of the meaning of the reported fact. An alternate interpretation says the fact demonstrates that the IQ test is culture specific and can't be used to compare different populations.

Neither do the findings about race, gender, and income we can find in the U.S. Census speak for themselves. Someone speaks for them, interpreting their meaning. People argue more about interpretations than they do about facts. We can agree on the numbers describing the relations between gender, race, and income, but the same census data might be interpreted to show the existence of discrimination, the lessening of discrimination, the joint working of two disadvantaged conditions (being female, being black) on income, or many other possible stories.

A report about society, then, is an artifact consisting of statements of fact, based on evidence acceptable to some audience, and interpretations of those facts similarly acceptable to some audience.

2

Representations of Society as Organizational Products

People who gather facts about society and interpret them don't start from scratch every time they report. They use forms, methods, and ideas that some social group, large or small, already has available as a way of doing that job.

Reports on society (remember that *representation* and *report* refer to the same thing) make most sense when you see them in organizational context, as activities, as ways some people tell what they think they know to other people who want to know it, as organized activities shaped by the joint efforts of everyone involved. It's a confusing error to focus on nouns rather than verbs, on the objects rather than the activities, as though we were investigating tables or charts or ethnographies or movies. It makes more sense to see those artifacts as the frozen remains of collective action, brought to life whenever someone uses them—as people's making and reading charts or prose, making and seeing films. We should understand the expression *a film* as shorthand for the activity of "making a film" "or "seeing a film."

That's a distinction with a difference. Concentrating on the object misdirects our attention to the formal and technical capabilities of a medium: how many bits of information a television monitor with a particular degree of resolution can convey, or whether a purely visual medium can communicate such logical notions as causality. Concentrating on organized activity, on the other hand, shows that what a medium can do is always a function of the way organizational constraints affect its use. What photographs can convey depends in part on the budget of the photographic project, which limits how many

photographs can be used and how they can be displayed, how much money will be spent making them (put another way, how much photographers' time will be paid for), and the amount and kind of attention viewers will put into interpreting them.

Seeing reports about society organizationally means bringing all aspects of the organizations in which they are made into the analysis: bureaucratic structures, budgets, professional codes, and audience characteristics and abilities all impinge on telling about society. Workers decide how to go about making representations by seeing what is possible, logical, feasible, and desirable, given the conditions under which they are making them and the people they are making them for.

It makes sense to speak, in rough analogy to the idea of an art world (Becker 1982), of worlds of makers and users of representations: the worlds of documentary film or statistical graphics, of mathematical modeling or anthropological monographs. These worlds consist of all the people and artifacts whose activities of making and using center on a particular kind of representation: all the cartographers, scientists, data gatherers, printers, designers, corporations, geography departments, pilots, ship captains, drivers, and pedestrians whose cooperation makes up a world of maps, for instance.

These worlds differ in the relative knowledge and power of makers and users. In highly professionalized worlds, professionals mostly make artifacts for use by other professionals: scientific researchers make their reports and inscriptions (Latour and Woolgar 1979; Latour 1983, 1986, 1987) for colleagues who know as much (or almost as much) about the work as they do. In the extreme case, makers and users are the same people—a situation almost realized in such esoteric worlds as mathematical modeling.

Members of more differentiated worlds usually share some basic knowledge, despite the differences in their actual work. That's why sociology students who will never do statistical work learn the latest versions of multivariate statistical analysis. Other professionals, however, do much of their work for lay users: cartographers make maps for motorists who know just enough about cartography to get to the next town, and filmmakers make movies for people who never heard of a jump cut. (Of course, these professionals usually worry about what their professional peers will think of their work as well.) Laypeople tell stories, make maps, and write down figures for each other too. What gets made, communicated, and understood varies among these typical kinds of settings.

This makes it useless to talk of media or forms in the abstract, although I already have and will continue to. Abstract terms like *film* or *statistical table* not only need active verbs like *making* or *seeing* to have meaning but are also shorthand for more contextually specific formulations like *tables made for the census* or *big-budget feature films made in Hollywood*. The organizational constraints of the census and Hollywood are best thought of as integral parts of the artifacts made in those places. So my focus differs from a more common and conventional one, which treats the artifact as the main thing and the activities through which it is produced and consumed as secondary.

The form and content of representations vary because social organizations vary. Social organization shapes not only what gets made but also what users want the representation to do, what job they think needs doing (like finding your way to your friend's house or knowing what the latest findings in your field are), and what standards they will use to judge it. Because the jobs that users call on representations to do depend so heavily on organizational definitions, I'm not concerned with what many people think is a major methodological problem (indeed *the* problem): given a particular representational job to be done, what is the best way to do it? If that were the question, you could set up a task—to communicate an array of numbers, for example—and then see which way of organizing a table or chart would communicate that information most honestly, adequately, and efficiently (as people compare computers by seeing how fast they can find prime numbers). I've avoided judgments about the adequacy of any mode of representation, not taking any of them as the yardstick against which all other methods should be judged. Nor have I adopted the slightly more relativistic position that, while the jobs to be done may differ, there is a best way of doing each kind of job. That isn't relativistic asceticism on my part either. It seems more useful, more likely to lead to new understanding of representations, to think of every way of representing social reality as *perfect*—for something. The question is, *what* some-

thing is it good for? The answer to that is organizational: since the organization of that area of social life has made one (or more) of the jobs the representation might do the one(s) that must be done, users and makers alike will judge every method according to its efficiency and reliability in producing the most satisfactory result, or maybe just a less unsatisfactory result than, other available possibilities.

Despite superficial differences between genres and media, the same fundamental problems occur in all of them. The influence of budgets, the role of professionalization, what knowledge audiences must have for a representation to be effective, what is ethically permissible in making a representation—all these are common to every form of representation making. How these problems are dealt with varies depending on organizational resources and purposes.

Such problems are debated in every field that makes representations. Novelists worry about the same ethical dilemmas sociologists and anthropologists do, and filmmakers share social scientists' concern about budgets. The literature of those debates, and informal observations and interviews in those fields, has given me a lot of data. I've also found work in the sociology of science, concerned with problems of representation and rhetoric, very helpful (see, for instance, Gusfield 1976; 1981, especially 83–108; Latour and Bastide 1986; Bazerman 1988; Clifford 1988; Geertz 1983).

Transformations

Scientists, as Latour describes them, continually transform their materials. They begin with an observation in the laboratory or field and turn that into writing in a notebook, the notes into a table, the table into a chart, the chart into a conclusion, the conclusion into the title of an article. At each step, the observation becomes more abstract, more divorced from the concreteness of its original setting. Latour shows, in a description of French soil scientists working in Brazil (Latour 1995), how these transformations occur: how a clod of dirt changes into a piece of scientific evidence when the scientist puts it in a box and makes it part of an array of similar, comparable clods from other parts of the parcel of land under study. This, Latour says, is

what the work of science is: transforming objects so that they can be used to "show" or "demonstrate" what the scientist wants to persuade others of.

Scientists make these transformations in standardized ways, using standard instruments to do standard operations on standardized materials and report the results in standardized ways, designed to give users what they need to judge the ideas presented without burdening them with other material they don't need. What's needed is established by convention. You need everything that answers possible questions and nothing to do with what no one will question. We can look for similar operations in the making of every kind of representation of social life. What raw materials do the makers start with? What transformations do they put the materials through?

Latour says that the fate of a scientific argument or finding is always in the hands of later users; they decide whether it will be rejected or accepted and incorporated into the body of fact everyone in that science accepts (1987, 29). Which users make these important decisions is always a relevant question.

In some worlds the representation soon leaves the "inside" world of the makers, experts, and adepts and enters lay worlds, in which what users make of the object may vary considerably from what the makers intended. Makers try to control what users make of their representation, building constraints into it that limit the uses and interpretations viewers can make. But authors often have the bizarre experience of hearing readers explain that their work means something that they have gone to a lot of trouble to prevent it from meaning.

Here's a checklist of interesting questions to be asked about the transformations that materials undergo in the hands of makers and users in any representational world.

- What route does the object follow once it leaves the original makers?
- What do the people into whose hands it falls at each stage make of it?
- What do they need or want it for?
- What equipment do they have for interpreting it?

- What elements, built into the object, constrain viewing and interpretation?
- How do makers head off alternate interpretations?
- How do they prevent users from making this or that of it?
- Latour says a scientific fact is a statement that has withstood tests that tried to deny its existence (1987, 74–79, 87–90). Who applies what tests to representations of society?
- In what typical arenas of testing are representations presented (journals, theaters, etc.), and where do people who have an interest in seeing if they are true do the testing?

Making Representations

Any representation of social reality—a documentary film, a demographic study, a realistic novel—is necessarily partial, less than what you would experience and have available to interpret if you were in the actual setting it represents. That's, after all, why people make representations: to report only what users need in order to do whatever they want to do. An efficient representation tells you everything you need to know for your purposes, without wasting your time with what you don't need. Because everyone expects these artifacts to be trimmed down that way, makers and users of representations must perform several operations on the reality they experience to get to the final understanding they want to communicate. Social organization affects the making and use of representations by affecting how makers go through these operations.

SELECTION : Every medium, in any of its conventional uses, leaves out much, in fact most, of reality. Even media that seem more comprehensive than the obviously abstract words and numbers social scientists usually use leave practically everything out. Film (still or moving) and video leave out the third dimension, smells, and tactile sensations and are inevitably a small sample of the entire span of time during which the represented events took place (although Andy Warhol's film *Empire State* lasted the full eight hours of the event it portrayed—someone sleeping). Written representations usually, but not necessarily, leave out all the visual elements of experience (it still

surprises readers when a novelist like W. G. Seybald [2001] incorporates photographs into his story). Every medium leaves out whatever happens after we stop our representational activities. It describes whatever-it-is up to now, and then it stops. Some sociologists point out that numerical representations leave out the human element, or emotions, or symbolically negotiated meaning—these scholars use the criterion of completeness to criticize work they don't like. But no one, neither users nor makers, ever regards incompleteness in itself as a crime. Instead, they recognize it as the way you do that sort of thing. Road maps, tremendously abstract and incomplete renderings of the geographic reality they represent, satisfy even the sternest critic of incomplete representations. They contain just what drivers need to get from one place to another (even if they do sometimes mislead pedestrians).

Since any representation always and necessarily leaves out elements of reality, the interesting and researchable questions are these: Which of the possible elements are included? Who finds that selection reasonable and acceptable? Who complains about it? What criteria do people apply when they make those judgments? Some criteria, to suggest the possibilities, are genre related ("if it doesn't include this [or does include that] it isn't really a novel [or photograph or ethnography or table or . . .]") or professional ("that's how *real* statisticians [or filmmakers or historians or . . .] always do it").

TRANSLATION : Think of translation as a function that maps one set of elements (the parts of reality that makers want to represent) onto another set of elements (the conventional ones available in the medium as it is currently used). Anthropologists turn their on-the-spot observations into field notes, from which they construct standardized ethnographic descriptions; survey researchers turn field interviews into numbers, out of which they create tables and charts; historians combine their index cards into narratives, character sketches, and analyses; filmmakers edit and splice raw footage into shots, scenes, and movies. Users of representations never deal with reality itself but rather with reality translated into the materials and conventional language of a particular craft.

Standard ways of making representations give makers a standard

set of elements to use in constructing their artifacts, including materials and their capabilities: film with a particular light sensitivity, so many grains of light-sensitive material per square inch and thus a particular degree of resolution, which makes possible the representation of elements of a certain size but not smaller; conceptual elements, like the idea of plot or character in fiction; and conventional units of meaning, like the wipes, fades, and other transitional cinematic devices that indicate the passage of time.

Makers expect standard elements to have standard effects, so that consumers of representations made with those effects will respond in standard ways. And users expect the same thing in reverse: that makers will use standard elements they are familiar with and know how to respond to. Representations made when that condition obtains—when everything works exactly as it understood to by all the parties involved—are "perfect." Everything works just as everyone expects it will. But that condition never exists completely. Materials don't behave as advertised. Audiences don't understand what the maker thought they would. The available language can't, after all, express the maker's idea. What happens when these inevitably inadequate representations are presented to an audience that does not know what it should know? Often enough, most people, makers and users alike—and especially those whose opinion counts, because they are powerful and important—respond near enough to what the original makers intended that the result is "acceptable" to everyone involved.

The criteria defining acceptability vary. Take the issue of the "transparency" of the prose, tables, and pictures people use to report scientific results. Both the makers and users of scientific representations would like the verbal, numerical, and visual languages they use in their articles and reports to be neutral standard elements that add nothing to what is being reported. Like a clear glass window, they would allow results to be seen through them without being affected by being seen through anything. Kuhn, as I noted earlier, argued persuasively that no such "transparent" descriptive scientific language is possible, that all descriptions are "theory laden" (1970). More to the point, it is clear that even the width of bars in a bar chart and the size and style of type in a table, let alone the nouns and adjectives in an

ethnography or historical narrative, affect our interpretation of what is reported. Wide bars in a chart make us feel that the quantities reported are larger than we might think if the bars were narrow. When we conventionally call users of illegal drugs "abusers" or "addicts," we communicate a lot more than a scientifically defined "fact." But all these methods of portraying social reality have been acceptable to scientific and lay audiences alike, whose members taught themselves to accept or ignore or discount for the unwanted effects of the communicative elements they accepted as standard.

Standard elements have the features already found in investigations of art worlds. They make efficient communication of ideas and facts possible by creating a shorthand known to everyone who needs the material. But they simultaneously constrain what a maker can do, because every set of translations makes saying some things easier while making saying other things more difficult. To take a contemporary example, social scientists conventionally represent race and gender discrimination in job promotions in a multiple-regression equation, a standard statistical technique whose results show what proportion of the variation in promotions among subgroups in a population is due to the independent effects of such separate variables as race, gender, education, and seniority. But as Charles Ragin, Susan Meyer, and Kriss Drass showed (1984), that way of representing discrimination does not answer the questions sociologists interested in general social processes ask or those that courts trying to decide whether laws against racial discrimination have been broken ask. The results of a multiple regression cannot tell you how the chances for promotion of a young white male differ from those of an older black female; they can tell you only the weight of a variable like age or gender in an equation, not at all the same thing. Ragin, Meyer, and Drass advocate making another statistical element standard: the Boolean algorithm (details can be found in the article just cited or in Becker 1998, 183–94), which represents discrimination as the differences in chances of promotion for a person with a particular combination of those attributes as compared to mean rates for a whole population. This *is* what social scientists and courts want to know. (Related and complementary arguments are made in Lieberson 1985.)

Some constraints on what a representation can tell us arise from the way representational activity is organized. Organizationally constrained budgets—time and attention as well as money—limit the potential of media and formats. Books and movies are as long as makers can afford to make them and as users will pay attention to. If makers had more money and users would sit still for it, every ethnography might contain every field note the anthropologist made and every step in the analytic process (which Clyde Kluckhohn [1945] thought the only proper way to publish life history materials). These elements can still be provided, but not at a price in time or money anyone will pay.

ARRANGEMENT : The elements of the situation, the facts a representation describes, having been chosen and translated, and the interpretations it makes of them must be arranged in some order so that users can grasp what is being said. The order given to elements is both *arbitrary*—you can always see another way to have done it—and *determined* by standard ways of doing things, just as the elements are. Arrangement makes narratives out of random elements. It communicates such notions as causality, so that viewers see the order of photographs on a gallery wall or in a book as meaningful, interpreting earlier pictures in the arrangement as the "conditions" that produced the "consequences" depicted in the later ones. When I tell a story (personal, historical, or sociological), listeners will hear the earlier elements as "explanations" of those that come later; a character's actions in one episode become evidence for a personality that reveals itself fully in later ones. Students of statistical tables and graphics are particularly sensitive to the effects of arrangement on interpretations.

No maker of representations of society can avoid this issue, since, as many studies have shown, users of representations see order and logic even in random arrangements of elements. People find logic in the arrangement of photographs whether the photographer intended it or not, and they respond to typefaces as "frivolous," "serious," or "scientific," independent of a text's content. Social scientists and methodologists have yet to treat this as a serious problem; what to do about it is one of the things that get passed on as professional lore. (Edward Tufte [1983, 1990], however, has devoted a lot of attention to the way graphical and typographical elements and arrangements affect the interpretation of statistical displays.)

INTERPRETATION : Representations exist fully only when someone is using them, reading or viewing or listening and thus completing the communication by interpreting the results and constructing for themselves a reality out of what the maker showed them. The road map exists when I use it to get to the next town, Dickens's novels when I read them and imagine Victorian England, a statistical table when I inspect it and evaluate the propositions it suggests. These things reach their full potential in use.

What users know how to do interpretively thus becomes a major constraint on what a representation can accomplish. Users must know and be capable of using the conventional elements and formats of the medium and genre. Makers can't take that knowledge and ability for granted. Historical studies (e.g., Cohen 1982) have shown that it was not until well into the nineteenth century that most inhabitants of the United States were "numerate," capable of understanding and using standard arithmetic operations. Anthropological studies show that what such literary critics as Roland Barthes and Susan Sontag insist is the universal appeal to our sense of reality embodied in still photographs and film is instead a learned skill. Professionalized fields expect users to become knowledgeable consumers of representations through training in graduate or professional school, although what is expected to be known varies from time to time. Sociology graduate departments expect their students to acquire a certain amount of statistical sophistication (for which read, in part, "ability to read formulas and tables"), but few expect their students to know much about mathematical models.

Users interpret representations by finding the answers to two kinds of questions in them. On the one hand, they want to know "the facts": what happened at the battle of Bull Run, where the slum communities of Los Angeles are located, what the median income of white-collar suburbs is, what the correlation is between race, income, and education in the United States in 1980, what it is "really like" to be an astronaut. The answers to questions like these, at every level of

specificity, help people orient their actions. On the other hand, users want answers to moral questions: not just what the correlation between race, education, and income is but why the correlation is what it is, whose fault it is, and what ought to be done about it. They want to know whether the Civil War, and thus the battle of Bull Run, was "necessary" or could have been prevented, whether astronaut John Glenn was the kind of man who deserved to be president; and so on. On the most superficial inspection, almost any factual question about society displays a strong moral dimension, which accounts for the ferocious battles that often occur over what seem to be minor matters of technical interpretation. Arthur Jensen's statistical mistakes in the analysis of intelligence test results upset people who were not statisticians.

Users and Makers

We all act as both users and makers of representations, telling stories and listening to them, making causal analyses and reading them. As in any other service relationship, the interests of makers and users usually differ considerably, particularly when, as so often, the makers are professionals who make those representations full time for pay and the users are amateurs who use them occasionally, in a habitual and uninspected way (see the classic analysis of routine and emergency in Hughes 1984, 316–25). Representational worlds differ in which set of interests dominates.

In worlds dominated by makers, representations take the form of an *argument*, a presentation of just that material that makes the points the maker wants to get across and no more (current work on the rhetoric of scientific writing, mentioned earlier, makes this point). In a professionalized world of representation making, makers usually control the circumstances of the making, for all the reasons Hughes pointed out: what is out of the ordinary for most users of their results is what they do all day long. Even if others have substantial power, professionals know so much more about how to manipulate the process that they retain great control. Powerful users who support representation making over a long period of time typically learn enough to

overcome that disability, but casual users seldom do. So professionally made representations embody the choices and interests of makers and, indirectly, of the people who can afford to hire them, and thus may well not show the hills a pedestrian would like to know about.

The members of user-dominated worlds, on the other hand, use representations as *files*, archives to be ransacked for answers to whatever questions any competent user might have in mind and for information to be put to whatever use the users would like. Think of the difference between the street map you buy at the store and the detailed, annotated map I draw to show *you* how to get to *my* house, a map that takes into account the time you have available for the trip, your possible interest in seeing a few interesting sights, and your aversion to heavy traffic. Lay representations are typically more localized and more responsive to user wishes than are those made by professionals. Similarly, amateur snapshots satisfy their makers' need for documents to show to a circle of intimates who know everyone in the pictures, while the photographs made by journalists, artists, and social scientists, oriented to the standards of professional communities, aim to please their professional colleagues and other highly knowledgeable viewers (Bourdieu 1990).

Some artifacts seem to be *essentially* files. A map, after all, seems to be a simple repository of geographic and other facts that users can consult for their own purposes. In fact, maps can be made in a great variety of ways, none of them a simple translation of reality, so that they are in some important sense arguments designed to persuade their users of something, perhaps just by taking that something for granted. Thus, some formerly voiceless peoples claim that the maps that dominate world thinking are "Eurocentric," the technical choices that shaped them leading to results that arbitrarily make Europe and North America look like the center of the world. Those maps might be said to embody the argument that Europe and North America are "more important" than those other places off on the edge of the map.

Yet arguments and files are not kinds of objects but rather kinds of uses, ways of doing something rather than things. We see this when we notice that users are not powerless and, in fact, often remake the products they are presented with to suit their own desires and needs.

Scholars in every field routinely ignore the arguments made by the scholarly papers they cite and instead merely rifle the literature for results that can be put to *their* purposes. In short, they use the literature not as the body of arguments its makers intended but rather as a file of results with which to answer questions the original authors never thought of. This kind of rebellious use of cultural products has been studied in other areas: the sociology of technology (Oudshoorn and Pinch 2003), the inventive uses of digital games and other internet phenomena (Karaganis forthcoming), and cultural studies. Constance Penley (1997) described a sizable group of straight, working-class women who had commandeered the characters of *Star Trek* for their own creative work: homosexual erotica involving the major characters (Captain Kirk and Mr. Spock were a favorite couple) and distributed via the Internet. In all these cases, users thoroughly remade what makers had intended to be a one-way communication into raw material for their own constructions made for their own purposes and uses. Users can always take things into their own hands this way.

So?

What I have said implies a relativistic view of knowledge, at least to this degree: The way we pose questions and the way we frame answers come in a great variety of flavors—the various examples I've cited attest to that—and there's no guaranteed best way of choosing between them, since they are all good for conveying something. The same reality can be described in many ways, since the descriptions can be answers to any of a multitude of questions. We can agree in principle that our procedures ought to let us get the same answer to the same question, but in fact we ask the same question only when the circumstances of social interaction and organization have produced consensus on what constitutes a "good question." That doesn't happen very often, only when the conditions of people's lives lead them to see certain problems as common, as requiring certain kinds of representations of social reality on a routine basis, and thus lead to the development of professions and crafts that make those representations for routine use.

So some questions get asked and answered while others, every bit as good, interesting, worthwhile, and even scientifically important, are ignored, at least until society changes enough that the people who need those answers come to command the resources that will let them get an answer. Until then, pedestrians are going to be surprised by San Francisco's hills.