construction of a nuclear waste repository in his or her community one should be. Of course, each of these relationships is complicated by the fact that many variables may contribute to imagery or support for a local repository. Therefore, one cannot expect nuclear image valences to be fully determined by these other measures. Nevertheless, one should expect to find significant positive relationships among these variables. If so, this finding will increase the level of confidence that the nuclear waste image valences are valid measures.

A first test involves using an individual's perceptions of the safety of the technologies used in nuclear energy generation (NucGen) and nuclear waste disposal (NWDisp). Both of these measures have scales that range from zero (completely unsafe) to 10 (completely safe).[29] If the nuclear waste images valences perform as expected, there should be significant positive associations between these measures of perceived safety and the nuclear waste image valences. In addition, the association between the perceived safety of nuclear waste and the image valences should be the stronger of the two associations (because the valences are for images of nuclear waste rather than nuclear power). These propositions were tested by using linear regression analysis. The results are shown in Table 9.

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27 A succinct treatment of validity assessment can be found in Carmines and Zeller (1979).

28 This result is close to what Carmines and Zeller (1979, pp. 17-20) refer to as the criterion-related test of validity.

29 See items 51, 55, and 56 in Appendix A.

TABLE 9 Relationship between Nuclear Waste Image Valences and the Perceived Safety of Nuclear Waste and Energy Technologies

Regression Summary
NWSumScore vs. 2 Independents

Number	911
Number missing	93
R	0.30
R squared	0.09
Adjusted R squared	0.09
RMS residual	4.73

Parameter	Coefficient	Standard Error	Standard Coefficient	t-Value	p-Value
Intercept	-4.16	0.37	-4.16	-11.11	<0.0001
NWDisp	0.40	0.07	0.22	5.57	<0.0001
NucGen	0.21	0.07	0.11	2.85	0.0045

As shown in Table 10, the relationships between the nuclear waste repository image valences and the perceived safety of the nuclear technologies are as expected; both are positive and highly statistically significant. The model predicts that those who perceive nuclear waste and energy technologies to be safe will attach positive valences to their nuclear waste images. Furthermore, the relationship between the perceived safety of the technologies used in nuclear waste storage (NWDisp) and the image valences has the stronger of the two associations, as was expected. These results support the validity of the nuclear waste image valence measures.

A second test involves the relationship between the nuclear waste image valences and acceptance of a nuclear waste repository "within 100 miles of your community." The acceptance variable has a values ranging from -2 (strongly oppose) to +2 (strongly support) and is here called "NIMBY" (not in my backyard). One would expect that the higher the nuclear waste image valences are, the more acceptable such a repository would be. This relationship was tested by using linear regression analysis. The results are shown in Table 10. The relationship is plotted in Figure 8.

As shown in Table 10, the more positive the nuclear waste image valences, the greater the acceptance of a nuclear waste repository. As indicated in Figure 8, as the nuclear image valences approach the positive end of the scale, acceptance approaches neutral. (Only a few people in this sample would positively support locating a high-level nuclear waste repository near their community.) This relationship is highly statistically significant. Again, because these results conform with prior expectations drawn from theory and intuition, they support the validity of the nuclear waste image valence measures.

TABLE 10 Relationship between Nuclear Waste Image Valences and Acceptance of a Nuclear Waste Repository

Regression Summary
NIMBY vs. NWSumScore

Number	963
Number missing	68
R	0.30
R squared	0.09
Adjusted R squared	0.09
RMS residual	1.05

Parameter	Coefficient	Standard Error	Standard Coefficient	t-Value	p-Value
Intercept	-0.95	0.04	-0.95	-26.61	<0.0001
NWSumScore	0.07	0.01	0.30	9.72	<0.0001

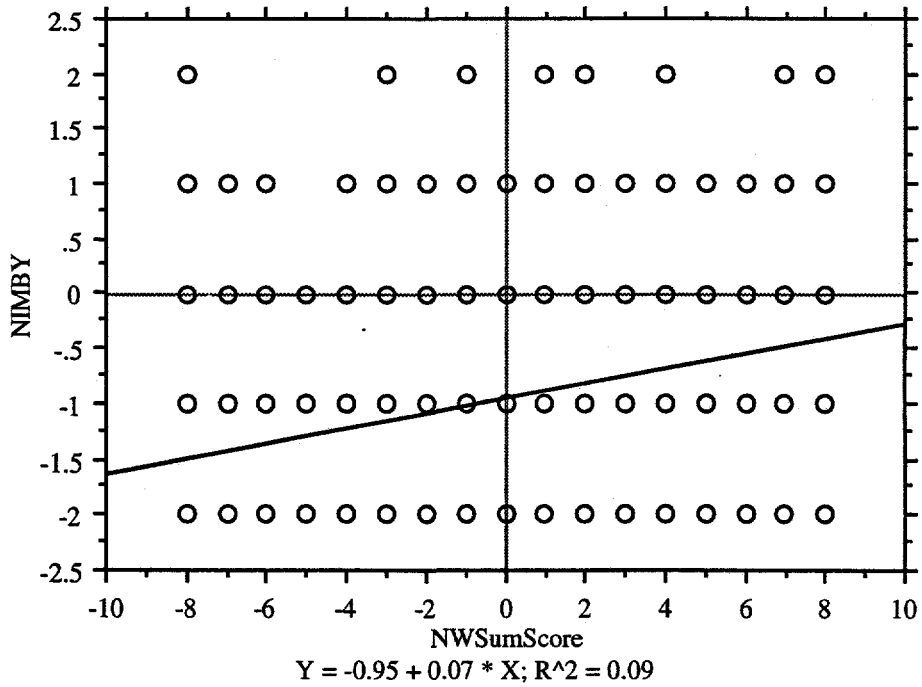

FIGURE 8 Plot of the Relationship between Nuclear Waste Image Valences and Acceptance of a Nuclear Waste Repository

In summary, these results lend support to the validity of the measures used to tap the valences of images attached to a nuclear waste repository. Nevertheless, there are reasons for some degree of caution in the use of these measures. Some scholars have suggested that the image valences may reflect the strength of attachment of the image to the elicitation subject rather than the valence of the image per se.[30] The use of the words "positive" and "negative," for example, may lead to some confusion on the part of the respondent as to whether the measure asks if the image is strongly attached, or attached with a positive affect, to the elicitation subject. To see if the wording created a problem, the wording in the national survey was changed from whether the images were "positively" or "negatively" associated with the elicitation subject to whether the association of the image was "good" or "bad." The idea was to see if a different wording would significantly alter the pattern of associations between the nuclear image valences and the more general attitudinal measures. In no case were such differences detected. Thus, while there may be some confusion on the part of some respondents on what the measure is asking for, this confusion does not seem to be widespread or sensitive to the wording of the question.

An indirect test of the validity of the nuclear waste repository image valences is to see how well they correlate with the nuclear images of Nevada held by the 93 Phoenix-area respondents. It seems reasonable to expect that the values that individuals attach to nuclear images of Nevada should be positively associated with their images of a nuclear waste repository.[31] Because it is reasonable to assume that the Nevada image valences are valid measures, a strong association lends validity to the nuclear waste images as well. Furthermore, a strong association would give a researcher some confidence that one could use the nuclear waste image valences (that were obtained from all respondents) to test for the kinds of differences in valence that one would expect for nuclear images of Nevada. This confidence is important because, with only 93 individuals having such images, statistical tests of how culture and ideology are related to image valences and of how the valences of different kinds of images are related are difficult to perform.

The correlation between the valences for the Nevada nuclear images and those for the nuclear waste repository was 0.44, which was highly statistically significant ($p < 0.0001$). Thus, the correlation is very strong, despite the fact that many of the Nevada nuclear images were of nuclear weapons tests or the weapons test site. Again, this correlation adds to the validity of the nuclear waste repository image valences. Of equal importance, the results indicate that the image valences for the nuclear waste repository are a reasonable proxy for the kinds of valences that individuals might attach to nuclear images of Nevada, should they acquire them in the future. Furthermore, should an onslaught of nuclear images result from location of a nuclear waste repository in Nevada (as hypothesized by Slovic et al. [1991b]), this correlation would probably grow stronger over time, because the new images would derive from nuclear waste rather than nuclear weapons tests. For that reason, subsequent tests in this report will rely on the valences attached to images obtained in response to the nuclear waste repository word associations.

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30 Both Paul Slovic and Harry Otway have brought this potential problem to my attention, for which I am most grateful.

31 At the same time, I would not expect the correlation to be perfect; the images of nuclear bomb testing in Nevada might invoke a quite different set of values than would the storage of (primarily civilian) nuclear waste from power plants.

4 Nuclear Image Valences and Vacation Preferences

Recent works of research have argued that nuclear imagery in the United States and other Western societies is widely and deeply negative, focusing on the dread attached to visions of nuclear holocaust and fear of accidents at nuclear plants (Weart 1988; Slovic et al. 1979). This section tests that proposition by looking at the overall distributions of the valences attached to the images of "nuclear power" and "high-level nuclear waste repository" as provided by the survey respondents. In addition, the distribution of valences attached to the nuclear images of Nevada provided by the Phoenix-area sample is examined, and tests are performed to determine if there is an association between nuclear images of Nevada and vacation preferences for that state. Finally, tests are conducted to assess the underlying reasons for the valences that individuals attach to nuclear images. The ideological and cultural attributes of individuals are used as explanations for these valences.

4.1 Distribution of Nuclear Image Valences

Are nuclear images uniformly negative? Evidence from the samples suggests that they are not. Responses to the image valences for nuclear power taken from more than 400 residents of the Phoenix area, in which individuals could score the images from -2 (very negative) through 0 (neutral) to +2 (very positive) were examined. The total of each individual's nuclear energy images was calculated (here called "SumNPIm"). The average valence score was slightly positive (a value of 0.13). The average is borne out by inspection of the actual distribution of nuclear power image valences, as shown in Figure 9.

Figure 9 shows that the nuclear power image valences are far from uniformly negative; in fact, they are tilted toward the positive end of the valence scale. Furthermore, there is considerable variation across the valence scale, with significant numbers of very positive and very negative valence scores. These results demonstrate that one cannot reasonably assume that nuclear images will be uniformly negative.

Of course, some positive connotations (e.g., electricity) that are attached to nuclear power are less likely to be attached to nuclear waste storage (Nealey and Herbert 1983), so one could expect that the valences attached to the images of a high-level nuclear waste repository will be considerably more negative. When the complete set of data from the Phoenix-area sample (more than 1,000 observations) is studied, this expectation proves correct. The average value for the totals of the nuclear image valences is -1.48, significantly below the neutral value of zero. This distribution is shown in Figure 10.

As Figure 10 indicates, there is a significant bulge on the negative side of the valence scale for the images of the nuclear waste repository. Nevertheless, there is considerable variation in

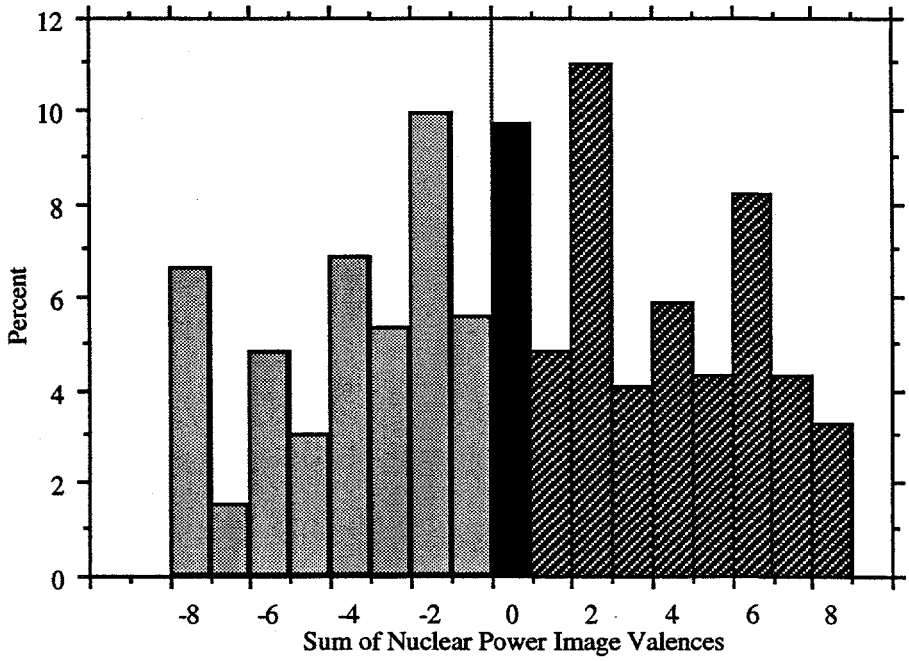

FIGURE 9 Distribution of Nuclear Power Image Valences among Phoenix-Area Respondents

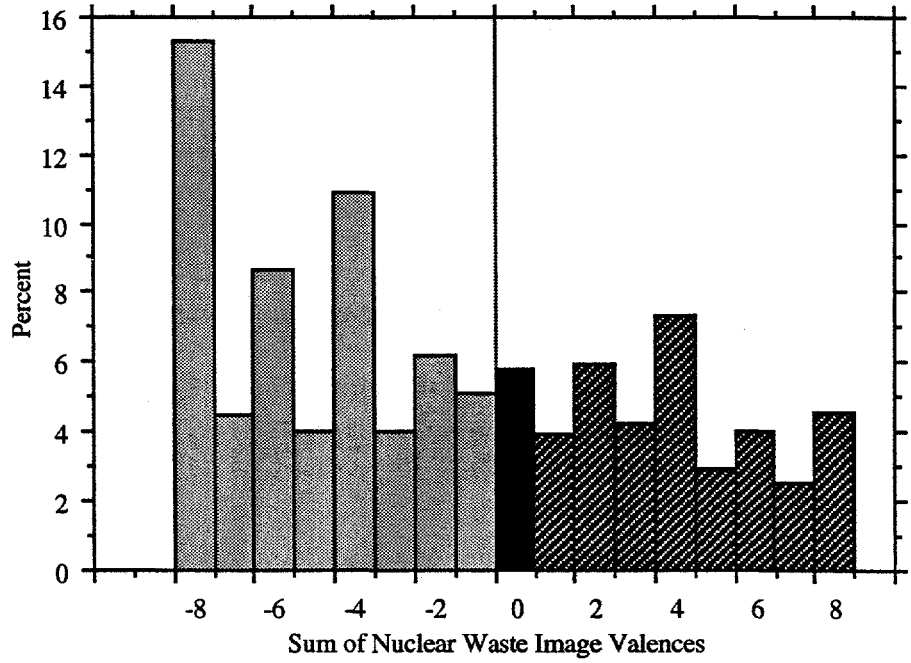

FIGURE 10 Distribution of Valences for Images of a High-Level Nuclear Waste Repository among Phoenix-Area Respondents

valences, with a substantial fraction of the sample — more than 35% — having scores above the neutral value of zero.[32] Again, it is not correct to assume that nuclear images will be consistently negative.

4.2 Relationship between Nevada Nuclear Image and Nevada Vacation Preference

Given that the valences attached to nuclear facilities vary a great deal, how much do the valences attached to nuclear images of Nevada vary? Are these images, perhaps, more negative than other types of nuclear images? This situation might be true if, for example, the types of individuals who have these images tend also to be the types of people who take an unusually negative view of nuclear images. In addition, if images attached to nuclear weapons are particularly nasty (as argued by Weart [1988]), the prevalence of the attachment of nuclear weapons images to Nevada might also drive these images down.

On the basis of the data from the Phoenix-area sample, the mean value and distribution of the valences of the nuclear images of Nevada were evaluated. In this case, since virtually none of the respondents provided more than one nuclear image, the scale runs from -2 (very negative) to +2 (very positive). The average value of the valences attached to nuclear images of Nevada is -0.97 and statistically significantly below zero. However, as Figure 11 shows, the distribution of valences shows variation. Although a strong majority of those who had nuclear images gave them negative valences, about 28% gave them valences of zero (neutral) or above, and 14% gave them valences above zero. Again, although most of the valences attached to nuclear images of Nevada are negative, such images are not uniformly negative.

Slovic et al. (1991b) found that the presence of a nuclear image of Nevada significantly reduced a person's preference for vacationing in Nevada. Does that result remain true for the more recent data? Table 11 shows the relationship between the rank of Nevada as a vacation destination among four states (Nevada, California, Colorado, and New Mexico) and the presence of a nuclear image of Nevada. These results confirm the findings of Slovic et al. Of those individuals with nuclear images, only 2% ranked Nevada first among the vacation choices, but those without nuclear images of Nevada ranked it first 7% of the time. At the other extreme, those with nuclear images of Nevada ranked the state last 56% of the time, while those without a nuclear image ranked it last only 42% of the time. Clearly, there is an association between those people currently having nuclear images and those having a reduced preference for vacationing in Nevada.

The results shown in Table 11 raise several questions. As shown in Section 2, not all individuals are equally likely to have nuclear images of Nevada. Is it also true that different types

[32] In the national sample, about 32% of the respondents provided image valence scores of above zero for the nuclear waste repository images.

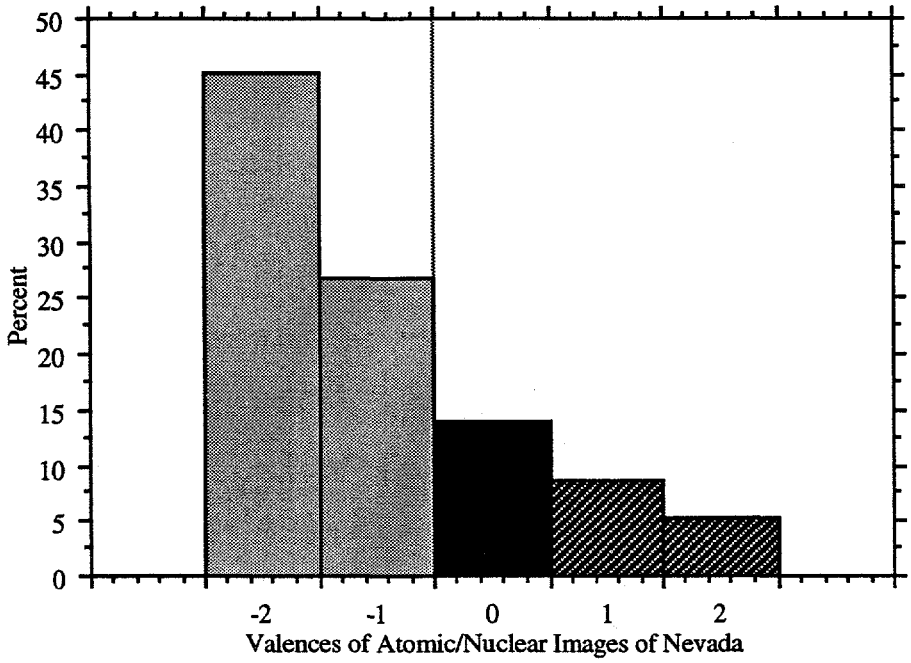

FIGURE 11 Distribution of Valences for Nuclear Images of Nevada among Phoenix-Area Respondents

TABLE 11 Relationship between Frequency of Nuclear Images of Nevada and Rank of Nevada as a Vacation Preference (%)

Image of Nevada	First Choice	Second Choice	Third Choice	Last Choice	Total
No nuclear image	7.00	18.67	32.00	42.33	100.00
Nuclear image	2.13	13.83	27.66	56.39	100.00
Total	6.54	18.21	31.59	43.66	100.00

of people will place different valences on the nuclear images they attach to Nevada? The remainder of this section tests for systematic differences in the values that people attach to nuclear images by looking specifically for differences that are associated with the ideological and cultural measures described in Section 1. A second question raised by the results in Table 11 concerns the special significance of nuclear images. The idea of "stigma" suggests that images causing stigma should have out-of-the-ordinary weight in shaping overall attitudes toward the object to which the images are attached. If so, the valences of nuclear images of Nevada should have greater weight in shaping people's preferences for vacationing in Nevada than would the valences of the other images attached to the state. This hypothesis is tested in Section 5.

4.3 Predicting Nuclear Image Valences

Section 1 presented a revised model of how images are acquired and valences are attached to them. It hypothesized that image valences are affected, in part, by an individual's underlying ideological or cultural predispositions. If so, there should be significant relationships between the four grid/group cultural bias measures based on the cultural theory of Douglas and Wildavsky (1988) and the nuclear image valence scores.

To test for such a relationship, the four grid/group cultural types were used to predict the sum of the valences for the images elicited in response to the prompt "high-level nuclear waste repository" (NWSumScore), by using an analysis of variance. The mean values of NWSumScore are shown in Table 12. Figure 12 shows the differences in these mean values according to cultural type, with 95% confidence intervals. Differences among the mean values of the nuclear waste image valences across cultural types are statistically significant ($p < 0.05$).

The results in Table 12 and Figure 12 show that the cultural bias measures are significantly linked to the valences attached to images of a nuclear waste repository. As hypothesized in Section 1, those who share the egalitarian cultural bias tend to have substantially lower valences for these nuclear images than do others (a mean value of -3.01). Hierarchs, on the other hand, tend to give higher valences to nuclear images (an average of -1.21, a full 1.8 points above the average for the egalitarians). The difference between the mean values for these two groups is statistically significant ($p < 0.01$). Differences between the egalitarian and individualist scores are statistically significant as well.

Does political ideology also affect nuclear image valences? The existing literature on ideology and attitudes toward nuclear issues suggests that those who are more liberal should hold a dimmer view of — and therefore attach lower valences to — a nuclear waste repository than conservatives (Kuklinski et al. 1982; Rothman and Lichter 1987; Nealey and Herbert 1983; Jenkins-Smith et al. 1991).

This hypothesis is tested by comparing the summed imagery valences for a nuclear waste repository (NWSumScore) across ideological subgroups. To eliminate the problem of small samples at the ideological extremes, the seven-point ideology scale was reduced to three categories (liberal, moderate, and conservative). The mean values of the NWSumScores are shown in Table 13, and the differences are illustrated in Figure 13.

As shown in Table 13 and Figure 13, there is a strong and statistically significant relationship between political ideology and the valences that people attach to images of nuclear waste. Respondents in the liberal category attached the lowest valences (an average value of

TABLE 12 Relationship between Grid/Group Cultural Type and Nuclear Waste Repository Image Valences

Grid/Group Cultural Type	No. of Responses	Mean	Standard Deviation	Standard Error
Hierarch	198	-1.21	5.02	0.36
Individualist	398	-1.43	4.85	0.24
Egalitarian	72	-3.01	4.91	0.58
Other/mixed	264	-1.32	5.04	0.31

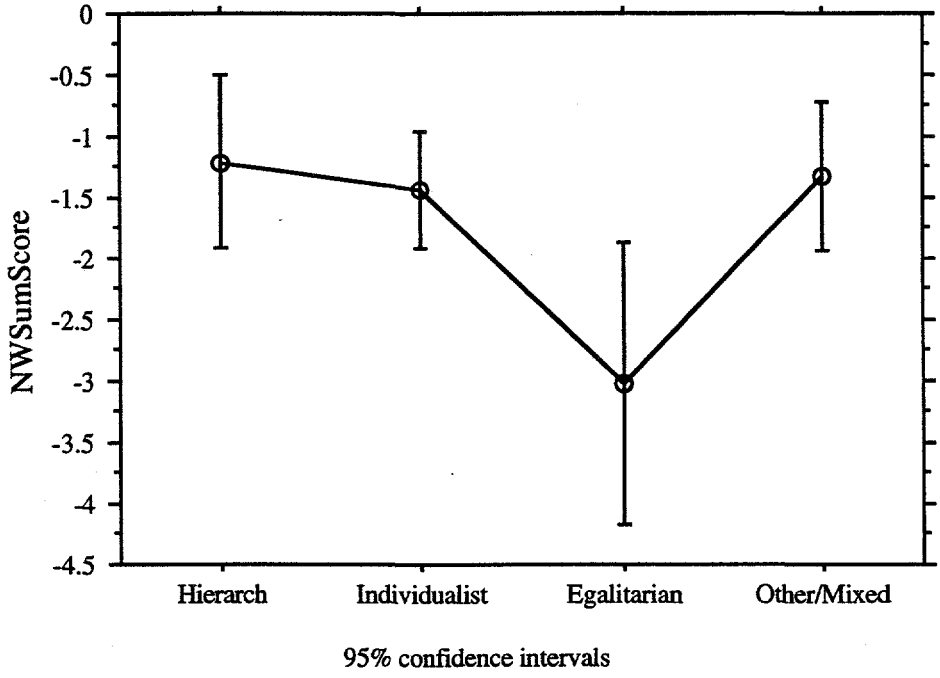

FIGURE 12 Average Values of Nuclear Waste Images According to Grid/Group Cultural Type

-2.17), while those in the conservative category attached the least negative valences (-0.89, on average). The difference in the mean values between the liberal and conservative groups is highly statistically significant ($p < 0.001$).

In summary, the valences attached to images of nuclear waste are significantly associated with the ideological positions of the individual. The more politically conservative the individual is, the more positive are the valences that this person attaches to nuclear waste images. The more politically liberal the person is, the more negative are the valences.

TABLE 13 Relationship between Political Ideology and Nuclear Waste Repository Image Valences

Political Ideology	No. of Responses	Mean	Standard Deviation	Standard Error
Liberal	296	-2.17	4.95	0.29
Moderate	213	-1.57	4.99	0.34
Conservative	401	-0.89	4.92	0.25

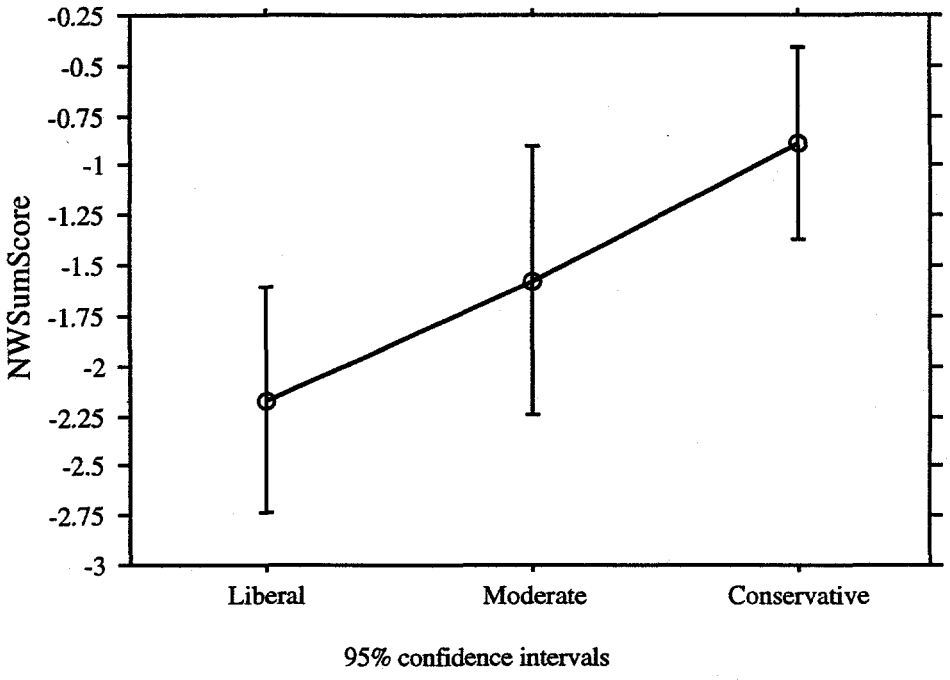

FIGURE 13 Average Values of Nuclear Waste Images According to Political Ideology

4.4 Implications

The results in this section have shown that, contrary to recent arguments that nuclear images have valences that are deeply and uniformly negative, the valences attached to images of nuclear power and nuclear waste show considerable variation. Valences attached to images of a nuclear power plant among the Phoenix-area sample were distributed roughly evenly around neutral, with a slight tilt toward the positive side. Images of a nuclear waste repository had valences that were significantly more negative, but there was still a substantial percentage of positive valences. Given the variability of the valences attached to nuclear images, what leads an individual to attach a higher or lower valence?

The valences attached to nuclear images are strongly associated with predispositions — ideological, cultural, and perhaps others — that orient the way the individual attaches value to this particular kind of image.[33] Some types of individuals — egalitarians and liberals — tend systematically to attach more negative values to these images, while those who are more conservative or more hierarchic tend to attach more positive values to them. Thus, neither the acquisition and expression of particular kinds of images (as shown in Section 2) nor the values attached to an image are accidental or random. In other words, should a greater frequency of nuclear images about a place result from siting a nuclear waste repository in that place, those images will remain disproportionately in the minds of particular types of people and will be given systematically different values by different types of people. Instead of uniformly eliciting a response of stigma, nuclear images are likely to have a negative impact on the vacation preferences of particular types of people and less effect on others.

But the potential for stigmatization of a location because it hosts a nuclear facility is complicated still further by the possible relationships among images. Addition of a negative image is unlikely to have much of a net effect on preferences for a vacation site if other images of that place are already negative. If images tend to be associated with one another, assessing the possibility of stigmatization requires an understanding of how new images will fit into the preexisting image sets associated with the potential host site.

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33 See Dake (1991) for a particularly useful discussion of "orienting dispositions" as they apply across cultural types.

5 Image Sets and Associations among Images

Thus far, this analysis has focused on the potential effects of nuclear images and their valences on vacation preferences. But what about the other images that people may have about a place? This section lists the categories of images that were elicited in response to the prompt "Nevada" and compares their frequencies and average valences. In essence, these image categories and their valences can be taken to represent the broader sets of images that people employ when shaping perceptions of Nevada. For purposes of comparison, the image categories (and their valences) obtained in free word associations in response to the prompt "Colorado" are also presented. These categories of images are then used to test hypotheses that bear on the potential interactions among images and on how such interactions may affect the potential to stigmatize a place. First, tests were run to determine whether the valences attached to different categories of images might be associated. The act of attaching more negative values to nuclear images may be related to how one values other images that are prominent in one's Nevada image set. Second, tests were conducted to determine the degree to which cultural and ideological predispositions influence the most frequent image that people have about Nevada: gambling. Finally, tests were run to determine the possibility that some types of images — nuclear images in particular — may have unique importance in shaping overall assessments of a place.

5.1 Images of Nevada

Two independent coders categorized the images elicited in response to the word "Nevada."[34] When interpreting the results presented here, one should remember that the coders made somewhat arbitrary decisions about the scope of the categories. For example, one category includes various man-made structures (dams, highways, buildings), and another includes casinos. The latter could readily have been placed into the former, but the frequency with which casinos were mentioned as an image of Nevada (11.6% of the respondents provided such an image) led the coders to assign that image its own specific category. It is possible that other coders would have made different decisions and thus had somewhat different categories. A complete list of the images in each category is included in Appendix C to permit the reader to study the coding directly.

The categories of Nevada images, along with the percentage of the Phoenix-area respondents who provided that type of image, are shown in Figure 14. Figure 15 shows the average valences within each image category.

As Figure 14 makes clear, certain categories of images dominate the image set for Nevada. Images of gambling (gambling, gaming, specific games, etc.), natural characteristics of the state (deserts, climate, lakes, mountains, wildlife, etc.), and Nevada cities were each mentioned by

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[34] When coders disagreed about the categorization of an image — an infrequent occurrence — they consulted the principal investigator to reach a decision.

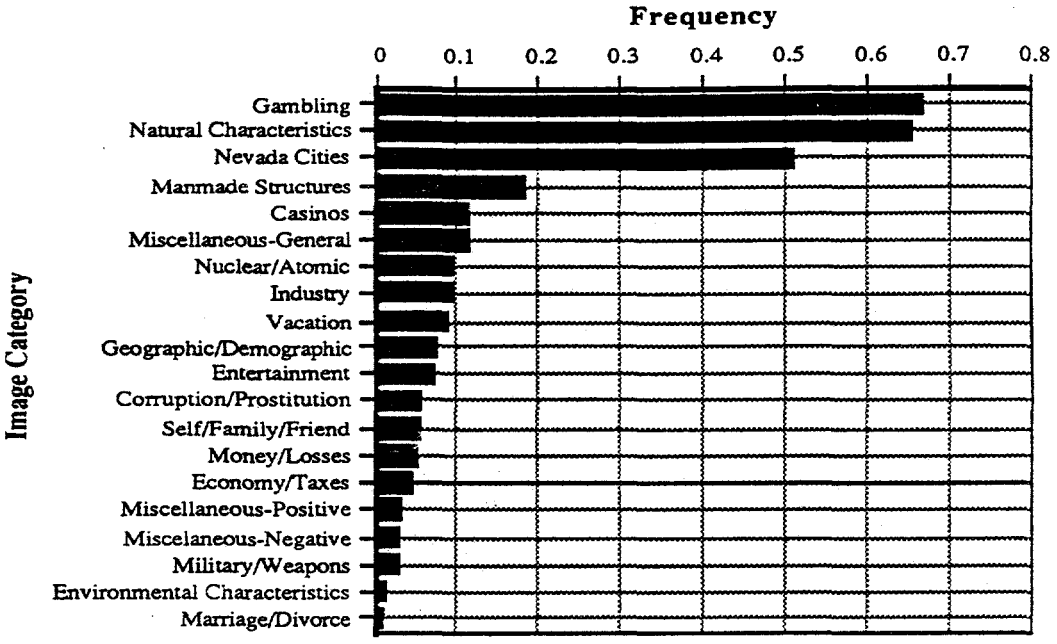

FIGURE 14 Nevada Image Frequencies

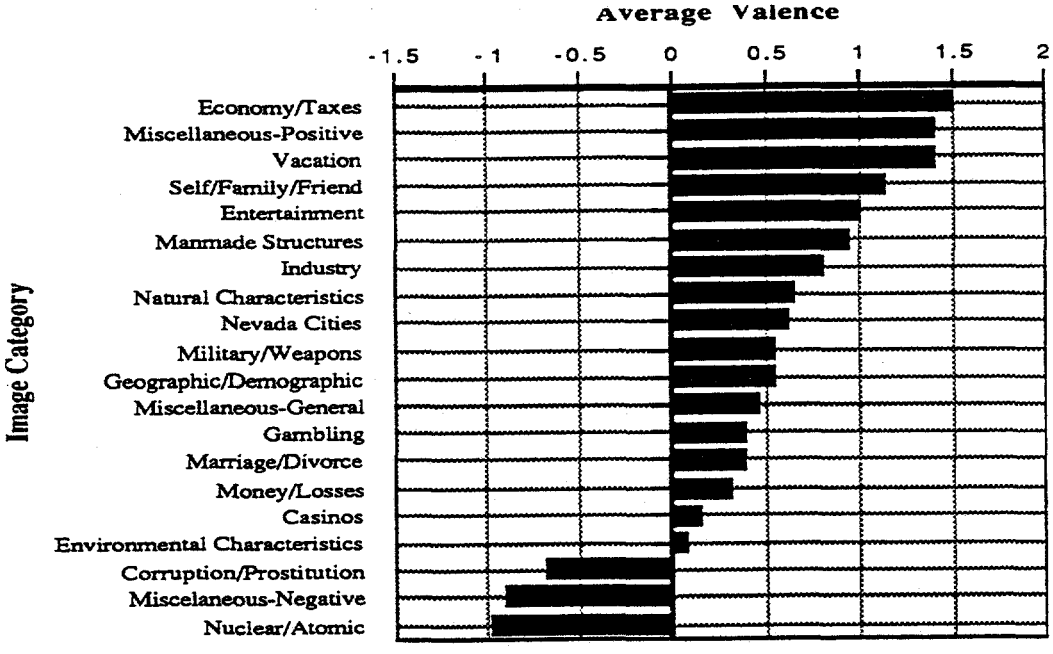

FIGURE 15 Nevada Image Valences

more than half of the respondents, with the other image categories falling off rapidly in frequency. Nuclear images tied with images of industries (at 9.3%) as the seventh most frequently mentioned image category.

The average valences for the images within each category are shown in Figure 15. Valences for the economy and (low) taxes take top billing, followed by a miscellaneous-positive category and vacation images. The gambling image falls well down the list, with a valence of 0.40. Natural characteristics, as the second most frequently mentioned image of Nevada, fares a little better at 0.66. Thus, neither of the most frequently mentioned images of Nevada received particularly high valences. Not surprisingly, nuclear images (with an average valence of -0.97) came in last, behind miscellaneous-negative images and prostitution/corruption (with an average valence of -0.68).

In combination, the frequencies and average valences for the image categories provide a summary of the mental sketches that people make of a place. By way of contrast, Figure 16 shows the frequencies of images, by category, elicited in response to the word "Colorado." Figure 17 shows the average valences for the images in each category.

A comparison of the image categories for Colorado and Nevada shows clearly that the image sets for different places can be quite distinct. For Colorado, natural characteristics of the state (mountains, wildlife, vistas, etc.) were mentioned most frequently by 92% of the respondents. Vacation images (about 57%) and Colorado cities (at 37%) were the next most frequently mentioned types of images.

As shown in Figure 17, the valences attached to Colorado's most frequently mentioned image categories were quite positive. The valence for Colorado's natural characteristics averaged 1.42 on the -2 to +2 scale, while that for Colorado vacation images averaged 1.45. The average valence for Colorado cities was 0.96. Thus, the composite pictures that people make from images of a place can vary substantially through combinations of image frequency and valence. The combination of attaching valences that are very positive to the Colorado images that are mentioned most often gives Colorado a very high rank among four states (Nevada, California, Colorado, and New Mexico) as a vacation destination. Of the Phoenix-area respondents, 51% ranked Colorado as their first choice as a vacation destination; only 6.7% ranked Nevada first.

These results provide strong evidence that to make sense of the relationship between images and vacation preferences, the broader image set for a place — including both frequencies and image valences — must be taken into account. It is not sufficient to focus exclusively on a particular kind of image within that image set.

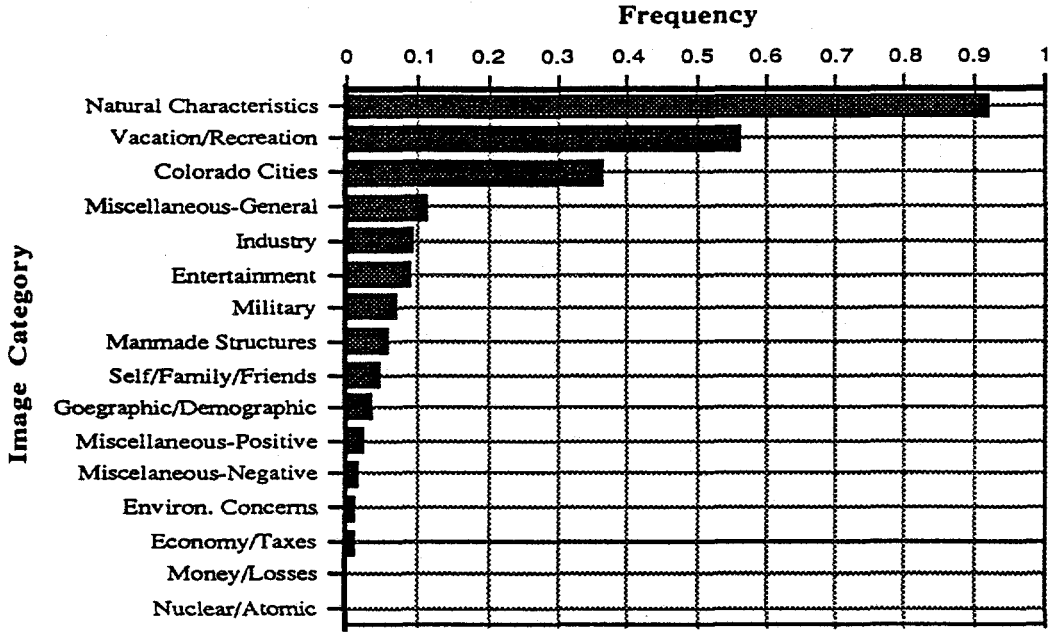

FIGURE 16 Colorado Image Frequencies

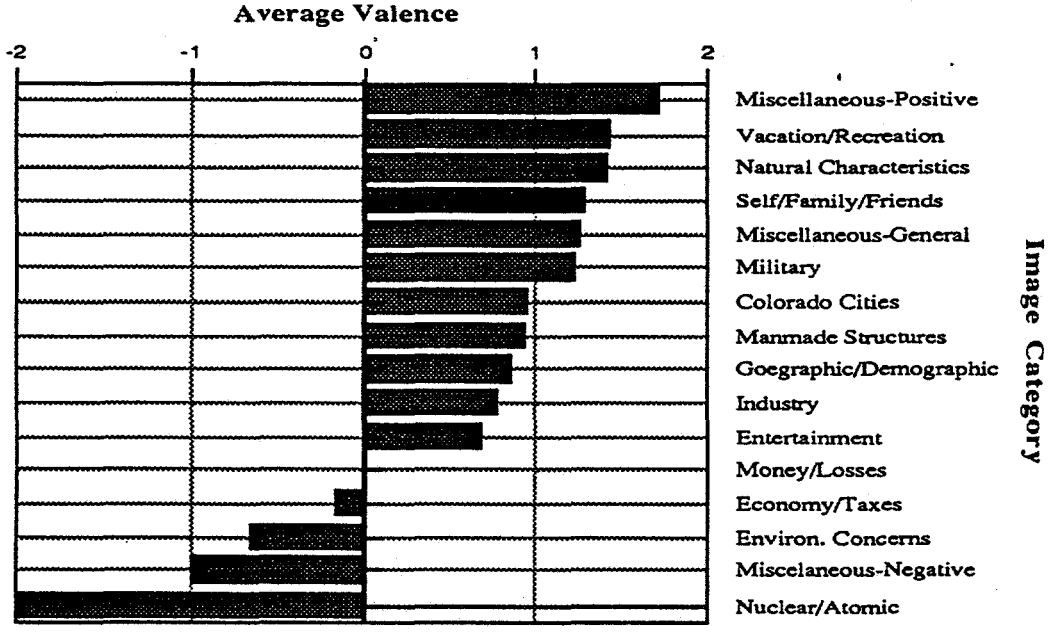

FIGURE 17 Colorado Image Valences

5.2 Relationships among Different Images of Nevada

The importance of characterizing the entire image set extends beyond the need to account for the relative importance and valuation of the images. Images may be related to one another in ways that can mute or magnify the effect of introducing new images into an image set for a place. For example, if the valence of the new image (e.g., nuclear waste) is strongly and positively correlated with existing images that are important components of a state's image set (e.g., gambling), the introduction of the new image will tend to reinforce existing perceptions of that state. The positive correlation means that those who already attach lower valences to the gambling image will also attach lower valences to the nuclear image, essentially buttressing an already negative view of the place. For those who had more positive views of gambling, the new nuclear images will also tend to be more positive — or at least less negative. If, on the other hand, there exists a strong negative correlation between the new image and prior important images, the introduction of the new salient image is likely to alter the individual's perceptions of the place. If the nuclear image is loathed (and hence carries negative valence) by those who like gambling (and give gambling high valences), the new image will have the greatest negative impact on precisely those people who previously had positive perceptions of the place.

Are there significant associations among the valences of images across the different Nevada image categories? For some image categories (e.g., the Nevada nuclear image category), the number of people having the image was quite small. This fact makes it very difficult to calculate meaningful correlations of these categories with other image valences. For example, only 58 of more than 1,000 respondents provided both a nuclear image and a gambling image. Since correlations with nuclear image valences are of particular importance, the valences for the images attached to a nuclear waste repository were used (since these were obtained from everyone) in lieu of nuclear images of Nevada. The use of the nuclear waste repository image valences as proxies appears to be justified because (1) there is a very strong correlation between the valences of the nuclear images of Nevada and those for a nuclear waste repository (as discussed in Section 3) and (2) the expected change in the Nevada image set is to come from the introduction of a nuclear waste repository.[35]

Table 14 shows the Pearson correlation coefficients, and the probabilities that these correlations occurred because of random chance, for the valences of the nuclear waste images and the Nevada image categories. Table 15 shows the correlation between the gambling image valences and the other Nevada image categories.

Table 14 shows that there are statistically significant correlations between the valences that people attach to images of a nuclear waste repository and the average valences of several of the Nevada image categories. The more positive (or less negative) the valences of the nuclear waste

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35 In fact, given the strong preponderance of references to nuclear weapons in the existing Nevada image set, using nuclear images of Nevada for this test may well bias the results, since the types of images that would result from the presence of a nuclear waste repository are not known but are being inferred.

TABLE 14 Correlation of Nuclear Waste Image Valences with Other Nevada Image Category Valences

Other Nevada Image Valence	Correlation	p-Value	No. of Responses
Gambling	0.23	<0.0001	626
Casino	0.11	0.2537	110
Prostitution/corruption	0.50	<0.0001	55
Economy/taxes	0.10	0.5433	43
Entertainment	0.38	0.0013	68
Industries	0.12	0.2655	88
Man-made structures	0.15	0.0449	175
Natural characteristics	0.14	0.0004	620
Cities	0.17	0.0001	475

TABLE 15 Correlation of Nevada Gambling Image Valences with Other Nevada Image Category Valences

Other Nevada Image Valences	Correlation	p-Value	No. of Responses
Casino	0.82	<0.0001	57
Prostitution/corruption	0.49	0.0005	46
Economy/taxes	0.57	0.0001	38
Entertainment	0.26	0.0431	60
Industries	0.18	0.1434	65
Man-made structures	0.21	0.0189	120
Natural characteristics	0.12	0.0162	418
Cities	0.56	<0.0001	261

images are, the more positive are the images in the categories of gambling, prostitution, entertainment, man-made structures, natural characteristics, or Nevada cities. These results suggest that should nuclear waste repository images be increasingly introduced into people's Nevada image sets, those who currently give lower valences to gambling, prostitution, and entertainment images will be the most likely to attach very negative valences to these nuclear images. Those who attach more positive valuation to gambling, prostitution, and entertainment images will give the nuclear images less negative valences.

More generally, associations across the valences of the different categories of Nevada images suggest that there is considerable structure within image sets. Rather than being independent of one another, the valences that are attached to images within particular categories

appear to be systematically related to valences attached to other image categories. For example, as shown in Table 15, the valences attached to gambling images are related to the valences of many of the other image sets. Those individuals who attach positive valences to gambling images also tend to attach more positive (or less negative) valences to images of casinos, prostitution or corruption, the Nevada economy, and Nevada's cities.

These results show that the patterns people follow when attaching values to the images they have about a place have considerable structure. Therefore, rather than to think of images of a place as isolated bits that independently influence people's general perceptions of that place, it makes more sense to think of them as parts of an interrelated set of images about a place. Furthermore, the valences that people currently attach to images in their image sets tells quite a lot about the values that they are likely to attach to new images about that place that might be introduced.

5.3 Relationship between Cultural Type and Nonnuclear Images of Nevada

This analysis has shown that there are systematic relationships among the valences attached to different kinds of images and that both the presence of nuclear images and the valences attached to them are influenced by cultural predispositions. Are the acquisition and valences of the other image categories influenced by these cultural predispositions as well? One test would be to assess whether valences of other images of Nevada that are correlated with the valences of nuclear waste repository images are also significantly influenced by the measures of cultural type. For illustrative purposes, the percentages of respondents expressing images in the categories of gambling, industry, and corruption/prostitution, broken out by grid/group cultural type, are shown in columns 1, 3, and 5 of Table 16. Columns 2, 4, and 6 show the average valences for these images, again broken out by cultural type.

Table 16 suggests that individualists and hierarchs attach higher valences to images of gambling than do egalitarians.[36] Egalitarians also appear to acquire (or express) Nevada images that fall in the industry category more frequently than do others ($p < 0.05$) and to attach substantially lower valences to these images than do the other cultural types ($p < 0.01$). Finally, egalitarians are two to three times more likely than individualists or hierarchs to have images of corruption or prostitution. Once such an image is acquired, however, it is the hierarchs who appear to give it the most negative valence.[37] These results suggest that general predispositions — like the cultural biases measured here — provide at least part of the basis for giving value to the range of images that people acquire about a place. This conclusion supports the general argument that cultural and ideological factors generally influence the acquisition and valuation of images, as discussed in Section 1.

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36 While not large, the effects of the cultural bias measures on gambling valences are statistically significant (p-value for a multivariate regression model is 0.0021).

37 This result is as the cultural theory would predict; hierarchs should perceive threats to social order — such as moral and economic corruption — to be among the most threatening.

TABLE 16 Frequency and Average Valences of Gambling, Industry, and Prostitution/Corruption Images According to Grid/Group Cultural Type

Grid/Group Cultural Type	Gambling %	Gambling Average Valence	Industry %	Industry Average Valence	Prostitution/ Corruption %	Prostitution/ Corruption Average Valence
Hierarch	67	+0.44	9	+1.00	4	-1.13
Individualist	66	+0.45	10	+1.12	6	-0.61
Egalitarian	73	+0.28	15	-0.09	12	-0.33
Other/mixed	67	+0.36	7	+0.50	6	-0.75

5.4 Unique Aspects of Nuclear Images

Thus far, this analysis has shown that images of a state and their valences tend to be systematically related to one another and that these relationships may result from more general cultural (or other) predispositions. For that reason, examining a particular type of image outside the context of how that image fits into the larger image set for a place is unlikely to provide a reasonable basis for assessing the impact of that image on overall perceptions of that place. However, a particular type of image might have unique properties that make that image particularly damaging. In that case, introduction of that image might lead to a serious change in attitude toward a place (and change vacation preferences), regardless of its relationship with other images. Nuclear images might have such a property.

Do nuclear images of Nevada carry more punch (i.e., have more weight or importance) than other images? Suppose that nuclear images are indeed uniquely repulsive to large numbers of people. Individuals who have such an image would be expected to give it a lower average valence than they would give other categories of images, as was shown earlier. Because of the special nature of the image (its unusual repulsiveness), the valences attached to it might be expected to have a greater weight than other run-of-the-mill images in shaping overall preferences for vacationing in Nevada. Thus, some people might give other images very negative valence scores, but they would not have as much effect as would nuclear images on preferences for vacationing in Nevada.

If a particular category of images has a consistent and unusually powerful influence on vacation preferences, its presence should have an effect above and beyond the average effect of the valence scores for the entire image set (which treats the valences from all kinds of image categories as equivalent). Such an effect might look something like the relationship depicted in Figure 18, in which the relationship between overall image scores of Nevada are shown for two groups. The first (top) line represents individuals who do not have an image from the hypothesized "special"

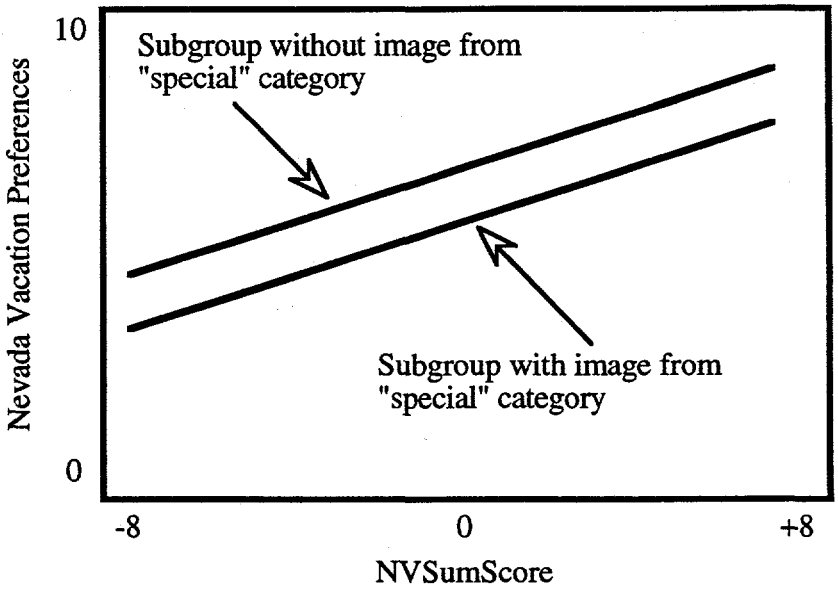

FIGURE 18 Hypothetical Effect of a "Unique" Negative Image Category on Preferences for Vacationing in Nevada

category. The second (bottom) group does have an image from the special category. For both groups, there is a positive association between the sum of the image valence scores and vacation preferences for Nevada. Because of the presence of the special image, however, the latter group has a lower overall preference for vacationing in Nevada, even when the image scores are the same. Such an image, if it became widespread, would clearly contribute to the stigmatization of Nevada, quite independently of its correlation with other kinds of images.

The appropriate test for such an effect is a linear regression model that would predict Nevada vacation preferences by using the following predictor variables: (1) the overall sum of the image valence scores for each individual and (2) individual dichotomous variables indicating whether a nuclear image was present (value of 1) or not present (value of zero) (referred to as "nuclear"). Such a model, including a dichotomous variable indicating the presence or absence of a nuclear image, is shown in Table 17.[38]

Table 17 indicates that nuclear images have no special influence beyond the normal weight of the valences attached to the image. The effect of having a nuclear image, once the sum of the image valences is controlled for, is statistically indistinguishable from zero. Thus, when evaluating the effect of a nuclear image of Nevada on vacation preferences, one would find no unique effect from this particular type of image. A negative nuclear image appears to have the same weight as would a negative gambling image. In other words, because no special weight is attached to a nuclear image valence, a negative nuclear image can be offset by a positive valence attached to an image of some other category.

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38 For a technical discussion of this type of modeling, see Kmenta (1971, pp. 409-425).

TABLE 17 Modeling Potential Unique Effects of Nevada Image Categories

Regression Summary
VacNV vs. 2 Independents

Number	990
Number missing	14
R	0.52
R squared	0.27
Adjusted R squared	0.27
RMS residual	2.17

Parameter	Coefficient	Standard Error	Standard Coefficient	t-Value	p-Value
Intercept	4.52	0.09	4.52	51.26	<0.0001
NVSumScore	0.43	0.02	0.52	18.72	<0.0001
Nuclear	0.23	0.24	0.03	0.97	0.3324

It is possible, however, that it is only negative nuclear images of Nevada that carry particular weight and that their effect is diluted by inclusion of the positive images in the nuclear variable calculated above.[39] To test this hypothesis, a second model was run in which nuclear images of Nevada were coded into two separate variables. In one, only neutral or positive values attached to nuclear images were coded as a value of 1, and all else was coded as zero. In the second, only negative nuclear images of Nevada were coded as 1, and all else was coded as zero. These two "dummy" variables, along with NVSumScore, were run as predictors of vacation preferences for Nevada (VacNV). The results indicate that both negative and positive nuclear images matter, with roughly equal weight, but in opposite directions. Thus, the results indicate that no disproportionate weight is attached to the negative nuclear images of Nevada.

These results should not be taken to suggest that nuclear images have no effect on, or are unimportant with regard to, Nevada vacation preferences. In fact, as shown in Section 4, nuclear images do make a difference: people with nuclear images of Nevada tend to have lower preferences for vacationing in Nevada. What the results do indicate is that, aside from their valences, these images do not have any unique effects on vacation preferences. Nuclear images do not appear to contaminate the entire image sets, nor do they override the valences attached to other images. Except for their lower-than-average valence scores, these images appear to have the same kinds of effects as any other images; a negative nuclear image is no more weighty than a negative image of gambling or of a Nevada city.

39 I am grateful to Howard Kunreuther for suggesting this alternative hypothesis.

5.5 Implications

The analysis in this section has shown that it is important to understand the roles of images of a place within the context of the larger image set attached to that place. First, the categories of images held about a place indicate the mental sketches that people make of a place and the different values that people attach to the different types of images of that place. Different places are accorded images at quite different frequencies with quite different valences across image categories. The effect of any specific kind of image — particularly if it is relatively infrequently held — must be evaluated in light of the frequencies and valences of the other categories of images attached to that place. Furthermore, the valences of images tend to be systematically associated across different kinds of categories. For Nevada, valences of images of a nuclear waste repository were positively correlated with those of gambling, entertainment, and others. This result means that those who give gambling and entertainment images more positive valences also tend to give nuclear waste repository images more positive (or less negative) images. Thus, those who would attach the most negative valences to images of a nuclear waste repository in Nevada are also likely to be those who would least attracted to Nevada for gambling and entertainment.

This section also found that images for gambling are related to cultural bias measures. Strong fatalists and individualists give higher valences to gambling, and egalitarians give lower valences to gambling. Given that egalitarians also give the lowest valences to the nuclear images, general predispositions like cultural biases appear to be affecting differences in the valences of both gambling and nuclear images, as hypothesized in Section 1. Thus, it should not be surprising that those who have negative nuclear images of Nevada have a low regard for vacationing in Nevada if that low regard stems from a cultural bias that also predisposes them toward having a poor view of gambling.

This section also tested for the possibility that nuclear images are special (i.e., that they carry a specially stigmatizing effect beyond the valences attached to them). Tests found no evidence for such an effect, indicating that nuclear images have no greater weight than other kinds of images. A negative image of gambling — as reflected by a low valence score — appears to have just as negative an effect on vacation preferences for Nevada as does a negative nuclear image. Thus, to make sense of the effects of nuclear images on a place, these images must be understood as part of a broader set of images to which they are systematically related.

6 Images and Hazardous Facility Siting

This report has presented the results of a series of tests of hypotheses that bear on the ways in which people's images of a place — nuclear images in particular — might be related to their vacation preferences. Beginning with the pioneering work of Slovic et al. (1991a,b), the report has explored the process by which people acquire images about a place and give value to them. The particular concerns have been who is most likely to acquire nuclear images about a place, how image valences are related to vacation preferences, and how valences are attached to nuclear images. More generally, the analysis has sought to explain how particular images fit into the broader image sets that individuals have about a place, how they are associated with other images, and what kind of framework underlies those associations.

6.1 Summary of Research Findings

The more important findings reported in the preceding sections are as follows:

- Some types of people are more likely to acquire nuclear images of Nevada than others. Those who score high on the egalitarian cultural bias measure, identify themselves as liberals, or have postmaterialist values are significantly more likely to have nuclear images. Conservatives, materialists, and those who score high on the hierarch cultural bias measure are less likely to have nuclear images.

- The results confirmed the findings of Slovic et al. (1991a,b), which conclude that the valences attached to images about a place are very strong predictors of vacation preferences for that place. Thus, the more positive the valences of one's images about a place are, the more likely it is that one will want to vacation there.

- The valence scores people attach to images of a "high-level nuclear waste repository" appear to be reasonably valid measures of the positive and negative images that they have about a waste repository.

- Despite the implication of some scholars (e.g., Weart 1988) that nuclear imagery is overwhelmingly dread-filled, the valences that people attach to nuclear images of nuclear facilities have considerable variation, ranging from quite positive to quite negative. On average, valences attached to images of a nuclear waste repository were negative; however, more than 30% of the respondents in Phoenix and in a nationwide survey had sets of images that were positive.

- The valences that people attach to nuclear images are related to their cultural and ideological predispositions. Egalitarians and self-described liberals tend to have

more negative nuclear image valences. Conservatives and fatalists tend to have more positive ones.

- Nuclear images are part of an interrelated set of images about Nevada, and the valences of nuclear images are correlated with the valences of other Nevada image categories. Those people having more negative valences for nuclear images also tend to have more negative valences for images of gambling, prostitution, and entertainment.

- Valences for nuclear, gambling, and other images appear to be influenced by cultural biases. Egalitarians tend to attach more negative valences to both gambling and nuclear images. Individualists and fatalists attach more positive valences to them.

- Nuclear images appear to have no unique effect when compared with other images. Valences attached to nuclear images carry no more weight in explaining vacation preferences than do the valences attached to other images, on average.

Taken as a whole, these findings suggest that the stigma model developed by Slovic et al. (1991a,b) should be revised and elaborated.

6.2 Revised Stigma Model

The stigma model presented in Slovic et al. (1991b) suggests that if a high-level nuclear waste repository were to be built in Nevada, the process of social amplification of risk would probably lead to increasing numbers of people having nuclear images of Nevada. These images would presumably be widely distributed and about equally likely to be held by people who are attracted to Nevada as a place to vacation and those who are not. These images would be overwhelmingly negative. The negative images would reduce people's preferences for vacationing in Nevada and ultimately alter behavior, because fewer people would vacation, relocate, and retire in Nevada.

The findings presented here suggest that the stigma model should be revised to account for exactly who gets the images and how they attach valences to them. If certain people are more receptive to nuclear images and others are more resistant, nuclear images are more likely to enter the image sets of and become salient for certain types of people. Those with an egalitarian cultural bias or who hold postmaterialist values are more likely to acquire nuclear images, while those with hierarchical cultural biases are significantly less likely to acquire such images. If, as Inglehart (1990) argues, postmaterialists are less concerned about material things and the trappings of material society, it may be that those who are most likely to acquire nuclear images of Nevada are also those who are less likely to be attracted by Nevada's gaming industry. This situation appears

to be true, since postmaterialists and self-designated liberals tend to have lower preferences for visiting Nevada than other types of people (as shown in Table 8).

Beyond image acquisition, the model should be elaborated to specifically address the processes by which valences are attached to images. This analysis has shown that the valences of both nuclear images and gambling are significantly affected by broader predispositions such as a person's ideology and culture. These predispositions seem to act as filters that lend particular value to images, depending on how they are related to the predispositions. For example, egalitarians tend to attach more negative valences to images of both gambling and nuclear waste repositories. Thus, negative nuclear images and less willingness to vacation in Nevada may both be influenced by a broader predisposition that also encompasses a more negative view of gambling. By looking simply at nuclear images and their relationship to vacation preferences, one risks identifying a relationship that is at least partly spurious.

The results of the analysis support a model of imagery and stigma that looks more like the revised model depicted in Figure 1. A person's broad predispositions, including (but not limited to) his or her ideology and cultural type, tend to make the individual attracted to or repelled from different kinds of signals that are encountered, so the person will exclude some and accept others for inclusion in his or her image sets. Once the images are acquired, the predispositions act to give differential salience and valences to images, which affects how the images shape overall views of a place and vacation preferences. Such a model would explicitly account for the different propensity for certain types of images to be present in the image sets of different individuals and for the images to have systematically different values.

6.3 Importance of Prior Image Sets

The revised model of imagery and stigma should also specifically account for the importance of the sets of images that exist prior to the introduction of the potentially stigmatizing image. As shown in Section 5, the values of images are related to one another in systematic ways. If a new negative image is widely introduced into people's image sets of a place, the effect of that image on activities such as vacationing, relocating, and retiring will in part depend on how the new image is associated with images in the preexisting image sets. If the new image (e.g., a nuclear image) is negatively associated with the valences of images that previously had served to attract people to the place (e.g., a pristine environment), the nuclear image will lead to greatest reduction in vacation preferences among precisely those people who used to be most attracted to the place. The wide dispersion of such an image might well result in a stigmatization among those people who used to be attracted to that place. On the other hand, if the new image (e.g., a nuclear image) is positively associated with the valences of those images that previously had attracted people to the place (e.g., gambling), the nuclear image will be most positive (or least negative) to those who are most likely to vacation in that place. Those who were least likely to vacation in the place before (those who assigned negative valences to gambling) are the ones for whom the new images will be most negative. In that case, people who did not want to vacation there before will now want to vacation there even less.

The point is that new images are likely to be related in systematic ways to the images already in the image sets associated with a place. The actual effect of those images will largely depend on how they are related. Thus, the revised model of imagery and stigma should direct attention to the characteristics of the prior image sets attached to a place — particularly among those previously attracted to the place in question — and to the ways in which the new image is likely to be related to those already in the image set.

To summarize, while the recent work on imagery and stigma has been both path-breaking and important, the model of the process by which new signals may become negative images that can stigmatize a place should be revised. The revisions recommended here are intended to permit more adequate assessments and comparisons of some of the social and economic impacts that might result from siting a wide range of controversial and potentially hazardous facilities in states (or communities) that are potential hosts for those facilities. The premise of these revisions, supported by the data analyzed here, is that it is critical to understand something about the people who will potentially acquire the image, the kinds of images that previously attracted people to the host state, and the potential interactions between the old and (potential) new images of the place.

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Appendix A:

Survey Questionnaire

1. (1,2,3)[1] Are you the individual at least 18 years of age who had the most recent birthday?
1 That's me
2 I'll get him/her

2. (1,2,3) We're conducting a survey of American households concerning important environmental issues. If you have a few minutes, I would like to ask you some questions.

3. (1,2,3) The first few questions involve word association. I will give you a topic and ask you to tell me the first word or image that comes to mind. For example, I might say "education," to which you might respond "student," "learning," or "books." Today I am interested in the first four words or images that come to mind when you hear the name of a particular state.[2]

4. (1,2) Think about [USE FIRST STATE LISTED BELOW] for a moment — when you think about [USE FIRST STATE], what is the first word or image that comes to mind?
What is the next word or image you have when I say [FIRST STATE]
[FIRST STATE] Your next word or image?
[FIRST STATE] ?
[CONTINUE THE GAME USING THE ORDER OF STATES SHOWN BELOW][3]
1 Nevada
2 Colorado
3 New Mexico

5. (1,2) Next, I want to return to the words you associated with the three (two) states to be sure that I understand them. When I say your word, please tell me how it relates to your overall image of the state.
Let's begin with the words you gave me for [FIRST STATE]
The [FIRST] word or image you listed was [FIRST IMAGE FOR FIRST STATE]. Please tell me how this word or image relates to your overall view of [FIRST STATE]. Would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

6. (1,2) Now consider the words you gave me for [SECOND/(THIRD) STATE].
The [FIRST] word or image you listed was [FIRST IMAGE FOR SECOND/(THIRD) STATE]. Please tell me how this word or image relates to your overall view of [SECOND/(THIRD) STATE]. Would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

7. (1) Now think about the importance of the association between Nevada and [THEIR FIRST WORD OR IMAGE FOR NEVADA]. Would you say this association is very important, somewhat important, slightly important, or not at all important?

8. (1) Continuing with the word associations, think about a nuclear power plant for a moment — when you think about a nuclear power plant, what is the first word or image that comes to mind?

9. (1) What is the next word or image you have when I say a nuclear power plant?

10. (1) A nuclear power plant - Your next word or image? [IMAGE #3]

11. (1) A nuclear power plant? [IMAGE #4]

12. (1,2,3) Now think about a high-level nuclear waste storage facility for a moment — when you think about a high-level nuclear waste storage facility, what is the first word or image that comes to mind?[4]

13. (1,2,3) What is the next word or image you have when I say a high-level nuclear waste storage facility?

14. (1,2,3) A high-level nuclear waste storage facility — Your next word or image? [IMAGE #3]

15. (1,2,3) A high-level nuclear waste storage facility? [IMAGE #4]

16. (1) Next, I want to return to the words you associated with the two facilities to be sure that I understand them. When I say your word, please tell me how it relates to your overall image of the facility.

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[1] The numbers in parentheses indicate the survey(s) in which the question is found. 1 = Arizona long, 2 = Arizona short, and 3 = national.

[2] In the national survey, the question read: " . . . Today I am interested in the first four words or images that come to mind when you hear the name of a particular topic."

[3] In the Arizona short survey, images were elicited for only Nevada and New Mexico.

[4] In the national survey, the question used the term "repository" rather than "storage facility."

Let's begin with the words you gave me for nuclear power plant.

The first word or image you listed was «q7:2». Please tell me how this word or image relates to your overall view of a nuclear power plant. Would you say it is very positive [good], somewhat positive [good], neutral, somewhat negative [bad], or very negative [bad]?

17. (1) The second word or image you gave me was «q8:2». Concerning a nuclear power plant, would you say it is very positive [good], somewhat positive [good], neutral, somewhat negative [bad], or very negative [bad]?

18. (1) Your third word or image was «q9:2». Concerning a nuclear power plant, would you say it is very positive [good], somewhat positive [good], neutral, somewhat negative [bad], or very negative [bad]?

19. (1) Your final word or image concerning a nuclear power plant is «q10:2», would you say it is very positive [good], somewhat positive [good], neutral, somewhat negative [bad], or very negative [bad]?

20. (1,2.3) Now, reconsider the words or images you gave me for high-level nuclear waste storage facility. The first word or image you listed was «q11:2». Please tell me how this word or image relates to your overall view of high-level nuclear waste storage facility. Would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

21. (1,2,3) The second word or image you gave me was «q12:2». Concerning high-level nuclear waste storage facility, would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

22. (1,2,3) Your third word or image was «q13:2». Concerning high-level nuclear waste storage facility, would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

23. (1,2,3) Your final word or image concerning high-level nuclear waste storage facility is «q14:2», would you say it is very positive, somewhat positive, neutral, somewhat negative, or very negative?

24. (1,2,3) In the past year, have you voiced your opinion about government policies by contacting any state or federal public official whether by phone, mail, or in person?

25. (1,2,3) In the past year, have you participated in any demonstrations or protests in an attempt to influence public policy?

26. (1,2) We'd like to get your opinions about a short list of states in which many people take vacations. Assuming that there were no significant differences in the cost of the trip, please tell me how attractive each state is to you as a place to vacation. Please use a scale where ten means extremely attractive, zero means not at all attractive, and you can pick any point in between. [Random order for following four questions]

27. (1,2) Nevada

28. (1,2) New Mexico

29. (1) Colorado

30. (1) California

31. (1) Now, I'd like to get your impressions about the people who operate nuclear power plants in the United States, and in particular how competent they are in doing their jobs. On a scale of ten to zero, where ten is completely competent, zero is completely incompetent, and you can pick any point in between, on average, how competent are the operators of nuclear power plants?

32. (1) When the people who operate nuclear power plants make statements about the performance and safety of their plants, how believable do you think those statements are? On a scale of ten to zero, where ten is completely believable, zero is not at all believable, and you can pick any point in between, how believable are these plant operators?

33. (1) In general, when the people who operate nuclear power plants make decisions about how to run their plants, to what extent do you think they are concerned about human and environmental safety? On a scale of ten to zero, where ten means the operators of these plants are always concerned about human and environmental safety, zero means they are never concerned about human and environmental safety, and you can pick any point in between, where do you place your view

34. (1) Now think about the people in federal government agencies who regulate the nuclear industry in the U.S. And in particular — how competent they are doing their jobs. On a scale of ten to zero, where ten is completely competent, zero is completely incompetent, and you can pick any point in between, on average how competent do you believe the federal regulators are?

35. (1) When the people from government agencies who regulate the nuclear industry make statements about the performance and safety of nuclear power, how believable do you think those statements are? On a scale of ten to zero, where ten is completely believable,

zero is not at all believable, and you can pick any point in between, how believable are statements of these regulators about the safety of nuclear power?

36. (1) In general, when the people in government agencies who regulate the nuclear industry make decisions about how nuclear power plants should be run, do you think they worry primarily about human and environmental safety or do they worry primarily about other issues? On a scale of ten to zero, where ten means the plant regulators are exclusively concerned about human and environmental safety, zero means they are not at all concerned about human and environmental safety, and you can pick any point in between, where do you place your view?

37. (1,2,3) For each of the following statements, please tell me if you agree strongly, agree, disagree, or disagree strongly.

[RANDOM ORDERING OF QUESTIONS AT THIS POINT]

38. (1,2,3) Regardless of the qualities and faults of one's parents, one should support them in their old age.

39. (1,2,3) One of the problems with people today is that they challenge authority too often.

40. (1,2,3) The best way to provide for future generations is to preserve our customs and heritage.

41. (1,2,3) Everyone should have an equal chance to succeed or fail without government interference.

42. (1,2,3) Our laws should not create special advantages or disadvantages for anyone for any reason.

43. (1,2,3) If people have the vision and ability to acquire property, they ought to be allowed to enjoy it.

44. (1,2,3) It would be foolish to make serious plans in such an uncertain world.

45. (1,2,3) Cooperation with others rarely works.

46. (1,2,3) It seems that whomever you vote for, things go on pretty much the same.

47. (1,2,3) What this world needs is a fairness revolution to make the distribution of goods more equal.

48. (1,2,3) I support a tax shift so that the burden falls more heavily on corporations and persons with large incomes.

49. (1,2,3) Big corporations are responsible for most of the problems in the world.

50. (1,2,3) It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes.

51. (1,2,3) Now I'd like your view of the safety of the technologies used in certain activities. Assuming that the people who use these technologies are well trained and competent, please rate each of the following on a scale from ten to zero, where ten is completely safe, zero is completely unsafe, and you can pick any point in between:

[RANDOM ORDERING OF QUESTIONS AT THIS POINT]

52. (1,2,3) Genetic engineering

53. (1,2,3) Transportation of nuclear wastes

54. (1,2,3) Coal-powered electricity generation

55. (1,2,3) Nuclear-powered electricity generation

56. (1,2,3) Nuclear waste disposal

57. (1,2,3) Nuclear weapons testing

58. (1,2,3) Garbage disposal in a landfill

59. (1,2,3) Like any country, the U.S. must strive to achieve many goals at the same time. Among the following, which do you think is the most important goal that the U.S. should pursue for the next few years?

1 Maintaining order in the nation
2 Giving the people more say in important government decisions
3 Fighting rising prices
4 Protecting freedom of speech
5 Don't know or no answer (DK/NA)

60. (1,2,3) Which is the second most important?

1 Maintaining order in the nation
2 Giving the people more say in important government decisions
3 Fighting rising prices
4 Protecting freedom of speech
5 DK/NA

61. (1,2) For the next series of statements, think about how you usually do things in your household. Please tell me if you agree strongly, agree, disagree, or disagree strongly.

62. (1,2) We rarely have formal parties or dinners.

63. (1,2) We use products that are biodegradable even if they cost more.

64. (1,2) We always recycle newspapers, bottles, and cans.

65. (1,2) Most of our meals are vegetarian.

66. (1,2) We avoid products made by oppressive institutions.

67. (1,2) We sometimes boycott products from certain countries.

68. (1,2) We prefer simple and unprocessed foods.

69. (1,2) Now think of the four states — Nevada, California, New Mexico, and Colorado. Suppose you were going to spend two or more days vacationing sometime over the next year. Assume that transportation costs are no problem. Which one of these states would be your first choice?

1 Nevada
2 California
3 New Mexico
4 Colorado
-9 DK/NA

70. (1,2) Which of these states would be your second choice?

71. (1,2) Your third choice?

72. (1,2) [INTERVIEWER ENTER THE REMAINING STATE]

73. (1,2) Have you spent two or more days vacationing in Nevada during the past five years?

74. (1) Have you spent two or more days vacationing in Colorado during the past five years?

75. (1,2) Have you spent two or more days vacationing in New Mexico during the past five years?

76. (1) Have you spent two or more days vacationing in California during the past five years?

77. (1,2) Have you ever lived in Nevada?

78. (1) Have you ever lived in Colorado?

79. (1,2) Have you ever lived in New Mexico?

80. (1) Have you ever lived in California?

81. (1,2,3) On a five-point scale, where one is complete federal government control and five is complete state government control, how do you think control over the following policy areas should be distributed:

82. (1,2,3) Environmental policy

83. (1,2,3) Economic policy

84. (1,2,3) The siting of a high-level nuclear waste repository

85. (1,2,3) Some people believe that man-made problems have put us on the brink of environmental crisis where it will be impossible for humans to survive as we have in the past. Others believe these fears are overstated and we are not in serious environmental danger. On a five-point scale where one means we are on the brink of a serious environmental disaster and five means that environmental danger is slight, where do you place your views?

86. (1,2,3) Some people believe that the government already imposes too many environmental restrictions on individuals and businesses. Others believe that more environmental restrictions are necessary. What is your opinion? On a five-point scale, if one is need a lot less restrictions and five is need a lot more restrictions, where would you place your views?

87. (1,2,3) Next, we'd like to know how serious you believe the effects of mankind are on nature. For each of the following statements, please tell me if you agree strongly, agree, disagree, or disagree strongly.

88. (1,2,3) The environment is very FLEXIBLE, and will probably bounce back from any harm caused by people.

89. (1,2,3) With expert management, we can have economic growth WITHOUT environmental problems.

90. (1,2,3) The environment is very FRAGILE, and the SLIGHTEST human interference will result in major disaster.

91. (1,2,3) No matter what we do, the environment will change in unpredictable ways both for the better and the worse.

92. (1,2,3) In your view, should the U.S. increase the amount of electricity produced by nuclear power plants, keep it at its current level, decrease it, or stop it altogether?

93. (1,2,3) Suppose that the federal government has determined that an area within 100 miles of your community would be a reasonably safe location for a nuclear waste storage facility. How would you feel about this? Would you strongly support, support, be neutral, oppose, or strongly oppose locating a nuclear waste storage facility within 100 miles of your community?

94. (1,2,3) How much education have you had?

95. (1,2,3) What was your academic field of study in college?

96. (1,2,3) How old are you?

97. (1,2,3) Concerning your marital status, are you:
1 Married
2 Single
3 Divorced
4 Other

98. (1,2,3) Concerning your racial or ethnic background, do you consider yourself:
1 White - Non Hispanic
2 African American
3 Hispanic or Mexican American
4 American Indian
5 Asian, or
6 Something else
–8 Refused
–9 DK/NA

99. (1,2,3) With which political party do you identify?
1 Democrat
2 Republican
3 Other party
–8 None/Independent
–9 DK/NA

100. (1,2,3) Do you completely identify, somewhat identify, or slightly identify with that political party?

101. (1,2,3) On a scale of political ideology, individuals can be arranged from strongly liberal to strongly conservative. I will read you all of the points on the scale. In terms of your own political ideology, where do you place yourself? Are you:
1 Strongly liberal
2 Liberal
3 Slightly liberal
4 Moderate
5 Slightly conservative
6 Conservative, or
7 Strongly conservative
–9 DK/NA

102. (1,2,3) Are you currently registered to vote?

103. (1,2,3) Did you vote in the 1992 Presidential election?

104. (1,2,3) Including yourself, how many people currently reside within your household?

105. (1,2,3) How many of those people are 18 or older?

106. (1,2,3) How many different residential phone lines do you have in your house? By this we mean phones with different numbers. Do not include business lines in your home.

107. (1,2,3) Concerning the ESTIMATED GROSS ANNUAL INCOME for your HOUSEHOLD for the PAST YEAR — meaning the income BEFORE taxes were taken out — was it greater than or less than $30,000?
1 Less than $30,000
2 More than $30,000
–9 DK/NA

108. (1,2,3) I'm going to read you some broad income categories. Please stop me when I get to the one which includes the ESTIMATED GROSS ANNUAL INCOME for your HOUSEHOLD.
1 Less than $5,000
2 $5,000-10,000
3 $10,000-15,000
4 $15,000-20,000
5 $20,000-25,000
6 $25,000-30,000
–9 DK/NA

109. (1,2,3) I'm going to read you some broad income categories. Please stop me when I get to the one which includes the ESTIMATED GROSS ANNUAL INCOME for your HOUSEHOLD.
1 $30,000-35,000
2 $35,000-40,000
3 $40,000-45,000
4 $45,000-50,000
5 $50,000-55,000
6 $55,000-60,000
7 $60,000-65,000
8 $65,000-70,000
9 $70,000-75,000
10 $75,000-80,000
11 $80,000-85,000
12 $85,000-90,000
13 $90,000-95,000
14 $95,000-100,000
15 More than $100,000
–9 DK/NA

110. (1,2,3) Gender of the respondent
1 Male
0 Female

Appendix B:

Survey Administration and Response Rate

The survey was conducted by the Survey Research Center (SRC) at the University of New Mexico. The survey was implemented on the SRC's computer-assisted telephone interviewing (CATI) system between December 1992 and January 1993. The survey response rates, as recorded by the CATI system, were as follows:

A. Phoenix-Area Surveys

1. Cooperation rate: 1013/1866 = 54.3%

2. Unscreened refusal rate: 1013/3683 = 27.5%

3. Overall rate: 1013/4867 = 20.8%

B. National Survey

1. Cooperation rate: 813/1143 = 71.1%

2. Unscreened refusal rate: 813/2381 = 34.1%

3. Overall rate: 813/3108 = 26.2%

Appendix C:

Nevada Image Categories

Atomic/Nuclear
atomic bomb(s) (testing)
atomic energy testing sites
atomic test sites
atomic testing
atomic testing ground
bomb test(ing)
good place for an atomic waste dump
government testing
nuclear
nuclear bomb(s)
nuclear fallout
(the) nuclear plant
nuclear power
nuclear research
nuclear silos
nuclear test range
nuclear test(ing)/tests (site(s))
nuclear testing grounds
nuclear waste (site)
proving ground
test site for atomic bombs during WWII
test(ing) site(s)
testing
testing ground(s)
the Nevada Test Site
the nuclear dumpsite
underground nuclear
uranium
weapons testing
Yucca Mountain High-Level Nuclear Waste Repository

Casinos
Casino(s)
Circus Circus
Flamingo
Gold Nugget
MGM Casino
MGM Grand
Mirage
Mirage Casino
Mirage Hotel
Riviera

Corruption/Prostitution/Crime
cat houses
corrupt
corruption
crime
crooks
decadent
deception
drugs
drugs and alcohol
drunk
hookers
lawlessness
legal bordellos
Mafia
organized crime
pornography
prostitute(s)
(legalized/illegal) prostitution

Economy/Taxes
booming
business
business opportunities
cheaper utility bills
commercial
commercials in gambling
employment
everybody's going there for work
expanding
fast growing
good economy
good money from gambling and taxes
higher wages
jobs
low income tax

lower taxes
no property tax
no (state) income tax(es)
no tax(es)
rich
shopping
state tax
tax free
taxpayers don't pay taxes
working

Entertainment/Celebrities
boxing
car shows
celebrities
conventions
dancing girls
drinking
drinks
Elvis
entertainment/entertainers
excitement of shows
floor show(s)
good shows
liquor
Mike Tyson
movie stars
night club(s) (shows)
night life
parades
partying
performers
rodeos
show business
show girls
shows
shows/stars
tournaments
UNLV basketball
Wayne Newton

Environmental Concerns
image
air pollution
air quality
dumping toxic waste
environmentalist
land is being redone for vegetation growth
litter
pollution
waste disposal
water conservation

Gambling
bingo
black jack
craps
easy gambling
gambling
gambling is wrong
gambling state
gambling/casinos
gaming
main attraction is gambling
numbers
poker
poker tables
roulette wheels
slots/slot machine(s)

Demographic and Geographic Characteristics
a less highly populated state in our country
a lot of people
a pointy bottom corner, shape of the state
adjacent to Arizona
Arizona border
Boulder (City)
Bryce or Zion
California
close (by)
close to Arizona
Colorado
far (away)
Four Corners
Grand Canyon
growing population
Henderson, Colorado
least populated state

long drive
lots of people
low population(s)
map image of the state
near Arizona
near(by)
neighboring state
north of Arizona
not very populated
overpopulated
picture of (the) state (on a map)
populated state
really populated
Salt Lake
Salt Lake City
shape (of state)
small population (st)
southwest
scarcely/sparsely populated
square
(a) state
state in the west
the actual shape of it
the sixth largest state
the wild west
thinly populated
unpopulated
Utah
(the) west
west of Arizona
western
western state
western United States

Industry
cattlemen
cheap hotel room
cheap hotels
construction
farming
gold
gold (and copper) mining
gold nuggets
gold prospecting
hotel(s)
hotels and shows
ranches
metal mining
minerals and mining
mines
mining
oil
past mining
potatoes
raise a lot of cattle
sheep
silver
silver mines
(the) silver state
tourism
tourists

Man-made Characteristics
barren freeway
big dam
big/large hotels
big lights
big neon signs
Boulder Dam
chapels
concrete
(a)/(the) dam(s)
highways
Hoover Dam
Hoover Dam, Lake Mead
incline village
Las Vegas strip
Latter-Day Saint Temple
LDS temple
(the) (bright) light(s) (over Las Vegas)
light bulbs
lights glitter
limo
(the) London Bridge
long (barren) highway(s)
long streets
Mormon temple
Neiman Marcus
neon
neon lights

power and electric
road(s)
tall buildings
temple
the chapel
the lights of Las Vegas
the strip

Marriage/Divorce
divorce
eloping
marriage
married there
place you get divorces
quickie divorces
wedding

Military/Weapons/Weapons Tests
air force (base(s))
bomb
bombing
Edwards Air Force Base
Ellis Air Force Base
Metals Air Force Base
military
missile testing
missiles
Nellis Air Force Base
warheads

Miscellaneous
alkaline
all night
ancestors
area 91
better the roads
Bonanza
blasts
bonanza
bright
busy
busy cities
cheap rooms
cowboy(s)
cowboy hat
easy access
education
electricity
ellili
extravagance
fallon
fast life
food
ghost town
glamour
glitter
glitz(y)
growth
history
home
(Indian) reservation(s)
Indians
infected actor
Jar Beach
least developed states
license
lots of electricity
moon
moonscape
Mormon(s)
motorcycles/ing
neo tech
Nevada
no hotel rooms
not close enough
older people
open
open state
people
people staying up all night
pioneer
quiet
rural
schools
semma
seminars
silver dollars
simple life
singing

smokey/smoking
stark
stars
the homosexual issue
the stand
(the) university
time
transient
turtle problems
UFOs
union
University of Las Vegas
University of Nevada
UNLV
urban sprawl
vestly music
way off
western attire
what's it like
women
yu(c)k

Miscellaneous-Negative
bad
bad memories
breakdown
cold people
congested/congestion
crass
crowded
crowds
dirty
dirty and dusty
don't like it
don't want to live ([go] there)
dreary state
dull
fake
hurry
lost on freeway
misery
not desirable
overindulgence
sadness
scums
too many lights
too much neon
ugly
violence
waste
wasteland

Miscellaneous-Positive
clean
energetic people
enjoyment
excitement of strip
free country
freedom
friendly
(more) fun
good food
good livable conditions
good time
nice
peaceful
pretty girls
progress
progressive
warm hospitality

Money/Losses/Financial Loss
bankruptcy
blowing all your money
broke
debt
losing (money)
lost money
lots of money
money
not losing too much money

Natural Characteristics
animals
arid
bare mountains
barren (land)
barren and sandy

barren country
barren desert
barren (no trees)
barren state
beauty/beautiful(country/scenery/state)/
beauty (all its own)
beautiful lakes
beautiful mountains
big lake
bronco
brown
cactus
clean air
climate
cold (weather)
cold and hot
cold country
Colorado River
Death Valley
(the) desert(s)
desert area
desert and dry
deserty
desolate/desolation
desolate, deserty
desolate wasteland
drought
(its) dry (climate)/(land)
dust
earthquake(s)
empty (emptiness)
flat (land)
flat plain
flood
forestry
forest(s)
good climate (weather)
grass
great basin
Great Basin National Park
green trees
heat
high
high desert
horse(s)
hot (climate) (weather) (in summer)
(summers)
huge wide open spaces
isolated
jackrabbits
lack of trees
lack of water
Lake Havasu
Lake Mead
Lake Powell
Lake Tahoe
(their/the) lake(s)
lots of desert landscapes
lovely area (mts)
Mono Lake
(the) mountains (range) (mts)/
mountainous (area)
Mt. Charleston
mustang
nice weather
no water
open country
open space(s)
open, lots of land
open spaces in between towns
plains
Pony Express Trail
pretty
ranges
red dirt
(the) river
rock formations
(a lot) rocks
sagebrush
sagebrush and sand
sand
scenery
scenic
seasonal
Sierra Madres
(the) Sierra(s) Mountains
Sierra Nevada
(high) sierra(s)
sky
snow

snow country
snow mountains
spacious
sparse
spread apart
stream
sun
sunlight
sunshine
the great hills
the terrain
trees
Trukie River
Valley of Fire (State Park)
vast expanse of nothing
vastness
volcano
Walker Lake
warm
warm summers
water
ways the mountains are jutting up the level land
weather
(wide) open(ing) (space(s))
wild horses
wilderness
wind(y)
winter

Nevada Cities
Carson (City)
city
Elko
L.V.
Las Vegas
Las Vegas and gambling
Laughlin
Reno (city of)
Silver City
some of the cities
Sun City
Tahoe
the city
Vegas
Virginia City
Winnamucka

Self/Friends/Family/Individual Names
a friend
(a) friend that (who) lives there
Alan Pritchart
been there once
best friend
brother
Candy (a friend)
ex-husband
family
family and friends
first home
friend Jane
friend who lives there
friends
having lunch at the hotels
her sister
home state
husband
Mark
mother
me
my brother
my cousin lives there
my father
my friend
my grandmother
my mother
my nephew
my sister in law
never been there
seeing family
Senator Brian
shipmate
sister(s)
son
son's wedding
the face of someone I know
the graveyard I went to in Silver City
time served in the military
uncle

Vicki
your in-laws

Vacation/Recreation
a fun place to visit
(a) get away
basketball
bowling
camping
climbing
fishing
football
golf
good hunting and fishing
good skiing
hiking
holiday
hunting
nice place to go on a vacation
pleasure trip
recreation
resort(s)
sights
site seeing
ski resorts
(snow) skiing
skiing Tahoe snow
sports
square dancing
travel(ing)
trips
vacation (time)
vacations or resorts
visit
water skiing
water sports